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Honorary Editor of IFAC

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CONTENTS

IFAC NEWS

MEETING OF THE EXECUTIVE COUNCIL

Following an invitation of the Norsk Forening for Automatisering, the Executive Council of IFAC will meet in Bergen, Norway, from March 20 to March 22, 1961. The Chairmen and Vice-Chairmen of the IFAC Technical Committee are invited to attend the meeting.

ANNUAL SUBSCRIPTIONS

In addition to the National Member Organizations as listed on page 3 of Bulletin No 8, the following Members have decided to double their annual subscriptions. The new subscriptions as from 1961 are:

Finland $ 250

Japan $ 500

Poland $ 250

TECHNICAL COMMITTEES

New Vice-Chairmen

Mr. J. L o e b (France), being vice-chairman of the Advisory Committee as well as vice-chairman of the Technical Committee on Theory, has asked to resign from the latter office. Consequently, the Executive Council has appointed prof. P. N a s l i n (France) vice-chairman of the Theory Committee.

Moreover, prof. Zygmunt S z p a r k o w s k i (Poland) has been appointed vice-chairman of the Technical Committee on Education.

New Members

In addition to the membership listed in IFAC Information Bulletin No 8 pages 20 to 30, the following members have been proposed and approved:

IFAC Committee on Theory:

Dr. H. G ó r e c k i (Poland)
Dr. J. B r o m i r s k i (Poland)
Prof. J.M. H a m (Canada)
Prof. G.S. G l i n s k i (Canada)

IFAC Committee on Components:

N. H e r z b e r g (Israel)
Prof. T. Ż a r n e c k i (Poland)
Prof. Dr. H. L e ś k i e w i c z (Poland)
Ing. J.Š. H a š k o v e c (CSR)

IFAC Committee on Application:

Prof. Dr. J. K o z u c h o w s k i
Dipl.-Eng. K. T u s z y ń s k i (Poland)
Dipl.-Eng. I. P a n k o w (Poland)

IFAC Committee on Terminology:

Ing. J. K ř i ž e k (CSR)

IFAC Committee on Bibliography:

Prof. Dr. W. P e ł c z e w s k i (Poland)
Prof. T.J. H i g g i n s (USA)

IFAC Committee on Education:

Prof. Dr.-Ing. W. O p p e l t (Germany)
Prof. T. P r a s a d (India)
L. de B r u y n e (Belgium)
Prof. Z. S z p a r k o w s k i (Poland)

Activities of the IFAC Technical Committee on Theory

We have already published in Bulletin No 8 (pages 20 to 22) the decisions and programme of work of the IFAC Technical Committee on Theory as they were reached at the meeting in Moscow in June 1960.

Since then, we have been informed by Academician B.N. P e t r o v, Chairman of this Committee, of the following further progress achieved in this field:

1°- All members of the IFAC Technical Committee on Theory have received the decisions reached,

2°- The Chairman of the Committee has asked the Chairmen of all National Member Organizations to nominate

representatives in the sub-committees created in Moscow. Information is received presently as to nominees for these sub-committees,

3°- The Chairman of the Committee has asked all the members of the latter to fulfill in their countries the activities quoted in the programme of work adopted by the Committee,

4°- The programme and the main decisions of a survey covering the development of modern Automatic Control theory have been set up,

5°- Preliminary information suitable for serving as a basis for this survey has been received from the following Committee members: Dr. P u n (Switzerland), Prof. C h a r l e s (Belgium), Dr. B e n e š (Czechoslovakia), Prof. S a w a r a g i (Japan), Prof. B a l c h e n (Norway), Dr. K r o c h m a n n (Germany), Prof. T r u x a l (USA).

In the beginning of 1961, complementary information for this purpose is expected.

6°- Preparatory work is being dealt with for a symposium on algebraic theory of relay systems and finite automata to be held in 1962.

NEWS FROM NATIONAL MEMBERS

Switzerland

The General Assembly of ASSPA (Association Suisse pour l'Automatique - Swiss Association for Automatic Control) held in Zürich on September 21 1960 has elected as new members of the Executive Council:

Dr. R. Z w i c k y, Baden,
Dipl.-Ing. B. J u n k e r, Basel,
Dipl.-Ing. A.P. B o b i l l i e r, Geneva,
Dipl.-Ing. J.J. B r o c c a r d, Zürich.

Turkey

We give as follows some particulars on the aims and internal organization of the Turkish Organization for Automatic Control as set up by its Constitution approved on September 8 1960:

- Name and location -

The organization is called the "Turkish Organization for Automatic Control" (Türkiye Otomatik Kontrol Kurumu, abbreviated T.O.K.). The Organization is attached to the Rectorate of the Technical University of Istanbul.

- Aims -

The task of the Organization is that of promoting studies pertaining to the theory and practice of Automatic Control systems, to provide the interchange and circulation of information among those interested and to take necessary steps to promote Automatic Control in Turkey.

Also, to be a member of IFAC founded for the promotion of the science of Automatic Control among nations.

- Membership -

Academic staff of related chairs of the Technical University of Istanbul may become "member of center" of the organization if they desire.

Industrial organizations engaged in Automatic Control activities and applications may become "member of correspondance" of the Organization.

Engineers and specialists engaged in Automatic Control activities and applications may become "member of correspondance" if their application is presented and supported by two members of center and approved by the Executive Council.

The Advisory Council may elect "honorary member" those who have made outstanding contributions to the field of Automatic Control directly or indirectly.

- Internal organization -

The Advisory Council shall consist of members of center and two members sent from each of the member institutions.

The Executive Council shall consist of seven members elected for two years among academic staff by their respective falculties.

Technical Committees are established by the Executive Council.

The number of participants will be fixed by the Executive Council. The work of the Committees shall be evaluated by the Executive Council and a fee will be paid accordingly.

United Kingdom

At a luncheon held on December 7th 1960, at the Waldorf Hotel, London, to mark the recent reconstitution of the BRITISH CONFERENCE ON AUTOMATION AND COMPUTATION (BCAC) given by its Chairman, Sir Walter P u c k e y, there were present the Secretaries or other Chief Executives of the thirty-two organizations represented in the Conference.

Sir Walter Puckey recalled that formerly the BCAC operated as a federation of three separate groups concerned respectively with the Engineering Application of Automation, Automatic Control and Computation, and Sociological and Economic Aspects. He stressed that the recent merging of these groups in a single BCAC Council in no way represented any contraction of interest; all three aspects continued to carry equal weight, and balanced representation on the Executive Committee of the BCAC.

Sir Walter Puckey recalled that the objects of the BCAC were as follows:

- Objects of the BCAC -

a) To stimulate interest in, to spread knowledge of, and to foster the development and applications of automatic control and computations,

b) To afford a common meeting ground for the adhering organizations whereby such of their activities as fall within the purview of the Conference can, if they so desire, be co-ordinated and extended,

c) To encourage and, if desired, to co-ordinate, the presentation at International Conferences of British papers whose subjects fall within the purview of the Conference,

d) To maintain, as may be desirable, liaison with other countries which support such International Conferences.

