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INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

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Honorary Editor of IFAC

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CONTENTS

IFAC NEWS

COMPOSITION OF THE I.F.A.C. EXECUTIVE COUNCIL

In conformity with the Constitution of I.F.A.C., elections of all the officers (for a 2-years term) and of one-half of the ordinary members of the Executive Council (for a 4-years term) took place recently by postal ballot.

As a result of these elections, the Executive Council of I.F.A.C. will have the following composition with effect from November 1st, 1961 (the figures behind each name indicate the corresponding term):

President	- Prof. Ed. G e r e c k e (Switzerland) 1961-1963
Past President	- Prof. A.M. L e t o v (U.S.S.R.) 1961-1963
1st Vice-President	- Prof. J.F. C o a l e s (United Kingdom) 1961-1963
2nd Vice-President	- Prof. P.J. N o w a c k i (Poland) 1961-1963
Treasurer	- Dr. M. C u é n o d (Switzerland), re-elected for 1961-1963
Ordinary Members	- Prof. J.G. B a l c h e n (Norway) 1959-1963
	- Prof. K. K a n e s h i g e (Japan) 1959-1963
	- Prof. Zd. T r n k a (Czechoslovakia) 1959-1963
	- Prof. J.C. G i l l e (France) 1961-1965
	- Dr. J.C. L o z i e r (U.S.A.) 1961-1965
	- Academician Gr. M o i s i l (Roumania) 1961-1965

On the other hand, the following personalities remain in their respective functions:

Honorary Secretary	- Dr. G. R u p p e l (Germany)
Honorary Editor	- Prof. V. B r o i d a (France)
Chairman of the Advisory Committee	- Prof. D.P. E c k m a n (U.S.A.)
Vice-Chairman of the Advisory Committee	- Mr. J. L o e b (France)

The Executive Council expressed its deep gratitude to the following three retiring personalities:

Mr. Harold C h e s t n u t (U.S.A.), President (1957-1959) and Past President (1959-1961),
Dr. Otto B e n e d i k t (Hungary), 2nd Vice-President (1959-1961),
Professor Giuseppe E v a n g e l i s t i (Italy), Ordinary Member of the Executive Council (1957-1961),

whose co-operation was most significant for the progress of the Federation and extended all its thanks to the retiring President, Professor Alexander L e t o v (U.S.S.R.) for the very skilled, devoted and efficient way in which he has conducted the activities of the Federation during the past two years.

MESSAGE OF PROFESSOR A. M. L E T O V (U.S.S.R.),

Retiring President of I.F.A.C.

In October of this year ends the 2-years term of I.F.A.C.'s life under the direction of the Executive Council elected in 1959 by the General Assembly in Chicago. It is therefore convenient to summarize the results of this activity and to appreciate the prospects of further development of the Federation.

I. First International Congress of I.F.A.C.

The first half of this period was used to prepare and to bring into effect the First Congress of I.F.A.C. This Congress which took place in Moscow in June-July 1960 is different from the preceding congresses on automatic control held at Cranfield (in 1951), in Paris (1956) and in Heidelberg (in 1956) not only by a considerable increase of the number of papers and of attendants from 29 countries of the world. This Congress is also different from the others on account of the broadness of the investigated scientific and technical problems as well as on account of the enlargement of industrial and other applications of automatic control.

In course of our Congress, for the first time were investigated, in a broad meaning and with a thorough theoretical preparation, in specially organized sections, problems of designing optimal and self-adjusting systems, were quoted first results of using biological effects in automatic control, were discussed various modern mathematical problems called upon when designing control systems. Very important scientific results

were displayed in papers on stochastic processes, on pulse, linear and non-linear systems theory and in papers on remote control problems.

The main subjects of papers on theoretical investigations read in all sections were methods of optimal and self-adjusting systems design. To the same subjects were devoted most of the papers on components.

Magnetic, electric, semi-conductor, electronic, pneumatic and other elements used as main components of measuring devices, transducers, computers and amplifiers were investigated. Particular attention was devoted to components able to fulfill given logical functions. Such components are the basis of self-adjusting systems and contribute to bring into effect the adjusting algorithms of these systems.

Applications of automatic control in industry are the final achievements of the creative activity of scientists and engineers when they take profit together with the whole of the society of the results of their own labour. Here exist several fields corresponding each to different aspects of industry and to different aspects of engineering. Here also exists a new scientific field: the complex automation of production. The main point of this field is the problem of determining optimal operation conditions. This problem can be solved by using operation theory methods. Operation theory when applied to a given type of production will take into account the peculiarities of the technological process map and will allow to find the optimal operating conditions to be automated.

Papers read at the Congress, without considering the problems of complex automation in its totality, have sufficiently characterized their different aspects in metallurgy, chemical industry, metals working etc. All scientific and technical results contained in the papers will be a part of the treasure of human knowledge on automatic control. They correspond to the motto of the Congress : "practical applicability - for theory, maximum reliability - for components, greatest efficiency - for automatic control applications". These results will soon be published broadly by the U.S.S.R. Academy of Science Publications (in Russian) and have been published by Butterworths Scientific Publications (in English) and they will give a new powerful impulse to further developments of automatic control in the whole world. All this corresponds to the main targets of I.F.A.C.'s activity.

Since the end of the Congress, many newspapers and scientific and technical magazines in different countries have published reports of scientists and engineers on the First Congress of

I.F.A.C. I have read many of these reports and I have noticed that, with the exception of small details, they have exactly and highly appreciated the meaning of the Congress, its organization and the large hospitality of the Soviet people. Many national organizations and individual attendants of the Congress have given such appreciation in special letters sent to the U.S.S.R. National Committee on Automatic Control and to me personally in my capacity as President of I.F.A.C.

The First International Congress has achieved a good and solid beginning of the scientific activity of our Federation and I.F.A.C. will certainly develop and strengthen in the future.

I would like to take again this opportunity for thanking on behalf of I.F.A.C. the Soviet Government and the U.S.S.R. National Committee on Automatic Control for their large contribution to the development of I.F.A.C. and to the consolidation of its international prestige. I am glad to note that our hope to succeed when, more than four years ago in Paris, at the first General Assembly of I.F.A.C., we decided to hold the First International Congress of I.F.A.C. in Moscow, has been fully justified.

I would also like to thank all the members of the Executive Council, the chairman of the Advisory Committee, the Honorary Editor and more particularly the Honorary Secretary of the Federation, Dr. G. R u p p e l , for their contribution to the organization and to the work of the I.F.A.C. Congress.

II. I.F.A.C. Technical Committees

The activities of I.F.A.C. Technical Committees are most important during periods between I.F.A.C. Congresses. They develop and take place under the control and with the active participation of the I.F.A.C. Advisory Committee. The composition of the Technical Committees is nearly entirely completed. The I.F.A.C. Information Bulletin no. 8 has published good programmes of their activities.

However, we can presently consider only an initial period of activity of these Committees and the first important results achieved. What is the position in what the Committees are concerned?

(1) Bibliography
The Chairman of the Committee on Bibliography, Mr. M. A j n b i n d e r , in co-operation with the Honorary Editor, Professor V. B r o i d a , have been active in establishing contacts with U.N.E.S.C.O. with the aim of preparing and publishing a bibliography on automatic control. On the initiative of the Swiss delegate in U.N.E.S.C.O., the General Assembly of U.N.E.S.C.O.

has voted the résolution to allow the preparation and the publication by U.N.E.S.C.O. of a bibliography on automatic control. Let me express, on behalf of the Executive Council, my satisfaction on account of the decision of the General Assembly of U.N.E.S.C.O. Mr. M. A j n b i n d e r , Dr. V. B r o i d a and Dr. G. R u p p e l have started to collect bibliographical information.

The Executive Council in course of its meeting at Bergen in March 1961 has dicussed in detail and approved the programme of the Committee on Bibliography, prepared by its Chairman, Mr. A j n b i n d e r .

(2) Terminology
Dr. G. R u p p e l has highly appreciated the efforts of the U.S.S.R. National Committee on Automatic Control in preparing for publication a glossary of automatic control terms in four languages and has proposed to prepare and to publish an international dictionary on automatic control on the basis of this glossary. The Executive Council has decided that such a publication should be supervised by the I.F.A.C. Committee on Terminology.