The BCAC had decided to set up three Panels to activate the following aspects of its work:

- EDUCATION AND TRAINING - Chairman, Professor G.D.S. M a c l e l l a n, (University of Glasgow).
- RESEARCH AND DEVELOPMENT - Chairman, Prof. J.F. C o a l e s, (University of Cambridge).

- PUBLIC RELATIONS - Chairman, Mr. W.C.F. H e s s e n b e r g, (Deputy-Director, British Iron & Steel Research Association).

Arrangements were well advanced for the holding of a Conference at Harrogate from 27 to 30 June, 1961, with the general title "A u t o m a t i o n - M e n a n d M o n e y". Its organization was made the responsibility of 8 of the BCAC's member organizations particularly interested in the social and economic aspects of automation.

Plans were also in hand for the delivery, in the autumn of 1961 of the first BCAC Annual Lecture, which would be in the form of an authoritative review, by an expert in the field, of the present position and probable future development, of automation procedures in British industry and commerce.

After a brief discussion these proposals were warmly received and fully endorsed by all present.

The 32 organizations, members of BCAC, mentioned above are the following:

The Association of Certified and Corporate Accountants
The British computer Society Ltd.
The British Institute of Management
The British Productivity Council
The Chartered Institute of Secretaries
The Institute of Cost and Works Accountants
The Institute of Fuel
The Institute of Marine Engineers
The Institute of Materials Handling
The Institute of Metals
The Institute of Personnel Management
The Institute of Petroleum
The Institute of Physics and the Physical Society
The Institute of Welding
The Institution of Chemical Engineers
The Institution of Civil Engineers
The Institution of Electrical Engineers
The Institution of Engineering Inspection
The Institution of Gas Engineers
The Institution of Mechanical Engineers
The Institution of Mining Engineers
The Institution of Municipal Engineers
The Institution of Plant Engineers
The Institution of Production Engineers
The Institution of Structural Engineers
The Institution of Water Engineers
The Iron and Steel Institute
The Royal Aeronautical Society
The Society of Instrument Technology

The Tavistock Institute of Human Relations
The Trades Union Congress

Observer:
The Department of Scientific and Industrial Research.

Yugoslavia

On November 19th, 1960 following the National Conference, the Annual Meeting of the Committee for ETAN was held at which the programme of activities for 1961 was accepted. The meeting also elected a new secretariat and Executive Board:

Chairman: Dr. Ing. Rajko Tomovic
Vice-Chairmen: Ing. Dusan Strujic
Ing. Roboz Oskar
Dr. Ing. Herman Vidmar
General Secretary: Ing. Slobodan Ristic

Secretary for organizational matter: Ing. Jovan Pavlovic

Secretary for International Relations: Ing.Ljubomir Radanovic

Secretary for Professional activities: Ing. Tibor Varadi

Secretary for Publications: Ing. Slobodan Radoman

The ADRESS of the Yugoslav Committee for ETAN is :

Terazije 23/VII, Belgrade, Yugoslavia.

WORLDWIDE AUTOMATIC CONTROL

International Events

UNESCO SUPPORTS AUTOMATIC CONTROL

The General Assembly of UNESCO held in Paris in November - December 1960 has agreed to a proposal made by the Swiss Government that with regard to the increasing importance of the Theory and Application of Automatic Control for scientific, technical and economic purposes the Director of UNESCO should be entitled to co-operate with the competent scientific organizations in the fields of Bibliography and of Terminology of Automatic Control. A project has been discussed since for:

a) a Bibliography of the publications ot the last 40 years,

b) a periodical publication of all scientific and technical publications appearing in the whole world.

Although IFAC has not received an official information about the wording of this resolution, contact has been established between UNESCO on one hand and the Chairman of the IFAC Bibliography Committee and the Honorary Editor of IFAC on the other hand, aiming at a co-operation of this Committee of IFAC with UNESCO. A definite decision on the scope of work of the IFAC Bibliography and Terminology Committees in this respect will be taken at the meeting of the IFAC Executive Council towards the end of March.

IMEKO 1961

(International Measurement Conference)

We have already mentioned in Bulletin No 8 (pages 67 und 68) the International Measurement Conference, to be held in BUDAPEST, Hungary, on June 26 - July 1, 1961. This conference will have the following PROGRAMME:

1.1 PLENARY SESSIONS: Papers of general character in the field of measurement and instrument technology; papers of special importance concerning fundamental questions; integrating papers.

1.2 SECTION-MEETINGS:

21. S e c t i o n o n g e n e r a l s u b j e c t s

211. Theory and practice of instrument design.

212. Technology and organization in instrument manufacture.
213. Electronic measuring instruments for general application.
214. Border-questions related to measurement and automation (To be prepared jointly with the Technical Committee on "Components" of IFAC. 15 papers of authors from 9 countries have been accepted for section 214).

22. S p e c i a l i z e d S e c t i o n s

221. Instruments and methods for measuring geometrical and mechanical quantities, including geodetic measurements.
222. Instruments and methods for measuring time and frequency.
223. Instruments and methods for measuring thermal quantities.
224. Instruments and methods for physicochemical measurements (such as photometry, spectroscopy, colorimetry, electrochemical measurements, gas-analysis, etc.)
225. Instruments and methods for measuring electrical and magnetic quantities.
226. Instruments and methods for measuring radioactive radiation.

L e t t e r s in all matters concerning the Conference should be adressed to:

IMEKO Secretariat, Budapest 5, POB. 3.

Cables: IMEKO Budapest; Telephone: Budapest, 122-457.

H o t e l a c c o m o d a t i o n: Ft. 50,- to 120,- per day and person. Participants of the Conference should apply to the Secretariat for hotel accomodation as soon as they decide to participate.

Simultaneously with IMEKO 1961, an I n t e r n a t i o n a l M e a s u r e m e n t a n d I n s t r u m e n t s S h o w (I M I S 1961) will be organized. It is proposed to present here the latest and most important scientific achievements in the field of scientific and industrial measurement research, representing new methods and new solutions of instrumental technology.

A d d r e s s of the International Measurement and Instruments Show:

IMIS 1961, Budapest Fair Bureau
Budapest XIV, Városliget

Cables: IMIS Budapest.

THIRD CONGRESS OF ASICA 1961

(Association Internationale de Calcul Analogue - International Association of Analog Computation)

We have already mentioned in our Bulletin No 7 (page 6) this Congress to be held from September 4 to September 9, 1961 in Belgrade, Yugoslavia.

We are now in a position to give the following complementary information related to this event:

This International Conference on Analog Computation which is to last one week will be divided into four SECTIONS:

1) - Theoretical considerations,
2) - Analog computing equipment,
3) - Application of analog methods and devices,
4) - Connection between analog and digital techniques.

The FIRST SECTION will deal with general and specific theoretical problems concerning the principles of analog computation, the characteristics of computing equipment and the solution of various problems by analog methods.