The Committee under the chairmanship of professor Ed. G e r e c k e is systematically working on symbols and definitions and has achieved substantial progress in this respect.

(3) Theory
The Chairman of the I.F.A.C. Committee on Theory, academician B.N. P e t r o v , has proposed to organize small specialized symposia on:

a) Relay scheme and finite automata theory,
b) Optimal and self-adjusting system theory.

Steps are taken presently in order to elucidate the possibility of carrying these proposals into effect. Moreover, the Committee prepares a review of the development of automatic control theory in various countries of I.F.A.C.

(4) Components
Our relationship to I.M.E.K.O. (International Measurement Conference) becomes closer and closer. The I.F.A.C. Committee on Components has organized a special I.F.A.C. section in the I.M.E.K.O. Conference held at Budapest this summer. This section has successfully worked on solving scientific problems of interest to automatic control engineers as well as to measurement engineers. The activity of this section was conducted by Dr. B o r o m i s z a , Chairman of the I.F.A.C. Committee on Components. (See also page 14 of this Bulletin.)

(5) Applications
The I.F.A.C. Committee on Applications under the chairmanship of Dr. J. M o z l e y has co-operated with the Belgian Institute of Automatic Control in Brussels in organizing an international seminar on applications of simulation to chemical industry held in Brussels.

(6) Education
The I.F.A.C. Committee on Education under the chairmanship of professor A. M a r i n o is fulfilling a large task intended to clarify the specific aspects of educational organization and of training of experts in education in various countries.

The Executive Council, in course of its meeting in Bergen has examined reports from the Chairmen of the various Committees on the work achieved and has taken a set of decisions which will contribute to a further development of the activity of I.F.A.C. Committees.

III. Activities of the Honorary Secretary and of the Honorary Editor

The Executive Council has already had the opportunity of expressing our high appreciation of the activities of the Honorary Secretary and of the Honorary Editor for the past period by the fact that all have unanimously agreed to renew their terms for 1961. I wish to thank again Dr. G. R u p p e l and professor V. B r o i d a for their active work in I.F.A.C. and I expect that it will continue to be successful in the future.

In what the question of the prospects of publishing in the future the I.F.A.C. Information Bulletin and other publications is more particularly concerned, I have sent a letter to all national member organizations of I.F.A.C. asking them to nominate permanent correspondents responsible for sending regularly information to the I.F.A.C. Bulletin so as to ensure a more regular arrival of information.

IV. Activities of the Advisory Committee

I note with a particular satisfaction the activities of the Advisory Committee conducted by prof. D.P. E c k m a n, Chairman, and Mr. J. L o e b , Vice-Chairman. All those who have attended our meetings have often appreciated the important advisory part of this Committee and particularly the efficient action of its Chairman, prof. D.P. E c k m a n, whose ability to find and to clearly formulate decisions was frequently of great assistance to the Executive Council.

V. Budget of I.F.A.C.

Dr. M. C u é n o d , Treasurer of I.F.A.C., has worked under very difficult circumstances since, on the one hand, some financial difficulties have taken place in the past and, on the other hand, expenses were rising in connection with the Congress. Nevertheless, the report which Dr. C u é n o d submitted to the Executive Council in course of its meeting at Bergen demonstrates the fact that presently there are no reasons for concern and that the financial position of I.F.A.C. is becoming more and more stable. In connection with this success I would like to thank Dr. C u é n o d .

VI. Coming Events

(1) Election of Executive Council members
In October 1961 the terms of several members of the I.F.A.C. Executive Council reach their end and we had to proceed with re-elections. In this respect, my present message may be considered as a short report on the activities of the Federation during the past period.

In connection with these re-elections, the activities of the following members of the Executive Council reach their end:

H. C h e s t n u t	- Past President
Ed. G e r e c k e	- 1st Vice-President
O. B e n e d i k t	- 2nd Vice-President
M. C u é n o d	- Treasurer
G. E v a n g e l i s t i	- Ordinary Member
J.F. C o a l e s	- Ordinary Member
P. N o w a c k i	- Ordinary Member

The merits of each of them in the creation and the development of I.F.A.C. are widely known; they have borne a most active part in creating I.F.A.C. I would like to heartily thank my colleagues in I.F.A.C. for the fact that during the present period of increasing activities of I.F.A.C., which was full of responsibilities for me, their efforts have never slackened.

I am glad that many of them have been recommended for election by the Elections Committee and the Executive Council for the new composition of the Executive Council, namely:

Professor Ed. G e r e c k e - as President of I.F.A.C.
Professor J.F. C o a l e s - as 1st Vice-President

Professor P. N o w a c k i - as 2nd Vice-President
Dr. M. C u é n o d - - as Treasurer

Allow me, however, to express my conviction that also the other personalities who have created I.F.A.C. will continue to participate actively.

The Elections Committee and the Executive Council have recommended for election the following new members of the Executive Council:

Dr. J.C. L o z i e r (U.S.A.)
Academician Gr. M o i s i l (Roumania)
Professor J.C. G i l l e (France)

They are well-known and competent scientists who have a high social standing in their countries and I expect that the National member organizations of I.F.A.C. will support these recommendations.

(2) Second I.F.A.C. Congress

The Second Congress of I.F.A.C. will take place in Switzerland in 1963. We have two years to prepare it and we should do all our best in order to ensure also a great success to the Second Congress.

Professor Ed. G e r e c k e has submitted a schedule to the Executive Council. This schedule has been approved and the preparation of the Congress has started. The Committee for the selection of papers will work under the chairmanship of professor D.P. E c k m a n with the participation of the chairmen of I.F.A.C. Technical Committees.

(3) Moscow Exhibition 1967

The readers are perhaps aware of the decision of the Government of the U.S.S.R. to organize in 1967 in Moscow a World Exhibition to be held under the motto "Progress and Peace".

All countries and also international organizations will be invited to take part in the World Exhibition which will provide an opportunity for all countries, independent of their political organization and social system, to demonstrate the successes they have achieved in the fields of economy, science, engineering and culture.

The Soviet Government has decided to devote to the Exhibition a considerable area in South-Western Moscow. Architectural and building organizations of the city are

already working on the preparation of the project. The State Commissioner for the Exhibition Mr. N.P. D u d o r o v wrote me a letter in which he asked me to elucidate the position of I.F.A.C. in respect of the Exhibition and to answer the question whether I.F.A.C. wishes to take part in this Exhibition.

The Exhibition will be open to all those who will like to visit it. This would open to I.F.A.C. large possibilities for fulfilling its tasks and for consolidating its international prestige. Presently, the question of the participation of I.F.A.C. in this Exhibition is under consideration by the Executive Council.

VII. Membership of I.F.A.C.

During the last two years, our Federation has grown. In course of the General Assembly in Moscow, national organizations of Argentine, Bulgaria and Canada have been admitted as members of I.F.A.C. which now includes 26 national member organizations.

VIII. The Contribution of I.F.A.C.

I.F.A.C. exists since four years. I can, however, already state that, although young, I.F.A.C. has merits in respect of science and in respect of mankind and that it looks forward to prospects of its further development.

The merit of I.F.A.C. in respect of science consists in the outstanding scientific and technical results of the First Congress; the merits in respect of mankind consist in the examples of good and friendly relationship between scientists of all countries which we have noticed everywhere in course of I.F.A.C. meetings starting from Heidelberg and also in Paris, Zurich, Rome, Chicago, Bergen and more specially, in Moscow where nearly 2000 attendants of the Congress demonstrated their willingness to co-operate on an international basis in the field of automatic control. A further development and consolidation of this friendship can bear, under given conditions, a large part in consolidating peace in the world in our century of great scientific achievements, of concern and of doubts.

The prospects of the future development of I.F.A.C. consist in the considerable weight acquired by automatic control in the development of material and moral forces of modern society and also in the strong and good international prestige of I.F.A.C.

I express my hope that the Executive Council in its new composition will continue to foster the good tradition of friendship between scientists of all countries established in I.F.A.C. and the readiness to exchange knowledge and scientific information.

NEWS FROM NATIONAL MEMBERS

Italy

The National Research Council of Italy has reconstituted the Italian Commission for Automation (Commissione Italiana per l'automazione). The Commission had been dissolved at the end of the four-years term for which Italian law requires it to be appointed.

The tasks of the Commission are as follows:

1) to study theoretical and practical problems connected with automatic control;
2) to analyse the progress of automation in Italy; and
3) to coordinate the activities of Italian institutes, laboratories, associations and other organizations in the field of automation.

The Commission acts also as the Italian National Committee of I.F.A.C. Its officers and members are:

Chairman: Prof. Ing. A. M a r i n o , University of Rome.

Members: Prof. Ing. E. B o t t a n i , Politecnico, Milan - Prof. Dr. P. C a l d i r o l a , University of Milan - Prof. Ing. G. E v a n g e l i s t i , University of Bologna - Dr. Ing. G. F o d d i s , Director General, "Set", Naples - Prof. Ing. G. F r a n c i n i , University of Padua - Prof. Dr. A. G h i z z e t t i , University of Rome - Dr. Ing. E. L e n s i , Director, Telecommunications Institute, Rome - Prof. Ing. R. R i g h i , Director, State Railway, Experiment Institute, Rome - Dr. Ing. O.M. S a s s i , Technical Director, "Fiat", Turin - Prof. Ing. A. S c o r t e c c i , Director, Istituto siderurgico "Finsider", Genova - Prof. Dr. Giovanni S e m e r a n o , University of Padua - Prof. Ing. O. S e s i n i , Politecnico, Milan - Prof. R. T e a n i , President, Istituto per l'automazione, Milan.

Technical Secretaries: Prof. Ing. A. L e p s c h y , University of Trieste, Prof. Ing. A. R u b e r t i , University of Rome.

Secretary: Dr. Ing. R.V. C e c c h e r i n i of the Consiglic Nazionale delle Ricerche (C.N.R.) Staff, Rome.

The Commission is assisted by an Advisory Committee (Chairman: Professor M a r i n o) composed by some thirty members.

The address of the Italian Automation Commission is: Consiglio Nazionale delle Ricerche, Commissione italiana per l'automazione, Piazzale delle Scienze 7, Roma (Italia).

United Kingdom

B.C.A.C. ANNUAL GENERAL MEETING

At the First Annual General Meeting of the British Conference on Automation and Computation held at The Institution of Electrical Engineers, on Wednesday, 27th September 1961, the Chairman, Sir Walter P u c k e y , recalled that some twelve months ago the B.C.A.C. had been reconstituted in its present form and he then presented the Annual Report of the Executive Committee on the year's work. This was received with approbation; in particular the setting up of informal Panels of interested experts concerned respectively with Education and Training, Foreign Relations, Public Relations, and Research and Development, was endorsed.

As required by the Constitution, the meeting elected the Honorary and Executive Committee for the ensuing year, as follows:

Honorary Officers:

Sir Walter P u c k e y . Chairman
Mr. J.F. C o a l e s , O.B.E., M.A., Vice-Chairman
Prof. G.D.S. M a c L e l l a n , Vice-Chairman
Mr. C. M e a d , Vice-Chairman
Mr. S.M. R i x , Honorary Treasurer
Mr. F. Jervis S m i t h , Honorary Secretary

Executive Committee:

The Honorary Officers and

Messrs. S.W. A d e y , B.Sc.
E.H. B a t e m a n , M.A., B.Sc., Ph.D.
E.C. Clear H i l l , B.Sc.
J. C o o p e r
D. D u P r e
W.C.F. H e s s e n b e r g , M.A.
O.D. J o r d a n , M. Eng.
D. M a c d o u g a l d
Sir Charles N o r r i s , K.B.E.
Dr. J.M.S. R i s k , B.Com.
Mr. T.G.P. R o g e r s
Mr. G.M.E. W i l l i a m s , B.Sc.

WORLDWIDE AUTOMATIC CONTROL

International Events

FIRST INTERNATIONAL CONGRESS OF CHEMICAL MACHINERY, ENGINEERING AND AUTOMATION (Ch.I.S.A.)

This Congress will be held in Brno, Czechoslovakia, from September 3 to September 8, 1962 simultaneously with the 4th International Fair of Brno. In the section "Automation" papers will be adopted on the following subjects: Instrumentation, measuring and control systems; automatic data scanning and handling in chemical process control; economic problems of process control optimalization.

Persons wishing to present papers are requested to send their paper and a summary (not exceeding 250 words) before Mach 15th, 1962 to:

Organizační Výbor
I. Mezinárodního Kongresu
Ch.I.S.A.
Výstaviště 1
B r n o / C.S.S.R.

The official languages of the Congress are: Czech, English, German and Russian. Simultaneous translation will be provided from and into each of the official languages.

I.M.E.K.O. 1961

As already mentioned in I.F.A.C. Bulletins no. 9 (pages 8 and 9) and no. 10 (pages 18 and 19), this conference was held in Budapest, Hungary, on June 26 to July 1, 1961.

At the opening session of June 26, professor A.M. L e t o v , President of I.F.A.C., greeted the attendants on behalf of I.F.A.C. in the following terms:

"According to the decision of the General Assembly of I.F.A.C. in Chicago taken in 1959, I.F.A.C. co-operates with I.M.E.K.O. At present, this co-operation is expressed by the fact that the I.F.A.C. Technical Committee under the chairmanship of Dr. G. B o r o m i s z a , the Secretariat of I.M.E.K.O. under the chairmanship of Prof. G. S t r i k e r , Mr. O. B e n e d i k t , 2nd Vice-President of I.F.A.C., and Mr. J.F. C o a l e s , member of the I.F.A.C. Executive Council, have organized a special

section of this Conference the meetings of which will be devoted to border problems of interest to I.F.A.C. as well as to I.M.E.K.O.

The famous scientist William T h o m p s o n (Lord Kelvin) granted a large importance to measuring techniques. He stated that knowledge was impossible without measurement and that all that could be measured could be also known.

Although we can also consider abstract methods of knowledge, we grant, however, a great significance to this statement of the British scientist and philosopher, as only a given method of measurement can prove that the knowledge thus acquired is objective.

The science of measurement is one of the oldest in the world. It is quite probable that initially it was a means for settling trade relationship between men. However, whatever may be the initial development of this science, it demonstrates the fruitfulness of activities of scientists belonging to various specialities. We can quote here many outstanding scientists who as, for instance, W. T h o m p s o n , M.V. L o m o n o s s o v and F. G a u s s , whilst devoting themselves to problems of physics and of mathematics, have largely contributed to the science of measurements. The well-known French mathematician Henri L e b e g u e , whilst analyzing a measuring process, was lead to build purely mathematical abstractions which have substantially contributed to the development of modern mathematics. We can presently see how the investigations of L e b e g u e stimulate the development of automatic control theory.

Automatic control has its own old history and it is probable that in the development of modern engineering, automatic control and measurements should be considered as close partners.

Automatic control starts from measurement. In order to be able to control any item we have to know its conditions and this information is obtained by means of measurements.

The I.F.A.C. Executive Council feels sure that the scientific co-operation between I.F.A.C. and I.M.E.K.O. will be interesting, useful and sufficiently fruitful. It aims to objective knowledge and to its use for the profit of mankind.

This is why I am very glad to have the opportunity of greeting you here on behalf of I.F.A.C. and to wish the Conference a great success. I expect that our co-operation will develop and strengthen in the future."

The Closing Statement of the I.M.E.K.O. Conference mentions the following important facts and trends:

- the International Preparatory Committe has decided, during the Conference, to transform itself into a Permanent Committee with the aim of organizing International Measurement Conferences every three years and possibly in different countries
- the International Preparatory Committee has decided to further strengthen the friendly co-operation with I.F.A.C. and to extend it to other non-governmental organizations also represented at the Conference
- ways have to be found now to stabilize the enthusiastic support received by the Conference into a continuous activity in order to prepare ever more successful scientific I.M.E.K.O. Conferences
- all scientific and engineering societies and all individual scientists and engineers devoting themselves to the field of instruments and measurement are invited to assist the member organizations of I.M.E.K.O. in their countries (or the International Preparatory Committee directly where such member organizations do not exist) in preparing future I.M.E.K.O. Conferences.

INTERNATIONAL SEMINAR ON AUTOMATIC CONTROL IN THE IRON AND STEEL INDUSTRY

We have already published in I.F.A.C. Bulletin no. 10 (pages 20 and 21) detailed information on this International Seminar which will be held in Brussels, Belgium, in February 1962.