The SECOND SECTION is devoted to practical achievements and experiences in the design and realisation of various analog computers and computing elements.

The THIRD SECTION will deal with the application of analog computing devices for simulation, computation and analysis in industry, science and engineering.

The FOURTH SECTION will consider the relation between analog and digital techniques, their common aspects and interferences.

Apart from the scientific programme, a special ENTERTAINMENT programme for the participants of the Conference and their families (visits, excursions, banquets) will also be arranged.

An EXHIBITION of analog computing equipment and components will be organized during the Conference in conjunction with the International Fair of Technical Achievements which is held every Autumn in Belgrade.

Abstracts of PAPERS not exceeding 500 words and written in English, French or Russian (preferably in all three languages) should reach the Organising Committee before June 1, 1961. A special reading Committee appointed by the International Association for Analog Computation will judge whether the subjects dealt with concern the work of the Conference.

The working LANGUAGES of the Conference will be English, French and Russian, one of which should be used by the speakers. Arrangements will be made for consecutive translation from Russian into French or English and from French or English into Russian.

The ORGANIZATION of the Conference is entrusted to the Yugoslav National Committee for Electronics, Telecommunications, Automation and Nuclear Engineering which has appointed an organizing Committee of seven members. The Chairman of the Organising Committee is Dr. R. T o m o v i c, the Secretary Mr. L. R a d a n o v i c and Members are Mr. D. K o v a c e v i c. Mr. P. M a d i c, Mr. J. K o t n i k, Mr. P. P e j o v i c and Mr. P. S t a r c e v i c.

All CORRESPONDENCE relating to the Third International Conference on Analog Computation should be addressed to

YUGOSLAV COMMITTEE FOR ETAN

Terazije 23, Belgrade,
Yugoslavia.

Companies wishing to participate in the Exhibition of analog computing equipment are requested to contact the Organizing Committee of the Conference who will be pleased to provide them with full imformation concerning terms and conditions of participation.

SECOND INTERNATIONAL CONGRESS OF IFIPS

The International Federation of Data Processing Societies (IFIPS) will hold its Second Congress in München (Germany) in September 1962. We shall give complementary information on this subject in due course.

INTERNATIONAL SEMINAR OF ANALOG COMPUTATION APPLIED TO THE STUDY OF CHEMICAL PROCESSES

We have published in Bulletin No 8 (page 64) a short notice on this Seminar which has been held since in Brussels (Belgium) from November 21 to November 23, 1960.

This seminar - organized by I.B.R.A. (Institute Belge de Régulation et d'Automatisme, National Member of IFAC for Belgium) under the joint sponsorship of ASICA (International Association of Analog Computation) and of the IFAC Technical Committee on Applications was originally planned to be an event for a somewhat restricted and specialized audience. In fact, some 250 participants from 16 different countries (Belgium, Czechoslovakia, Denmark, France, Germany, Italy, Japan, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom and USA) and 21 papers coming from 9 different countries (Belgium, France, Italy, Netherlands, Norway, Sweden, Switzerland, United Kingdom and USA) transformed

this initially restricted event into a genuine international conference.

After the opening session presided by Mr. G. de H e n a u (Belgium), who was introduced by Professor J. H o f f m a n n (Belgium), Chairman of both ASICA and IBRA, the following 21 papers were read, a short summary of which is given as follows. They were discussed in 4 sessions presided by Mr. J.F. C o a l e s (United Kingdom), Mr. S. S h a p i r o (USA), Mr. C h a l v e t (France) and Mr. R. V i c h n e v e t s k y (Belgium).

The main topics dealt with were the use of hybrid analog-digital techniques and optimization problems. The papers read can be divided into the following 5 groups:

A USE OF HYBRID ANALOG-DIGITAL TECHNIQUES

A_1 Simulation of chemical processes on a combined analog-digital computer by S. S h a p i r o, L. L a p i d u s, G. H a r r i s and C. L e e (USA).

A study of a chemical reactor was fulfilled at Princeton University by using the combination of an IBM 704 20-channel digital computer with an "Electronic Associates" 48-amplifier analog computer. Iteration techniques were used and 20 analog-to-digital converters were involved with only 10 digital-to-analog converters.

A_2 Analog-digital computing methods by J.I. A r c h i b a l d (United Kingdom).

The author described the RADIC (Redifon Analog - Digital Computing System) comprising an analog computer combined with a special digital memory having a magnetic tape which moves by controlled steps, the speeds of recording and of reading being adjusted independently. He quoted applications of this computer to simulation of delays, to computation of autocorrelation and cross-correlation functions, to statistical optimization of a system etc.

A_3 Process control by computer by M. J a m e s (United Kingdom)

The author described the use of a D e H a v i l l a n d "Anatrol" computer which is essentially a 75-unit analog computer working on a digital principle thanks to a switching unit (3 amplifiers and 1 multiplier), which switches from one to another of the 25 rows of the analog amplifier.

A_4 Application of the analog computer in the study of the esterification of terephthalic acid by J.E. R i j n s d o r p (Netherlands), R. V i c h n e v e t s k y (Belgium) and J.G. V a n d e V u s s e (Netherlands)

The authors have studied a tubular reactor producing di-ester and water from terephthalic acid and methanol and recycling non-transformed terephthalic acid, mono-ester and excess of methanol. This study made by the Koninklijke Shell-Laboratorium of Amsterdam in co-operation with Electronic Associates of Brussels used a purely analog equipment with iteration techniques thanks to the presence of switching circuits.

A_5 A simplified method of simulating a simple or a complex heat-exchanger. Possible extension to two-variable problems and to partial derivative equations by Victor B r o i d a (France)

The author described a hybrid analog-digital method based on the classic heat-exchanger theory and involving, for each elementary heat exchanger, 7 analog amplifiers with 3 potentiometers and, on the digital side, 4 synchronized relays. It is visualized to extend gradually the method to simple heat exchangers with time lags, to several heat exchangers in cascade forming a complex heat exchanger, to automatically controlled complex heat exchangers and to other two-variable (space and time) problems.

A_6 Network Differential Analyser Delta 600. Its application to the solution of partial derivative equations by Jean G i r e r d (France)

The author described a Labinal type Delta 600 analog computer based on the finite difference method, in which a resistance matrix (up to the order 1200) approximates an actual surface and the apex potentials are recorded digitally. This hybrid computer allows further digital processing of the data obtained namely for solving elliptic and parabolic partial derivative equations, two- and three-dimensional Laplace, Poisson and Lagrange equations as well as diffusion equations.

B USE OF COMPUTERS FOR OPTIMIZATION OF PLANTA

B_1 The use of computers in the design and operation of chemical plants by J.F. C o a l e s (United Kingdom)

The use of statistical optimizing methods was described, stress being laid on optimization according to relative, rather than to absolute optima. The linear network with a non-interactive matrix simulating a plant was discussed and its use for

optimizing purposes was considered.