We can add that - outside of the already mentioned sponsorship of the I.F.A.C. Technical Committee on Applications - this International Seminar will be also sponsored by the C.E.C.A. (European Coal and Steel Commonwealth), by the Belgian Ministries of Economical Affairs and of National Education, by the Federation of Belgian Blast-Furnaces and Steel works and by the International Association of Analog Computation.

The previously defined field of interest, i.e.:

- ore conglomeration
- blast furnaces
- steel works
- hot rolling mills, reversible and continuous
- cold rolling mills, reversible and continuous

is extended to the following complementary processes:

- treatment lines (for instance, tin-plating)
- production of coke and of its by-products
- energy production from waste fuels
- gas distribution.

Provisional list of authors and papers

"Optimizing Control of a Batch-Type Furnace". Prof. Akira Nomoto, Tokyo, Japan.

"Régulation de l'équirépartition du vent sur les tuyères des hauts fourneaux". Ing. C. Chantraine, Brussels, Belgium.

"Progress of Computer Automation in strip mills". X., U.S.A.

"Datenverarbeitung in der Kokerei eines Hüttenbetriebes".Dipl.-Ing. Dominik, Frankfurt/Main, Germany

"Automatische Energiebilanzierung in Hüttenwerken". Dipl.-Ing. Dominik, Minden/Westf., Germany

"Le Réglage d'équirépartition du vent dans les tuyères de Hauts Fourneaux". André Drohomirecky, Paris, France.

"Le Rôle du Réglage Automatique dans les nouveaux procédés de production d'acier par Convertisseurs". Arsène Duyns - laeger, Brussels, Belgium.

"Ein kombiniertes Meß- und Regelsystem für das Eisenhüttenwesen". Dipl.-Ing. G. Eifert, Stuttgart-Bad Cannstatt, Germany.

"Neues elektronisches Regelsystem in Kleinbauweise für die Eisenhüttenindustrie". Dipl.-Ing. Frensch, Minden/Westf., Germany.

"Theorie und Praxis der Regelungstechnik, insbesondere mit Zweipunkt-Reglern und dem dazugehörigen Zubehör". Dipl.-Ing. Karl Georg Holstein, Kassel-Bettenhausen, Germany

"Contrôle et commande automatique des fluides dans une aciérie Thomas". Ingénieur Jean Hurtgen, Seraing, Belgium.

"Projet d'automatisation du contrôle d'épaisseur sur un laminoir Quarto à tôles fortes". Institut de Recherches de la Sidérurgie (I.R.S.I.D.), St.-Germain-en Laye, France.

"Elément de base de l'automatisation : Le circuit imprimé". Ingénieur Jean-Pierre Jaquet, Baden, Switzerland.

"Commande programmée de laminoirs réversibles". MM. Koerperich, Tramaseur and Willems, Charleroi, Belgium.

"Control of galvanizing line in a steel plant". Mr. Steven K o m j a t h y , Hammond, Indiana, U.S.A.

"Automaten im Umkehrwalzwerke". Dipl.-Ing. K u s s l , Mannheim, Germany.

"Les aspects économiques des l'emploi des calculateurs dans l'industrie sidérurgique". Jean L e c l e r c , Boulogne-Billancourt, France.

"Kurzgefaßte aktuelle Anwendungsbeispiele von Digital-Rechnern für Automation im Hüttenwesen". Dipl.-Ing. L e s e m a n n , Minden/Westf., Germany.

"Die automatische Datenerfassung und Übermittlung als Werksystem in der zentral gelenkten Fertigung". Dipl.-Ing. M a r x , Berlin, Germany.

"Commande centralisée de l'Agglomération, des Hauts-Fourneaux et de l'Aciérie, à l'aide de calculateurs numériques industriels". André R e t , Boulogne-Billancourt, France.

"Application of Digital Control Computers to Rolling Mills and Processing Lines". F.S. R o t h e , Schenectady, U.S.A.

"An Approach to Computer Control of the Blast Furnace". Dr. E. S. S a v a s , New York, N.Y., U.S.A.

"Aufgaben der Automatisierung eines Hochofens und die Lösung durch Anwendung eines Gleichstrom-Regelsystems". Dipl.-Ing. S c h n e i d e r und Dipl.-Ing. P r e s s l e r , Frankfurt/Main, Germany.

"Die Untersuchung des dynamischen Verhaltens eines Tiefofens mit einem Analogrechner". Dipl.-Ing. S c h n e i d e r , Frankurtt/Main, Germany.

"Chargenrechner für Gebläseöfen - Basic Oxygen Furnace Charge Computer". Dr. Robert V i c h n e v e t s k y , Brussels, Belgium, or Dipl.-Ing. W. M i l d n e r , Aachen, Germany.

"Die vollautomatische Beschickung von Hochöfen mit Hilfe der Magnetbandtechnik". Prof. Dr. Harry W e i s s m a n n , Hannover, Germany, or Ing. C y t r i n , Montrouge, France.

"La régulation des entraînements de laminoirs réversibles et leur automatisation". Ingénieur Stéphan Z u r c h e r , Baden, Switzerland.

The registration fee of 1.000 Belgian francs can be sent to the bank account no. 16.325 at the Société Générale de Belgique Bank, 3, Montagne du Parc, Brussels. The account is opened by I.B.R.A. (Institut Belge de Régulation et d'Automatisme).

As already mentioned, all further particulars can be obtained from I.B.R.A., 98, chaussée de Charleroi, Bruxelles 6.

Austria

Österreichischer Arbeitsausschuß für Automatisierung

The Ö.A.A. (Austrian Committee for Automatisation) organized the following lectures and events:

- on April 6, 1961 - "Development problems in the light of progress of automatisation" by Prof. N i e n s, Berlin.
- on May 18, 1961 -- "Magnetic tape memories and their use in automatisation" by Dipl.-Ing. C y t r i n, Paris, presented by Prof. H o c h r a i n e r.
- on June 15, 1961 - A display of films on automatisation and mechanisation.
- on Sept. 28, 1961- "New trends in the representation of control systems" by Dipl.-Ing. Kurt F u c h s (Germany).

Moreover, courses on small automatisation, hydraulics, hydraulic vales, pneumatics, transistors, control components, introduction into automatic control theory, electronic components for automatization and statistics took place and were largely attended.

Czechoslovakia

From September 18 to 20, 1961 a Symposium on

"Automatic Control of large Power Plants"

had been organized by the Czechoslovak Scientific and Technical Society, Prague. 50 Czechoslovak engineers and 35 invited guests from 11 other countries attended the meeting.

Greetings from the I.F.A.C. President, professor A.M.L e t o v , were transmitted by the I.F.A.C. Honorary Secretary, Dr.-Ing. G. R u p p e l .

22 papers were read on the following subjects:

- Control of power systems and power stations.
- Dynamic behaviour of power blocks and of their elements.
- Theory of digital control engineering.
- Affiliated problems of control in power plant operation.

All papers and the very lively discussions will be published in the Proceedings to be issued by

Čs. Vědecko - Technická Společnost, Široká Č. 5, Praha 1.

After the meeting the Czechoslovak hosts invited their foreign guests to excursions to the International Fair in Brno, to power stations and to a recreation center in the mountains.

France

SYMPOSIUM ON MODERN COMPUTING TECHNIQUES AND INDUSTRIAL AUTOMATIC CONTROL

The A.I.C.A. (Association Internationale pour le Calcul Analogique - International Association of Analog Computation), the A.F.R.A. (Association Française de Régulation et d'Automatisme - French Association of Automatic Control) and the A.F.C.A.L.T.I. (Association Française de Calcul et de Traitement de l'Information - French Association of Computation and Data Processing) organize jointly in Paris, from May 28 to June 3, 1962 a Symposium on Modern Computing Techniques and Industrial Automatic Control.

The main sections of the programme of this Symposium are as follows:

- trends in the field of analog computation
- part borne by analog computers in industrial automatization design and projects
- part borne by computers in automatic control systems, particularly when an industrial process has to be optimized
- hybrid, analog and digital, techniques
- security, reliability.

Further particulars can be obtained from:

The Organizing Committee of the Symposium, c/o A.F.R.A., 19, rue Blanche, Paris (9).

Germany

SYMPOSIUM ON AUTOMATIZATION OF MANUFACTURING PROCESSES

The Fachgruppe Betriebstechnik (Workshop Technology Group) of V.D.I. (Verein Deutscher Ingenieure - Institution of German Engineers) organizes, together with the Institute of Production Techniques and Automatization of the Technical University of Stuttgart, a symposium on automatization of manufacturing processes. This symposium will be held in Stuttgart on December 6 and 7, 1961 with the following 13 papers:

- "Automatization and productivity" by Prof. C.M. D o l e z a l e k , Stuttgart
- "Exchange of information linked with technical and economical comparison of plants" by M. K n o r r , Stuttgart
- "Standardization and limitation of types as a basis of rationalisation and automatization" by Dr.-Ing. C. K n o t t, Erlangen

- "Design of products as related to automatization" (with film projection) by Dir. R. M a n t z , Hannover
- "The dependance of manufacturing costs on production volume and on manufacturing procedures" by Dipl.-Ing. G. L i n d n e r , Duisburg
- "Experiences in the construction of special machines" by E. S c h a u f f l e r , Stuttgart
- "Fundamentals and problems of digital machine tool control" by Dr.-Ing. W. S i m o n , Darmstadt
- "Manufacturing planning with data-processing equipment" by Ing. A. van B e y n e n , Stuttgart
- "Programming procedures for numerically controlled machine tools" by Dipl.-Ing. H. C o r d e s , Mannheim
- "Peculiarities in the design of numerically controlled machine tools" by Dipl.-Ing. H.W. P o l i t s c h , Darmstadt
- "The position of point and trajectory control engineering" by Dipl.-Ing. K. J ü s t e l , Aachen
- "Examples for the application of numerically controlled machine tools in the U.S.A." by Ing. S. S p i z i g , Köln
- "Investigations on feed equipment for sheet parts" by Dipl.-Ing. R. S e g e r e r , Stuttgart

Applications for attendance should reach:

Verein Deutscher Ingenieure (V.D.I.)
Postfach 10 250
Düsseldorf 10, Germany

before November 27, 1961. Subscription fee: 50 German marks.

Italy

CONGRESS ON AUTOMATION

As we have already mentioned in I.F.A.C. Bulletin no. 10 (page 27) the A.N.I.P.L.A. (Associazione Nazionale Italiana per l'Automazione) organized a Congress on Automation held in Turin from September 24 to September 26, 1961. This event was one of those which took place - together with the Exhibition "ITALIA 61" in Turin - in order to celebrate the first century of Italian unity.

Japan

4TH NATIONAL CONGRESS OF AUTOMATIC CONTROL

The 4th National Congress, co-sponsored by seven associated societies, is to be held in Tokyo from 16th to 18th of November this year. The sessions are divided into 3 groups: Theory, Components and Applications.

U.S.A. AUTOMATIC CONTROL EXPERTS VISIT JAPAN

A team of U.S.A. professors and specialists was invited by the Scientific Council of Japan (the National Committee of Automatic Control of Japan) to inspect the development of automatic control in Japan. Their tour through the prominent universities, laboratories and industrial plants in Tokyo, Nagoya, Osaka, Kyoto und Kyushu from May 9 to May 29, 1961, was marked with much success in exchanging views. In return for hospitality they gave lectures on various recent topics of automatic control in the United States.

Headed by professor Rufus O l d e n b u r g e r of the Purdue University, the American team members were Messrs. G.H. F e t t, J.E. G i b s o n , Sy. H e r w a l d , J.O. H o u g e n , O.J.M. S m i t h , A. S p e r r y , W.S. T a n d l e r and H.W. Z i e b o l z .

Netherlands

LECTURE COURSE ON AUTOMATIC CONTROL

The Section for automatic control of the Royal Institution of Engineers has organized on October 4 and 5, 1961 in Utrecht a 2-day course on instrumentation in the process industry. The economic justification of instrumentation and automatic control will have a dominating attention in these lecture series.

General views as well as case-studies are to be presented at a moderate level, understandable by university graduates and practical engineers.

The lectures coincide with the national exhibition on instrumentation "Het instrument" (October 4 to 11, Jaarbeursgebouw, Utrecht).

The programme includes the following titles:

1. Economic aspects (Ir. A.G. V a n N e s , Ir. H.J. d e H e e r)
2. Design, specification and installation (Ir. J.F.M. W o l s k y , Dr. Ir. W.A. L e R ü t t e)
3. Maintenance and its organisation (Ir. G.W. t e r H a r t, M.S. J o n g k i n d)
4. Automatic monitoring and safety switches (Ir. H.J. d e H e e r , Ir. J.M. B e n j a m i n s e n)
5. Automatic control of two fold effect evaporator (Dr. J. H o o g s c h a g e n)
6. Automatic control of batch processes (Ir. W.F.C.C. E i j s v o o g e l , Dr.Ir. W.A. L e R ü t t e)
7. Instrumentation with the chemical treatment of waste water Ir. P.G. K u i p e r s , Ir. J.L. F r i m a)
8. Automatic control of steam boilers (Ir. F.J.K i j l s t r a , Ir. F.J.J. H a m e r)
9. Dosing of solid material (G.W. v a n S a n t e n , Ir. J. M i n k h o r s t

Poland

SECOND NATIONAL CONFERENCE OF AUTOMATIC CONTROL

This Conference took place in Wrocław from September 19 to September 23, 1961. The basic purposes of the Conference were: the preparation of the 2nd I.F.A.C. Congress in 1963 and the stimulation of young scientists engaged in the field of automatic control and telemechanics.

128 papers were sent to the Conference; 45 of them are considered as basic contributions and 83 as supplementary ones.

Meetings of the Conference took place in 4 sections:

1. Automatic Control Theory (27 papers)
2. Components and Devices of Automatic Control (31 papers)
3. Automatic Control Applications (43 papers)
4. Telemechanics and Computation (27 papers)

In the section of Theory, general and special problems connected with investigations and design of control systems were discussed. Theoretical considerations contained mathematical problems allowing to find new methods for solving systems. Special

physical problems were considered, as well as methods for obtaining actual results having a scientific or a practical importance for technical purposes. The papers accepted contained seven general problems each of them being represented by one basic contribution and some supplementary papers. These problems were the following:

1. Optimal control systems
2. Problems of vibration theory
3. Multi-variable control systems
4. Self-adaptive systems
5. Extremal control systems
6. Statistical problems
7. Pulse control systems.

The Section of Components dealt especially with basic parts of the set-up such as measuring elements, relays, controllers, servo-elements etc., including problems of theory, design and accuracy estimation of devices. Moreover the 2nd section dealt with instrument design principles and production experience of these devices. Papers of this section were divided into four principal groups of problems:

1. Block systems of control arrangements
2. Magnetic elements of automatic control systems
3. Mechanical elements of control systems
4. Controllers and elements of control devices.

In the Section of Applications, problems were considered connected with theoretical and experimental methods of systems' analysis and applications of control devices to actual processes. There were six main groups of problems:

1. Applications of automatic control in power systems divided into two parts:
   a) synthesis and power systems
   b) automatization of nuclear reactors
2. Automatic electrical drives
3. Automatization of metallurgical processes
4. Automatization of chemical industry
5. Automatization of heating processes
6. Various automatic control applications.

The Section of Telemechanics and Computing Techniques encompassed problems of information transfer in industrial or in remote control systems and computing devices. Theoretical problems and constructive solutions of elements and arrangements, and some applications were discussed. Papers of this section correspond to four main directions:

1. Structure theory
2. Digital techniques
3. Telemetry
4. Analog devices.

Visits to plants in and outside of Wroclaw were organized.

The papers read at the Conference will be published.

Switzerland

THE 10TH AND 11TH SYMPOSIA OF A.S.S.P.A.

The 10th and 11th Symposia of A.S.S.P.A. (Association Suisse pour l'Automatique - Swiss Association for Automatic Control) were held:

the 10th symposium devoted to automatic control in industrial processes, on September 19 and 20, 1961 in Basel under the chairmanship of professor P r o f o s .

the 11th symposium devoted to recent developments in electronic digital computer methods, on September 21 and 22, 1961 in Zurich.