B_2 Optimization of a semi-continuous reactor by means of dynamic programming by B. M e s s i k o m m e r (Switzerland)

The author studied the optimization of a process in which a first chemical is periodically added to a second one and which is therefore two-dimensional.

This problem is reduced to a single-dimension optimization problem by using the Lagrange multiplicator method.

B_3 Control System synthesis by analog computer based on the "generalized linear feedback" concept by Jorma R i s s a n e n (Sweden)

The "generalized linear feedback" taking into account not only the outputs of a system but also its internal (and, generally inaccessible) parameters, the latter are adjusted, according to specifications, in a special output generator. The output of the latter is compared with that of the actual system and the mean square error is minimized so as to obtain from the actual system an output as close as possible to that desired.

B_4 Optimization of a chemical unit by means of an industrial digital computer by G. G a u (France)

Four different methods of optimization were described as applied to the same simple unit comprising a catalytic reactor, a distillation column and recycling. The two first well-known methods use a mathematical model of the plant, constantly re-adjusted according to the results of measurements. They use either simplified equations obtained beforehand or - if the number of variable parameters is too high for that - a very general mathematical model of the plant, the actual phenomena being simulated in the computer. The two other less usual methods do not use any mathematical model of the plant but a systematical research of the highest benefit by altering periodically the desired values and by observing the results. This research is effected either automatically or - if the variable parameters fluctuate rather slowly - by an operator who checks the optimum desired values, letting then the computer express the latter as functions of the corresponding values of variable parameters.

B_5 The use of an analog computer for the solution of linear and non-linear programming problems and its further application as an automatic optimization system by A.W.O. F i r t h (United Kingdom)

The author described applications of linear and non-linear programming to such problems as minimization of pumping costs between several oil wells and the corresponding port, programming the best route for a tanker from this port to the refinery, programming the refinery operation and programming sales problems with m sales storages and n oil refineries feeding the latter. He quoted simple analogue devices a mechanical solution of which was designed by C r o s s m a n and a simplified model of which was displayed - and corresponding electronic solutions.

B_6 Mathematical models of plant by J.K. L u b b o c k (United Kingdom)

The author described an optimization method by comparing the output of an analog simulator with the output of the actual system and by minimalizing the mean square error. Time constants are obtained by feeding the input to several delay lines and by synthetizing all these delays in order to obtain corresponding time constants.

C ANALOG TECHNIQUES

C_1 Conditional Control of physical and chemical processes by R i c h a r d P e r e t z (Belgium)

Initially well-designed controllers sometimes fail to work properly because of several reasons such as a bad shape of sensing devices after some use, an unsufficiently good response of the controller to frequency spectrums larger than that initially provided for, a lack of speed of response of some linear devices and, above all, interactions between multiple controlled variables. Examples show that, in the absence of interactions, stabilization is swift even for discontinuous (relay) systems. Conditional control - a combination of logical computation (with pre-determined logic) with analog computation - takes care of such unforseen conditions.

C_2 Some analog studies of boiler control system performance by J.G. T h o m a s s o n (United Kingdom)

The author described boiler control by means of an analog device computing combustion heat from the air/fuel ratio and then successively determining the flow and the pressure of steam, the flow of fuel and, with the given air/fuel ratio, the flow of air. A purely algebraic computation allows to figure the oxygen content in flue gases from the flows of fuel and of air; this allows in turn to correct the air flow according to this oxygen content in flue gases.

C_3 Transient behaviour of a distillation column plate by Samuel W a j c (Belgium)

Tests effected at the University of Brussels on a given plate of a distillation column fed with a mixture of methanol and

water were conducted either with step response or with frequency response. An analog simulation of this process by means of a system of 8 algebraic equations gave results fitting well with those obtained from the actual system.

D ON-LINE COMPUTERS

D_1 Analog on-line computers in industrial processes by A.M. T e r l i n d e n (Belgium)

Four examples of the application of analog on-line computers referred respectively: 1) to an automatic control of the flow of dry ore in water suspension (by computing this flow from that of the mixture and from its density), 2) to an automatic weighing of iron ore, of coke and of calcium carbonate in order to obtain in a blast furnace a constant proportion between the latter und silicum oxide contained in the iron ore (computations being made from the iron ore analysis), 3) to a constant indication of boiler efficiency (computed by the method of losses from the flow of steam, from temperatures in the stack and at the blower inlet, from the CO_2 content of flue gases and from the analysis of unburnt components in ashes) and 4) to the optimization of a catalytic reaction in a diffusion tower from the contradictory conditions of a decrease in the cost of the final product and of an increasé in the cost of the catalyzer when the flow of this product (and, therefore, the temperature of the reaction) increase.

D_2 Estimation of error in on-line computing by T.B. J a w o r (United Kingdom)

The addition of the modulae of partial errors on measured variables in order to compute overall errors on complex variables leading frequently to unadequate results, a table for more correct computation of these overall errors was proposed. This table can be easily adapted to different computation setups and an example of application of this method to a purely algebraic simulation of cooling circuits in a nuclear reactor was given.

D_3 Computer control of over-determined systems by D.J. W i l d e (USA)

An overdetermined system was defined as a system having more variable parameters than controllable variables, A simple example of a distillation column with 3 tanks and only one controlled variable - the flow of distillated product - was given. The probability of a satisfactory operation of such a system characterizes the quality of the adopted setup. Three criterions for evaluating this probability were given: the least squares criterion, the least weighted squares criterion

and the "Minimax" criterion (the probability of a satisfactory operation in the worst conditions, one of the variable parameters being out of control). Whilst originally developed for linear systems and Gaussian random inputs, this method has been adapted to non-linear systems and non-Gaussian random inputs starting from the "Minimax" criterion, and research is being done on a self-adaptive method which would allow to obtain automatically the highest probability of satisfactory operation.

D_4 Some analog studies of process control systems by J.B. B r o m l e y and C. S t o r e y (United Kingdom)

Three typical problems solved by analog or digital computation were quoted: 1) The study of a distillation column by means of a digital computer showed that the reflux (flow of recycled matter) had a large influence on the composition of the top product whilst the flow of the distilled matter had scarcely any influence on the composition of neither the top nor the bottom products; hence, the control of both of the latter was unnecessary. 2) In a high-pressure electrolyse of water, equations were determined from the flows of hydrogen and of oxygen through valves, from pressure variations and from movements of the different fluids in the electrolyse tank; these equations were linearized and used for an analog study of stability. 3) When mixing acid with water, the automatic control of acidity was achieved by means of analog simulation from the conductivity and the density of the mixture.

E SIMULATION OF PROCESSES LEADING TO PARTIAL DERIVATIVE EQUATIONS

E_1 On errors due to lumping of a system with distributed parameters by Tore H e n n i g and S. N a e v d a l (Norway)

The influence on errors incurred by replacing partial derivative equations by ordinary differential equations was studied according to the number of parts into which is lumped a system with distributed parameters; a simple example of a tubular heat exchanger to which is applied the method of finite differences was taken. The errors on the derivatives of the temperature and on the temperature itself were evaluated and - this method leading to somewhat long computations in transient conditions - the evaluation of the error on the steady-state temperature after a step-response was considered. An analog computer allowing the automatic evaluation of errors when a system with distributed parameters is lumped into up to 20 parts was finally described.