The following papers were read and discussed during these two symposia:

- 1.) Automatic control in industrial processes

"Calculation of the time behaviour of temperature control systems in reaction boilers" by Dipl.-Ing. W. R o t h .

"Measurement of the time behaviour of temperature control systems in reaction boilers" by Dr. V. W o h l e r .

"Temperature control of reaction boilers" by Dipl.-Ing. E. S c h ä r .

"The dynamic behaviour of various temperature controls of reaction boilers" by Dr. V. W o h l e r .

"Temperature control of thickwall reaction tanks" by Dr. H. F r a n k .

"Dynamic response of shell-and-tube heat exchangers to flow changes" by Mr.W.M. L a w (United Kingdom).

"The control properties of continuously-operated rectifying columns" by Mr. A. M ö g l i .

"Adjustment and control features of precision destillation columns" by Dipl.-Ing. R. H i l t b r u n n e r .

- 2.) Electronic digital computer methods

"Is the numeral analysis elementary?" by professor Ch. B l a n c .

"Introduction into the formulae language ALGOL" by professor K. S a m e l s o n (Germany).

"Processing of simple examples with ALGOL" by Dr. P. L ä u c h l i .

"Selected methods of numeral mathematics" by professor F.L. B a u e r (Germany).

"The simplex method of linear programming as an example of a computing process described in ALGOL" by Dr. P. L ä u c h l i .

"Introduction into the ALGOL methods" by professor H. R u t i s h a u s e r .

"Translation from ALGOL programmes into machine programmes" by professor K. S a m e l s o n (Germany).

"Automatised formation of difference equations for partial elliptic differential equations" by Mr. E n g e l i .

"Control applications" by Dr.H.G. B ü r g i n .

THE 12TH SYMPOSIUM OF A.S.S.P.A.

The 12th Symposium of A.S.S.P.A. will take place in Bern in May 1962 on the following topics:

Hydro-electric power station control problems in connection with the conditions assigned by the reservoirs

The following papers are to be read:

- "Methods of automatic control of weir installations" by Ing. L e u e n b e r g e r .
- "Automatic control installations of the weir in the Rheinau power station" by Dipl.-Ing. E l m i g e r .
- "Water level-dependent turbine and weir automatic controls" by Ing. R. W e i d m a n n .
- "Hydro-electric equipment power control with small volume compensation tank" by Dr. M. C u é n o d , Mr. D y s l i and Mr. S a l v e t t i .
- "Hydro-electric power control taking into account the conditions assigned by the water reservoirs and by the networks". Example of the equipment of the Grande Dixence" by Ing. R. C o m t a t .

- "Optimisation of the use of storage tanks by means of electronic computers" by Mr. P.A. B o b i l l i e r.
- "Control equipment of weir installations developed by Honeywell" by Mr. J. R i t z e n t h a l e r.
- "Frequency assistance by means of auxiliary power stations whilst maintaining the water control" by Ing. E. A n d r e s.
- "The control installations of the Misox power station".

ACTIVITIES OF THE GENEVA SECTION OF A.S.S.P.A.

As already announced in I.F.A.C. Bulletin no. 10 (p. 29 and 30) courses on logic circuits and repetitive automatic control are provided for 1961-1962. These courses will alternate, every Monday at 6.15 p.m. (Institute of Physics of the Geneva University), with lectures on probability calculus applications. Courses on logic circuits and repetitive automatic control will thus take place on the following Mondays:

- "Logic algebra, introduction to Boolean algebra" by Mr. Lucas P u n (October 9, 1961).
- "Introduction to distributive networks algebra" by Mr. F a u r e (October 23, 1961).
- "Recent development of memory components" (November 6,1961).
- "Computer circuits: composition and operation" (November 20, 1961).
- "General organisation of digital computers "(December 4,1961).
- "Applications of logic circuits to the transmission of digital information" (December 18, 1961).
- "Methods for designing automatic machine-tools"by Mr. A s s e o (January 22, 1962).
- "Examples of industrial applications of repetitive controls" by Mr. P a h u d (February 5, 1962).
- "Repetitive controls applied to railway vehicles" by Mr. G e r m a n i e r (February 19, 1962).
- "Repetitive controls in power stations" by Dr.M. C u é n o d and Mr. O g u e y (March 5, 1962).
- "Magnetic recording and programming" by Mr. C y t r i n (March 19, 1962).
- "An example of application of punched-tape controls" by Dr. W i l l e m s (Appil 2, 1962).
- "Industrial applications of pneumatic repetitive controls" by Mr. M a r t i n (April 16, 1962).

U.S.A.

THE 1961 JOINT AUTOMATIC CONTROL CONFERENCE

The Joint Automatic Control Conference organized by the five main engineering societies of the United States is certainly the most important annual event in the field of automatic control in U.S.A. This is why we list hereafter all of the 55 papers read at this conference together with the means of eventually obtaining copies of them.

This year, the 2nd Joint Automatic Control Conference was held at the University of Colorado, Boulder, Colorado, from June 28 to June 30, 1961. It was sponsored, as usually, by the five following societies, the addresses of which are included, in order to enable readers to obtain from them copies of papers in which they would be eventually interested:

A.I.Ch.E. (American Institute of Chemical Engineers)
25 West 45th Street, New York 36, N.Y.

A.I.E.E. (American Institute of Electrical Engineers)
33 West 39th Street, New York 18, N.Y.

A.S.M.E. (American Society of Mechanical Engineers)
345 East 47th Street, New York 17, N.Y.

I.R.E. (Institute of Radio Engineers)
1, East 79th Street, New York 21, N.Y.

I.S.A. (Instrument Society of America)
Penn - Sheraton Hotel, 530, William Penn Place, Pittsburgh 19, Pennsylvania.

All papers listed below bear an indication to which of these 5 societies (A.I.Ch.E., A.I.E.E., A.S.M.E., I.R.E., or I.S.A.) they pertain (and consequently, from which of them they can be obtained at the above addresses). All I.R.E. papers have been published in the I.R.E. Transactions on Automatic Control, volume AC-6, no. 2, May 1961, price: 4 dollars. A.I.Ch.E., A.I.E.E. and A.S.M.E. papers are available as individual preprints at the price of 1 dollar each from the corresponding society. Information on the availability of the I.S.A. papers can be obtained from the Instrument Society of America.

Moreover, the 96-page conference digest containing the abstracts of all papers is available at the price of 5 dollars from any of the 5 above-mentioned societies.

The first of the 16 sessions of the Joint Automatic Control Conference was devoted to introductory remarks, to the award of the American Automatic Control Council prize for the 1960 Joint Automatic Control Conference paper and to invited addresses. In the other sessions, the following papers were read:

Session 2. Theory of optimization

- A.S.M.E. "The structure of optimum control systems" by B. Friedland .
- A.S.M.E. "On the existence of optimum controls" by L. Markus and E.B. Lee .
- A.S.M.E. "Optimal pursuit strategies in discrete-state probabilistic systems" by J.H. Eaton and L.A. Zadeh .
- I.R.E. "On a property of optimal controllers with boundedness constraints" by H.L.Grogins-ky .

Session 3. Hydraulic and pneumatic control

- I.S.A. "Design of hydraulic servo with improved band-pass characteristics when driving a resonant mechanical load" by W. Seamone .
- I.S.A. "The linear properties of pneumatic transmission lines" by N.B. Nichols .
- I.S.A. "Hydraulic control of acoustic-test siren rotors using analog-digital techniques" by F.D. Ezekiel .
- I.S.A. "A systems approach to high-accuracy fluid-control valving" by R. Henke .

Session 4. Economic parameters in process control

- A.I.E.E. "Cost models for systems engineering" by Harold Chestnut .
- A.I.Ch.E. "Outline of the future role of feed-forward control in the chemical industry" by S.Calvert and G. Coulman .
- A.I.Ch.E. "Incentives for computer control in the chemical process industries" by T.Q. Eliot and D.R. Longmire .

Session 5. Optimal Switching I

- A.S.M.E. "A switching criterion for certain time-optimal regulating systems" by E.R. Rang .
- A.S.M.E. "Time optimal control of non-linear processes" by E.B. Lee .
- A.S.M.E. "A general iterative technique for optimal control systems subject to saturation" by Y.C.Ho .
- I.R.E. "A minimal time discrete system" by C.A. Desoer and J. Wing .

Session 6. Aerospace vehicle control I

- I.S.A. "Design considerations of inertia wheel systems for attitude control of satellite vehicles" by R.E. Mortensen .
- A.S.M.E. "Gyroscopic coupling in space vehicle attitude control systems" by R.H. Cannon , Jr.
- A.S.M.E. "Derived rate increment stabilization. Its application to the attitude control problem" by H.C. Vivian and J.C. Nicklas .

Session 7. Process dynamics

- A.I.Ch.E. "A finite-stage model for highly asymmetric residence time distributions" by R.J. Adler and R.B. Hovorka .
- A.I.Ch.E. "Concentration dynamics in tubular flow systems" by L.T. Fan and Y.K. Ahn .
- A.I.Ch.E. "Transfer functions of heat exchangers" by J.P. Hsu and N. Gilbert .

Session 8. Optimal switching II

- I.R.E. "Theory and design of high-order bang-bang control systems" by M. Athanassiades and O.J.M. Smith .
- A.I.E.E. "The synthesis of quasi-stationary optimum non-linear control systems. Part 1 - Synthesis considerations. Part 2 - Extension in mechanization" by C.T. Leondes and P.Chandaket .
- A.S.M.E. "Optimal control methods for on-off sampling systems" by W.L. Nelson .
- A.S.M.E. "Minimum time control of second order pulse-width-modulated samples-data systems" by E. Polak .

Session 9. Aerospace vehicle control II

- I.R.E. "Model feedback applied to flexible booster control" by G.E.Tutt and W.K. Waymeyer .
- A.I.E.E. "Can electric actuators meet missile control requirements?" by G.C. Newton , Jr., and R.W. Rasche .
- I.R.E. "Terminal control system applications" by R.K. Smyth and E.A. O'Hern .

Session 10. Automatic control applications

- I.R.E. "Direct cycle nuclear power plant stability analysis" by D. Buden and R.F. Miller .
- I.S.A. "The application of dead-time compensation to a chemical reactor for automatic control of production rate" by D.E. Lupfer and M.W. Ogglesby .
- A.I.E.E. "Description of a digital speed regulating system" by E.C. Fox and J. Dobbie
- I.S.A. "Measuring and classifying haze in plate glass with an automatic hazemeter" by B.W.Preston .

Session 11. Adaptive control systems

- I.R.E. "A parameter perturbation adaptive control system" by R.J. Marc Grath , V. Rajaraman and V.C. Rideout .
- I.R.E. "Transfer function tracking and adaptive control systems" by N.N. Puri and C.N. Weygandt .
- I.R.E. "Adaptive servo tracking" by A.I. Talkin .
- I.S.A. "An adaptive three-mode controller for the process industries" by W.B. Field .

Session 12. Non-linear control systems

- I.R.E. "A modified Lyapunov method for non-linear stability analysis" by D.R. Ingwerson .
- A.I.E.E. "Some recent advances in analysis and synthesis of non-linear systems" by A.A. Wolf .
- A.I.Ch.E. "Non-linear controllers" by J.C. Webb and H.T. Bates .

Session 13. Statistical design considerations

- A.I.E.E. "Signal stabilization of a control system with random inputs" by Rufus Oldenburger and R. Sridhar .
- I.R.E. "The use of mean weighed square error criterion for optimum filtering on non-stationary random processes" by K. Sahara and G.J. Murphy .
- A.S.M.E. "Stability of a non-linear feedback system in the presence of Gaussian noise" by Rufus Oldenburger and R. Sridhar .

- I.R.E. "A general performance index for analytical design of control systems" by Z.V. Rekasius.

Session 14. Special topics in control

- A.S.M.E. "On periodic modes of oscillation in pulse-width-modulated feedback systems" by E.I. Jury and T. Nishimura.
- A.I.E.E. "Design of non-interacting control systems using Bode diagrams" by K. Chen, R.A. Mathias and D.M. Sauter.
- A.I.E.E. "A graphical method for finding the frequency response of non-linear closed-loop systems" by A.S. Mac Allister.
- A.S.M.E. "Optimizing control of single-input extremum systems" by J.S. Fraait and Donald P. Eckman.
- I.R.E. "Sensitivity considerations for time-varying sampled data feedback systems" by J.B. Cruz Jr.

Session 15. Process and control non-linearities

- A.I.E.E. "Fast analog computer techniques for design of controllers for non-linear systems" by G.J. Fiedler and J.J. Landy.
- A.I.E.E. "On stabilization of feedback systems affected by hysteresis non-linearities" by A.K. Mahalanabis.
- I.R.E. "Stability of servomechanisms with friction and stiction in the output element" by W.H. Bohacek and F.B. Tuteur.
- I.S.A. "The motion of systems under square law damping" by W.H. Baier.

Session 16. Time series and process identification

- I.R.E. "System impulse response identification based upon short normal operating records" by R.B. Kerr and W.H. Surber, Jr.
- I.R.E. "Some techniques of linear system identification using correlating filters" by W.W. Lichtenberger.
- A.I.E.E. "Digital computer analysis of closed-loop systems using number series approach" by. R.K. Adams.

COMING EVENTS IN INSTRUMENTATION AND CONTROL IN THE U.S.A.

We have listed hereafter a number of coming events in instruments and control with their dates and locations as well as the names and addresses of persons from whom further particulars can be obtained:

12th Annual Conference on instrumentation for the iron and steel industry (I.S.A.)	Pittsburgh, Pennsylvania March 14 - 16, 1962	H.M. Gravatt, Allegheny Ludlum Steel Corporation, Research Laboratory, Brackenridge, Pennsylvania
4th National Chemical and Petroleum Instrumentation Symposium (I.S.A.)	Wilmington, Delaware, April 9 - 10, 1962	C.W. Sanders, E.I. du Pont de Nemours & Co., Inc., Louviers Building, Newark, Delaware
3rd National Pulp and Paper Instrumentation Symposium (I.S.A.)	Jacksonville, Florida April 26 - 27, 1962	L.G. Good, Systems Service Corp. P.O. Box 952, Charlotte, North Carolina
8th National Symposium on Instrumental methods of analysis (I.S.A.)	Charleston, West Virginia April 30 - May 2, 1962	M.D. Weiss, Section Head, Special Instrumentation Department, Union Carbide Olefins Company, South Charleston, West Virginia
5th National Power Instrumentation Symposium (I.S.A.)	Fort Worth, Texas May 6 - 9, 1962	L.J. Mertz, Convair, Fort Worth, Texas
8th National Aero-Space Instrumentation Symposium (I.S.A.)	Washington, D.C. May 21 - 23, 1962	Cyrus Creveling, Goddard Space Flight Center, Greenbelt, Maryland

11th National Telemetering Conference (A.I.E.E., I.R.E., I.S.A.)	Washington, D.C. May 23 - 25, 1962	H.W. Royce, Operations Manager, Electronic Control System Department, Mail n° G-3049, The Martin Company, Baltimore 3, Maryland
3rd Joint Automatic Control Conference (A.I.Ch.E., A.I.E.E., A.S.M.E., I.R.E., I.S.A.)	New York, N.Y. June 27 - 29, 1962	Dr. A.S. Robinson, Kollsman Instrument Corporation, 80-08, 45th avenue, Elmhurst 73, New York
17th Annual I.S.A. Instrument Automation Conference and Exhibit	New York, N.Y. October 15 - 19, 1962	Instrument Society of America, Penn-Sheraton Hotel 530, William Penn Place Pittsburgh 19, Pa.

THE SYSTEMS RESEARCH CENTER OF THE CASE INSTITUTE OF TECHNOLOGY

The Case Institute of Technology in Cleveland, Ohio, runs under the general direction of professor Donald P. E c k m a n a Systems Research Center which has a dual objective: first, the contributions to knowledge by working on problems of interest and significance in systems and second, through this education-by-research to enhance the technical ability of engineers and scientists in the techniques of systems analysis.

Four project groups exist presently:

A. Adaptive and self-organizing systems
C. Control of complex systems
L. Life science systems
M. Medical systems.

The research topics as listed on the next pages are presently covered in each of these project groups.

A set of research abstracts has been published in June 1961. Requests for further information should be sent to the corresponding Project Director, Systems Research Center, Case Institute of Technology, 10900 Euclid Avenue, Cleveland 6, Ohio.