E_2 The use of standard technique in solving propagation problems by A. G a d o l a, V. G e r v a s i o and C. Z a f f i r o (Italy)

In the particular case of heat propagation in a nuclear reactor, a partial derivative equation with respect to time and to space was transformed into an ordinary differential equation. Given the coefficient of the derivative of temperature with respect to time, initial conditions (temperatures at various points at the initial moment) and input conditions (temperatures at different moments at the entrance of the reactor), temperature was developed in Fourier series having only odd trigonometric terms and corresponding coefficients were evaluated. A model based on this mathematical theory was described.

The PROCEEDINGS of this Seminar will be published by Presses Académiques Européennes, 98, Chaussée de Charleroi, Brussels (Belgium). In the meantime, a much more detailed report on this event than that given above is to be published by the Editor of this Bulletin in the January and February 1961 issues of the French review "Automatisme".

Austria

The following lectures were given by the ÖAA (Österreichischer Arbeitsausschuss für Automatisierung - Austrian Committee for Automatisation):

On Oct. 10, 1960 - "A NEW SYSTEM FOR AUTOMATISATION" by E. R e i n d l, Vienna.

The author described a new system for the automatisation of materials handling between machines using transistors or magnetic amplifiers and built according to the packaging principle, so as to allow great flexibility of application. As an example of the use of this system its application to galvanizing automata with contactless switching - which allows the use of lighter equipment - was quoted.

On November 10, 1960 - "LEARNING AUTOMATA" by Heinz Z e m a n e k.

The author described two learning automata, the first of which developed by H. K r e t z. is an improvement of W.G. W a l t e r s 's "tortoise"; this device which works through the association of two actions - such as stopping and reversing, generalizing and specifying an excitation, falling asleep or awakening - is a model of conditional reflexes covering different forms of action. The second learning

device, built by Dipl.-Ing. R. E i e r, is a development of C.E. S h a n n o n 's "mouse in a labyrinth"; it is applied to a labyrinth of up to 36 elements.

On Jan.19, 1961 "HYDROSTATIC MACHINES FOR STEPLESS AUTOMATIC CONTROL" by H. S i c k. The author described hydraulic control systems comprising an adjustable oil pump and an adjustable oil motor fed by the latter. He reviewed different types of equipment of this kind, their main dynamic features and suitability for different types of stepless Automatic Control as well as their applications to woodworking industry, machine-tool industry, textiles, materials handling etc.

Canada

The Canadian Associate Committee on Automatic Control is organizing a one-day SYMPOSIUM on various aspects of automatic control to be held in Vancouver on June 1st 1961. Full details may be obtained from: The Secretary, Engineering Institute of Canada, MONTREAL, Province de Québec, C a n a d a.

Japan

RUSSIAN CONTROL ENGINEERS visited Japan. Invited by the Science Council of Japan (The National Committee of Automatic Control of Japan), four USSR specialists in automatic control and electronics flew to Japan on December 15, 1960. They were Mssrs. B.N. Naumov, I.S. Muchin, Yu. S. Akimov and A.A. Rajev. They made an inspection tour through Tokyo, Kyoto, Osaka, Nagoya and Chugoku areas. Their itinerary included many universities, laboratories and factories. After having exchanged information with Japanese scholars and engineers of the same field, they departed on January 2, 1961.

Switzerland

8th SYMPOSIUM OF ASSPA

As we have just mentioned in Bulletin No 8 (page 69), the 8th Symposium of ASSPA (Association Suisse pour l'Automatique - Swiss Association for Automatic Control) was held in Zürich from September 20 to September 22, 1960 on the following subject:

APPLICATION OF SEMI-CONDUCTORS AND MAGNETIC ELEMENTS TO AUTOMATIC CONTROL

It was attended by more than 300 participants.

After an introduction by Professor Ed. G e r e c k e, Chairman of ASSPA, who showed the growing importance of the different kinds of semi-conductors: low- and highpower diodes, transistors, transitrons, transwitches etc., the following PAPERS were read, a short summary of which is given as follows:

1. Computation of the dynamic behaviour of power diodes by Ch. I s e l i n.

Determination of the heating of diodes in steady state, in transient state and computation of their overload capacity.

2. Application of sampled-data control systems theory to the computation of currents and tensions in circuits with ionic valves by M. B a y o u m i

Summary of the principles of the new sampled-data control systems theory leading to the Z-transform. Use of this method for studying the behaviour of rectifiers and vibrators.

3. Transistors as DC amplifiers by M.W. G u g g e n b ü h l

Transistors have numerous advantages when compared with electronic tubes but have the inconvenience of characteristics depending on their heating and on their age. The author displayed circuits developed in order to compensate these influences.

4. Use of schematized characteristics for the study of transistorized circuits by H. D i g g e l m a n n

The schematization of the characteristics of transistors by means of several straight lines - as developed in the USA by Professor MASON of the Massachusetts Institute of Technology - allows the use of elementary models, which easily explain the relationship between currents and tensions characterizing the operation of transistors.

5. Some setups used with transistors and adjustable silicon valves by H.R. W a l l e r t s h a u s e r, H. M ü l l e r and H. B a d r

New methods developed for measuring current and tension variations in transistorized circuits.

6. The synchronous generator and motor combined with adjustable ionic valves by Ed. G e r e c k e

Theory and characteristics of synchronous machines having a field fed by semi-conductors. Description of various setups using semi-conductors in order to obtain D.C. machines without collectors, A.C. generators without D.C. field generators and variable speed synchronous motors.

7. Vibrators with transistors by E. S c h ü e p p

Production of low- and average frequency A.C. from an accumulator, a frequency transformer and a D.C. transformer. Display of a model.

8. Vibrators with ionic valves by U. M e i e r

Transformation of D.C. to A.C. by means of silicon ionic valves. Theory and characteristics of a vibrator operating independently. Display of the feeding of discharge lamps by a vibrator.

9. Dynamic stabilization of control circuits by means of transistors by O. K o l b

Description of the use of transistors in Automatic Control taking into account their conditions of stability. Example of an analytical study of the dynamic behaviour of a control circuit. Applications to various control problems.

10. Optimization of logical circuits according to their cost and to the reliability of their operation by H. B r ä n d l e

Analysis of the quality and of the cost of diodes used in logical circuits. Statistical study of the variation of the parameters of these diodes according to their heating and to their age. Comparison in this respect of the behaviour of germanium and of silicon diodes. Conclusions from this comparison in respect of the choice of standardized setups.

11. Considerations on dimensioning transistorized logical circuits by H. S c h e n k e l

Principle of realization and operation of transistorized multivibrators. Display of a transistorized decimal counter's operation.

12. Speed control of asynchronous motors by means of ionic valves by L. T e r e n s and Ed. G e r e c k e

Principle of the insertion of adjustable ionic valves into the rotor circuit of asynchronous machines and of recuperation of the energy induced in these circuits under the form of D.C. Study of currents and tensions intervening in circuits of this kind. Generalization of the circle of Ossana and determination of the speed-torque characteristic of such motors.

13. Speed control of asynchronous machines with shorted rotor by means of adjustable ionic valves inserted into their stator circuit by H. B a d r

Theory of currents and tensions intervening in such a setup. Determination of the speed-torque characteristic. Study of its properties by means of an analog computer. Display of the operation of a 1 HP motor controlled according to this principle.

14. Three-phase current transformer with adjustable silicon valves by H. M ü l l e r
Transformation of a three-phase 50 hertz A.C. into an A.C. of lower frequency. Logical construction of control circuits. Execution of these circuits by means of diodes and transistors. Oscillographic recording of currents and tensions.

15. A digital method for studying signals disturbed by a high-level noise by K.E. D r a n g e i d
Study of modern methods for transmitting signals in order to cancel the influence of disturbances added to the transmitted message. Example of application of these methods.

16. Digital information storage by means of magnetic cores and of very thin magnetic layers by W.E. P r o e b s t e r
Study of the magnetic properties of magnetic layers having a thickness of less than 1 micron. Use of these properties for memories with access time of the order of 1 nano second.

17. Conclusions and general considerations on Automatic Control by Ed. G e r e c k e

All these papers are to be published in the Swiss review "Nouvelle Technique".

USA

The MAGNETIC AMPLIFIERS COMMITTEE of the A.I.E.E. (American Institute of Electrical Engineers) and the PROFESSIONAL GROUP ON INDUSTRIAL ELECTRONICS of the I.R.E. (Institution of Radio Engineers) had jointly organized on October 26, 27 and 28, 1960 in Phildelphia a CONFERENCE under the name of:

1960 NON-LINEAR MAGNETICS AND MAGNETIC AMPLIFIERS CONFERENCE.

We give hereafter the titles of some papers of interest to Automatic Control Engineers:

- "Distributed Parameter Aspects of Cose Memory Wiring" by J.S. E g g e n b e r g e r,
- "Optical Readout of Digital Magnetic Recording" by J.J. M i y a t a,
- "A New Magnetic High-Speed Switching Element - Its Application to Machine Tool Numerical Positioning Control" by M. D u m a i n e, France,
- "High Repetition Rate Magnetic Pulse Generators" by B.M. W o l f f r a m,

- "A Magnetic Amplifier and Differential Transformer Combined for Regulation and Non-linear Computation" by G.A. O' S u l l i v a n,
- "A Controllable, Low-Ripple Constant Current Source" by T. B o n n e m a and G.R. S l e m o n, Canada,
- "A New Magnetic-Controlled Rectifier Power Amplifier with a Saturable Reactor Controlling on Time" by R.E. M o r g a n,
- "Programmed Time Ratio Control Techniques" by D.L. W a t r o u s and J.D. H a r n d e n Jr.

These papers can be obtained from:

A.I.E.E. HEADQUARTERS
33 West 39th Street, NEW YORK 18, NY.

Yugoslavia

On November 18th and 19th, 1960, the 5th NATIONAL CONFERENCE ON ELECTRONICS, TELECOMMUNICATIONS, AUTOMATION AND NUCLEAR ENGINEERING was held in Belgrade. The Conference was organized by the Committee for ETAN and was attended by over 250 specialists from universities, scientific institutions and industry.

The Conference was divided into four SECTIONS:

Electronics
Telecommunications
Automation and Computers
Nuclear Engineering.

Altogether 60 papers were presented at the Conference. The most interesting among those which cover the fields of Control Engineering were:

1) "Digital Computer - CER" by T o m o v i c, M a n d z i c, A l e k s i c, V r b a v a c, M a s n i k o s a, H r i s t o v i c, M a r i c,
2) "Automatic Control of Electric-Arc Furnaces" by G r b i c,
3) "Nuclear Reactor Simulator - RAS" by R a d a n o v i c, B i n g u l a c, P o p o v i c,
4) "Influence of Mechanical Chopper on Servo-mechanisms Performance" by M i k i c,

5) "Design of Positional Servo-mechanisms taking into account Certain Non-linearities" by K o k o t o v i c, R a d a - n o v i c,

6) "Application of analog Computer - RAS in the Synthesis of Automatic Control Systems" by B i n g u l a c, G a v r i - l o v i c,

7) "Some Experiences in Designing DC Operational Amplifiers" by P e t r o v i c, T o s i c,

8) "A new Binary Element and Ring Counter" by S k a p e r - d a,

9) "A transistorized regulator for DC generators" by T i j a n i c,

10) "Power Supply for Digital Computer - CER" by H r i s t o v i c,

11) "Rythmic pulse generator for synchronising the CER Digital Computer" by M a r i c.

FREE IDEAS, OPINIONS AND SUGGESTIONS

UNESCO REPORT ON THE TRENDS IN AUTOMATION

The Secretary General and the Director General of UNESCO, in co-operation with other specialized agencies concerned with the peaceful application of science have arranged for a survey on the main trends of investigation in the field of natural sciences and also on the application for peaceful ends of such scientific knowledge. This Survey (No 3362) was issued by UNESCO on May 13, 1960. It has been signed by Prof. P i e r r e A u g e r, acting as special Consultant with the concurrence of an advisory committee composed by experts from various international organizations. This Survey includes a chapter on the APPLICATION OF AUTOMATION which reads as follows:

Automation techniques and practices are now being developed at a very rapid rate and are spreading to all branches of industry, both productive and extractive. These advances are due in part to major technological developments, especially in the field of electronics. The new devices are, to begin with, applied to the first phase of the automation chain, where the external phenomena are amplified in order sub-

sequently to control the automatic action. These devices are also used in the second phase - processing - when significant mathematical conversiongs, necessitating the use of electronic computers, are involved. In the execution phase, the two basic techniques used are electrical and mechanical (hydraulic or pneumatic) transmission.

1. Amplification

Here development work is based on the use of semiconductor devices and combinations thereof, and on new techniques such as printed circuits. The trend is towards miniaturization and maximum dependability in operation, for which checks on the materials' purity and quality are essential.

2. Processing

All research on analog or digital computing machines can be classified under this heading. However, special methods - for instance direct simulation techniques - represent a major development, especially in aeronautics. Such methods are utilized as a sort of intermediate stage between laboratory development and actual tests at which, for example, airborne (aircraft or missile) automatic control systems of all types can be finalized. Their successful exploitation requires extensive investigations in view of the problems presented both by the computing circuits and by the mechanical design (fast response rate being often difficult to reconcile with structural rigidity). The demands now being made by aeronautical programmes (for ever faster and more compact missiles) imply constant advances in simulator techniques and consequently constant research into computing circuits and quickacting control systems for the mechanisms.

Among theoretical studies in this field, those pertaining to servo-mechanisms and servo-systems in general must be mentioned.

By way of groundwork, a complete l i n e a r t h e o r y was developed and a few incursions were made into the complex field of non-linear mechanics. In the case of linear systems all methods are based on Cauchy's theorem of analytic function and derived from work carried out on feedback amplifiers. Current investigations mainly relate to highly specialized aspects like, for instance, multi-variable systems.

N o n - l i n e a r m e t h o d s offer a vast field of investigation in which, for all the work already done on the subject, relatively little ground has yet been covered. Almost all non-linear methods are based on Poincaré's work. Unfortunately most of the applications so far derived from them are concerned with oscillations and not with servo-systems, and it is difficult and often impossible to transpose

them from one field to the other. The methods now available to engineers are of three kinds: 1) approximate methods which, being purely technical in conception, suffer from the disadvantage of uncertain theoretical justification and, consequently, uncertain reliability of application in complex cases; 2) convenient exact methods: unfortunately in all cases, these are applicable only to a very narrow range of problems; 3) general exact methods: application to real problems (always of a complex nature) unfortunately entails calculations of such complexity that exploitation is practically impossible. In practice the engineer normally tackles his problem in two stages: first he breaks it down by an approximate method, and then he checks the results with an electronic computer - in other words, no attempt is made to understand the operating structure of the system under study. There is clearly a wide field of investigation to be covered: that of evolving, on the basis of existing mathematical methods, technically feasible processes applicable to servo-systems. This work entails close co-operation between mathematicians and engineers.

Other subjects of investigation in the field of servo-systems relate to s a m p l e d d a t a c o n t r o l s y s t e m s: i.e., those operating on intermittent or pulsed data. Work on these lines began with control systems incorporating a radar device, and has been recently extended by developments concerning control chains incorporating a digital computer. In this connexion the two major lines of current study concern sampling type controls featuring respectively non-linear elements and random inputs.

As to s t a t i s t i c a l m e t h o d s, it has long been known that the only rational way to approach the problem of controlled systems is from the statistical standpoint, since such systems are by their very nature controlled by random inputs. In this field the main subjects of research are the determination of adequate criteria other than that of the standard deviation and, especially, the extension of investigations to non-linear systems and to non-stationary random functions. Therefore, such investigations, are essentially mathematical in character, with no immediate technical application.

Lastly there are the s e l f-a d a p t i n g s e r v o-s y s t e m s, i.e., those which automatically adapt their structure to operating conditions. The notion of self-adaption is arrived at progressively by way of servo-optimization methods providing the most rapid response to a given input. In order to secure an optimum response to every input, the system must adapt itself to the type of inputs it receives. This in turn leads to the pre-establishment of a switching system permitting optimal responses in a wide range of applications. Many investigations have been made in this field, but most of the

results are very incomplete - i.e., limited to a very narrow range of problems. Their extension requires the application of Boolean algebra.

Conclusions

T o s u m u p, it is felt that the following represent the main trends of current research in the field of automation:

Development of semi-conductor techniques based on more detailed study from the physical standpoint (solid state physics);

Development of non-linear methods which are based on current mathematical methods and are technically feasible;

Application of statistical methods to pulse and non-linear systems;

Application of the methods of study and assembly of control circuits to servo-systems.

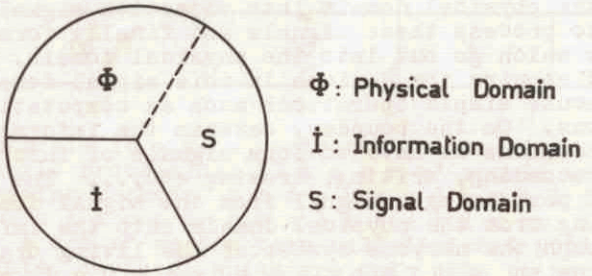
THE CONCEPT OF A SIGNAL AND THE CLASSIFICATION OF IFAC ACTIVITIES

by Prof. Ed. GERECKE (Switzerland)

In order to classify the different fields of automatic control systems, the basic definition of a signal is very useful. Theoretically we can distinguish 3 domains:

1. The PHYSICAL DOMAIN in which we live and which contains our machines and manufactured goods.
2. The INFORMATION DOMAIN, which exists in the minds of the living organisms.
3. The SIGNAL DOMAIN in which signals are being processed.

The boundaries between these 3 domains can be crossed in both directions.



In the p h y s i c a l d o m a i n we work with physical quantities, which are subject to physical laws. For example, water is evaporated by the energy of the sun at sea-level, then it is condensed on the mountains and later it drives water turbines. Or a machine-tool cuts metal from the raw piece using the power of an electric motor.

In the i n f o r m a t i o n d o m a i n living organisms process information by procecces called: thinking, remembering, calculating, making a decision etc ... These processes cannot be observed or perceived by another individual.

Along the contact surface between the physical domain and the information domain we have two different operations. The perception of some classes of physical quantities is possible by the nervous system of living organisms and these sensing activities are named: seeing, hearing, feeling, smelling and tasting. We can say that the nervous system is able to form s u b j e c t i v e s i g n a l s of some classes of physical quantities, but not yet of all. The only possibility of a transfer from the information domain to the physical domain is the muscular action of the living organism; the main activities of expressing and actuating are named: speaking, singing, writing, smiling, pushing, pulling, waking etc.... The life of a primitive man e.g. can be described in the following way: He receives subjective signals from the physical domain, he processes these signals in his information domain, he makes a decision, decides on an actic: and finally executes the latter in the physical domain.

An automatically controlled system can be understood as a combination of devices, machines etc.... (necessary for a technical processing), which works without the intervention of a human being. Therefore we see that some activities which were formerly fulfilled by a human operator must now be performed by a group of devices, which we can group in a "signal domain". These devices have first to transform physical quantities of the physical domain into objective signals, then they have to process these signals and finally form signals for actions which go out into the physical domain. We can go further and require the devices in this signal domain to be able to execute simple operations such as computation or logical decisions. On the boundary between the information and the signal domains we have to form signals of informations by automatic recording, writing, drawing etc.... The inverse operation of perceiving a signal from the signal domain is the same as going from the physical domain into the information domain through the nervous system of the living organism. Thus we can define an o b j e c t i v e s i g n a l as a picture of a physical quantity in the physical domain or of an information in the information domain. Automatic control of technical

systems therefore consists of the theory and practice of signal processing in the signal domain. On the boundary of the signal domain we have the formation of signals as measuring, counting, recording, writing (towards the signal domain) and the inverse operations of steering, acting, controlling towards the physical domain and of transferring signals towards the information domain. Because the devices in the signal domain are working as physical devices, we can also consider the signal domain as a subdivision of the physical domain.

IFAC has three groups ofactivities: T h e o r y, C o m p o n e n t s and A p p l i c a t i o n. On the other hand, the a u t o m a t i c p r o c e s s i n g of technical systems can be divided in four main domains: O p e n-l o o p c o n t r o l, a u t o m a t i c c l o s e d-l o o p c o n t r o l, a u t o m a t i c c o m p u t a t i o n and h i g h e r o p e r a t i o n. Therefore we obtain the following table:

Classification of the main fields of activities of IFAC

	1	2	3	4
	Automatic processing in open-loop systems	Automatic control in closed-loop systems	Automatic Computation	Higher automatic operations
a Theory	1a	2a	3a	4a
b Components	1b	2b	3b	4b
c Applications	1c	2c	3c	4c

It is now possible to give a restricted definition of the theory of automatic processing: "T h e o r y" should include all signal processing methods i n d e p e n d e n t l y of their t e c h n o l o g i c a l r e a l i z a t i o n. As to "C o m p o n e n t s" we can take half-finished products, units, elements, devices, which are only able to perform a single signal operation in the signal domain or a single pro-

cessing operation in the physical domain.

Under the scope "A p p l i c a t i o n s" we can take complex devices, especially large plants, which execute several processing operations with signals or physical quantities.

C o n t r o l refers to open-loop chains, but a u t o m a t i c c o n t r o l includes closed-loop systems. A u t o m a t i c c o m p u t a t i o n comprises analog and digital, pneumatic, electronic and other computers. The field of h i g h e r o p e r a t i o n s includes n o n - l i n e a r systems, s a m p l e d systems, digital systems, self-o p t i m i z i n g-, self-a d a p t i v e- and -l e a r n i n g systems. In this way we have obtained the 12 fields 1a to 4c of the preceding table, which constitute the main activity of IFAC. On the boundary of the physical and signal domains we have further-more the field of automatic measuring and counting and on the boundary between the information domain and the signal domain we find devices for the automatic conversion of informations to signals e.g. a device which listens to a speech and writes it down immediately in common letters. We touch here the field of IFIPS, the International Federation of Information Processing Societies.

LITERATURE: "Zum Begriff des Signales", by Eduard GERECKE, Zürich/Switzerland, VDI-Zeitschrift, volume 102 (1960), No 30, pages 1399/1406.

PUBLICATIONS

PROCEEDINGS OF THE SYMPOSIUM OF THE PROVISIONAL INTERNATIONAL COMPUTATION CENTRE

This symposium which was held in Rome from September 20 to 24, 1960 (See Bulletin No 7 pages 8 and 9) was devoted to the numerical treatment of ordinary differential, integral and integro-differential equations. It was attended by some 200 prominent mathematicians from Austria, Belgium, Czechoslovakia, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Japan, Netherlands, Poland, Roumania, Sweden, Switzerland, United Kingdom. USA and Yugoslavia.

The Proceedings will be shortly published in a volume of over 700 pages by BIRKHAUSER VERLAG, Basel (Switzerland) and Stuttgart,(Germany).

Germany

New Books

- Walter S c h i l l i n g: "Transduktortechnik" (Transducer technology). "Theorie und Anwendung steuerbarer Drosseln" (Theory and application of controllable valves). Published by R. OLDENBOURG Verlag, München, 1960. 267 pages, 193 figures, 40 German marks.

- Dr. Walter T r a u p e l: "Thermische Turbomaschinen" (Thermal Turbines). 2nd volume: "Regelverhalten, Festigkeit und dynamische Probleme" (Control behaviour, Power and dynamic problems). Published by Springer Verlag, Berlin-Göttingen-Heidelberg, 1960, 420 pages, 450 figures, 61,50 German marks. (The 1st volume, published in 1958 with 407 pages, 402 figures and costing 58,50 German marks was devoted to thermodynamics and fluid mechanics problems).

- Dr. Johann T s c h a u n e r: "Einführung in die Theorie der Abtastsysteme" (Introduction to the Theory of sampled-data systems). Published by R. OLDENBOURG-Verlag, München,1960, 185 pages, 81 figures, 5 oscillograms, 32 German marks.

- George K. T u c k e r and Doris M. W i l l s (translated from English) "Regelkreise der Verfahrenstechnischen Praxis" (Control loops in chemical engineering practice), "Graphische Methoden" (Graphical methods). Published by R. OLDENBOURG-Verlag, München, 1960, 376 pages, 137 figures, 24 German marks.

Periodicals

The Publishers "D o k u m e n t a t i o n e n d e r T e c h n i k", 24 Zweibrückenstrasse, München 8, publish periodically under the title "R e g e l u n g s t e c h n i k u n d A u t o m a t i o n" (Automatic Control and Automation) a collection of titles of Automatic Control publications. This collection is given under the form of cards printed on a single face of a page (each of which contains 8 of these cards).

The basic collection covering the period from 1952 to the beginning of 1955 costs 82 German marks.

Four complementary surveys have been issued for the following periods:

1°) - From the beginning of 1955 to the beginning of 1956 78 German marks.
2°) - From the beginning of 1956 to November 1956 82 German marks.
3°) - From December 1956 to June 1957 (over 1600 titles) 84 German marks.

4°) - For the second half of 1957, 96 German marks,
5°) - For the first half of 1958, 98 German marks,
6°) - For the second half of 1958, 108 German marks.

This basis collection with its four complementary editions covers over 10000 titles.

As from January 1st, 1959 the titles on Automatic Control and Automation are available against an annual subscription of 80 German marks.

New Review "Kybernetik"

The Publishers Lange & Springer, Heidelberger Platz 3, Berlin-West, have issued a new review "Kybernetik" publishing articles in German and in English and dealing with the transmission and processing of information as well as with Control processes in both automata and organisms. The first issue (January 1961) has 56 pages and costs 12,80 German marks.

Japan

New Books

1°) Synthesis of Hydraulic Control Systems by T. K a w a s a k i and T. A k i y a m a, published by the Industrial Daily News. (May, 1960).
2°) Electric Control Systems by S. J i m b o. Published by Kyoritsu Publishing Company (July, 1960).
3°) Process Control Handbook. Published by the Industrial Daily News (Oct., 1960).

Switzerland

Periodicals

The review "I n d u s t r i e l l e F o r s c h u n g" ("Recherche Industrielle", "Industrial Research"), Kalkbreitestr.33, Zürich 3, published quarterly in German and in French (10 Swiss francs per year) devotes its September - October 1960 issue to a report on the 7th Symposium of ASSPA (Swiss Association for Automatic Control).

USA

New Books

Mihajlo D. M e s a r o v i c (Yugoslavia): "The control of multi-variable systems". Published jointly by the Technology Press of the Massachusetts Institute of Technology and John Wiley & Sons, Inc., New-York, 1960, 112 pages, 52 figures.

NOTE ON INFORMATION BULLETIN No. 10

Information to appear in the Information Bulle in No. 10 should reach the Editor:

Professor Ing. Dr. Victor Broida
Honorary Editor of IFAC
13, rue de la France-Mutualiste
Boulogne-sur-Seine (Seine), France

not later than April 15th, 1961.