Project A. Adaptive and self-organizing systems

Project Director: Professor Mihajlo M e s a r o v i ć

- General systems theory by Professor Mihajlo M e s a r o v i ć ,
- Synthesis theory in digital control systems by Dr. Anatol G o s i e w s k i ,
- Interactions in multivariable systems by Mr. Peter A. O r n e r ,
- Interacting control by Mr. Roger W. B r o c k e t t ,
- Optimal and sub-optimal decision making by Mr. Donald S. M a c k o ,
- Multi-variable direct optimization by Mr. Karl M. W i i g,
- Decision models for urban traffic by Mr. John T.M o r g a n ,
- Energy models in control system design by Mr. James A d a m s ,
- Dynamic linearization of non-linear systems by Mr. Walter J. C u l v e r ,
- Systems approach to complex societies by Dr. Eugene S. U y e k i ,
- Investigations in computable probability spaces by Mr. Richard W. R o d g e r s ,
- Solution to the Shannon switching game by Dr. Alfred B. L e h m a n ,
- Basic transformations in many-valued logical systems by Mr. C h u e n K u a n g T u n g ,

Project C. Control of complex systems

Project Director: Dr. Irving L e f k o w i t z

- Dynamic optimization of a continuous non-linear process by Mr. K. Vergis M a t h e w ,
- Dynamic optimization of a continuous flow chemical reactor by Mr. Ole A. S o l h e i m ,
- Optimum control of continuous strip processing by Mr. David A. W i s m e r ,
- Control of a complex system by a simple model by Mr. Nobukazu I n a d a ,
- Investigation of model adaptation in the presence of noise by Mr. Charles E. R a d k e ,
- Model adaptation to achieve best predictive properties of a model by Mr. Leon S. L a s d o n ,

- Computer control using a generalized model with self-checking by Mr. John W. B e r n a r d ,
- Investigation of model adaptation techniques by Mr. William L. G i l l a m ,
- Dynamic response and control of a fluidized bed chemical reactor by Dr. Atsunobu I c h i k a w a ,
- Dynamic response and optimization of a continuous chemical reactor by Mr. Wesley M. L o n g ,
- The dynamic behaviour of a gas absorption system by Mr. George A. C o u l m a n ,
- Optimizing control of a gas absorption system by Mr. Edward J. S m i t h ,
- Computer control and optimization of an activated sludge treatment plant by Mr. Ernst J. N e u g r o s c h l ,
- Optimizing control of a batch heating furnace by Mr. Julius L. M a r c u s ,
- Real-time computation devices for control systems by Mr. Robert N. L i n e b a r g e r ,
- Decision analysis for marketing a new product by Mr. Irwin G r o s s ,

Project L. Life science systems

Project Director: Dr. David G. F l e m i n g

- Dynamic analysis of visual tracking by Mr. L. Ensign J o h n s o n , Jr.,
- Effect of X-irradiation on biological systems by Mr. Joseph A. M a r q u i s e e ,

Project M. Medical systems

Project Director: Professor Donald P. E c k m a n

- Determination of optimal rehabilitation for chronically ill by Mr. William R. K i n g ,
- Effective utilization of nursing ressources by Mr. William R. K i n g ,
- Computer analysis of electromyographic signals by Mr. Robin R. L a k e ,
- Effects of protein diet on decubitus ulcers by Mr. Jose T r e v i n o ,
- Investigation of dynamics of metabolic processes by Mr. Lester G o o d m a n ,
- Electrocardiographic analysis by Dr. Robert P l o n s e y,
- Systems research in electrocardiology by Mr. Arthur T. B u b l i t z .

FREE IDEAS, OPINIONS AND SUGGESTIONS

TENTATIVE CLASSIFICATION FOR THE BIBLIOGRAPHY OF AUTOMATIC CONTROL

by Prof. Ing. Dr. Victor B r o i d a , Boulogne sur Seine, France

Foreword

A preliminary classification of only 72 titles and sub-titles has been used by the author in the list of 757 books on Automatic Control published by U.N.E.S.C.O. in May 1960. This classification - which did not use the Universal Decimal Classification - was divided into 6 main chapters:

1. Theory of Automatic Control
2. General information on Automatic Control Systems
3. Physical and mechanical domains of application of Automatic Control
4. Automatic Control means
5. Applications of Automatic Control to industry, transportation and transmissions
6. Miscellaneous information related to Automatic Control

It was felt by the author himself that this classification, whilst being sufficient for books only, would be probably quite insufficient and too general in the case of books and articles on Automatic Control.

In course of the meeting of the Executive Council of I.F.A.C. held in Bergen, Norway, on March 20-22, 1961, the author was informed of a classification of documentation on Automatic Control prepared by Dr. K l i m e k (Czechoslovakia) and had the opportunity of investigating this tentative classification written in Czech language.

This very valuable work is very large as it comprises 788 titles and sub-titles and uses the Universal Decimal Classification with numbers some of which reach up to 8 consecutive figures, the average numbers being of 6 consecutive figures. This classification is divided into 5 main chapters:

0. General information on Automatic Control and telemechanics
1. Theory of automatization
2. Elements of measurement and control
3. Automatization, control and telemechanics of systems
4. Automatic computers and dynamic models.

As it has been generally felt that this classification was somewhat too large for merely bibliographical purposes, the author, on the suggestion of Mr. A j n b i n d e r , attempted to "blend" both systems in the most convenient way.

The tentative classification which is given hereafter is the result of this attempt.

This classification follows - just as that prepared by Dr. K l i m e k - the Universal Decimal Classification but uses numbers which never reach more than 4 consecutive figures (instead of 6 and sometimes up to 8 consecutive figures). The number of titles and sub-titles is 431 (instead of 788 in the classification prepared by Dr. K l i m e k and only 72 in the author's original classification). The classification given hereafter is divided into 6 main chapters:

1. General and mathematical theory of Automatic Control
2. Theoretical and experimental investigations of Automatic Control systems and their components
3. Physical domains of application of Automatic Control
4. Automatic Control means and components
5. Applications of Automatic Control in agriculture, mining, materials handling, building, power production, transformation industry, transportation of persons and goods and communications
6. Miscellaneous information related to Automatic Control

This division into 6 main chapters is, of course, much closer to that of the author's original classification - taking into account the large profit he has made of that prepared by Dr. K l i m e k - than to the division into 5 main chapters of Dr. K l i m e k ' s own classification. In fact, the following correspondence can be established between these two divisions:

Classification prepared by Dr. K l i m e k	Corresponding chapters of the classification given hereafter
0. General information on Automatic Control and telemechanics	6. Miscellaneous information related to Automatic Control
1. Theory of automatization	1. General and mathematical theory of Automatic Control
	2. Theoretical and experimental investigation of Automatic Control systems and their components
2. Elements of measurement and control	3. Physical domains of application of Automatic Control
	4. Automatic Control means and components
3. Automatization control and telemechanics of systems	5. Applications of Automatic Control in agriculture, mining, materials handling, building, power production, transformation industry, transportation of persons and goods and communications
4. Automatic computers and dynamic models	Included in chapter 4 under 4.0.5 "Automatic Control Computers"

The reasons for which the author has modified the division into separate chapters according to the above table are the following:

a) It seemed preferable to locate less mathematical and technical information (history of Automatic Control, economical, social and political aspects of Automatic Control, human control and its regularity, standards of Automatic Control, definitions of conceptions, terminology, symbols of Automatic Control, patent information on Automatic Control, bibliography and documentation of Automatic Control, teaching of Automatic Control and scientific and technical societies devoted to Automatic Control) at the end of the classification (under 6, Miscellaneous information related to Automatic Control) rather than at its beginning (under 0, General information on Automatic Control and telemechanics) so as to begin directly with more scientific and technical information on Automatic Control.

b) The reason for splitting 1. "Theory of automatization" into two independent chapters is the concern to separate specialized mathematics and cybernetics (1. "General and mathematical theory of automatic control") from theoretical and experimental methods peculiar to automatic control techniques (2. "Theoretical and experimental investigation of automatic control systems and their components").

c) The reason for splitting 2. "Elements of measurement and control into two independent chapters is the concern to separate the nature of magnitudes which are controlled (3. "Physical domains of application of Automatic Control") from the actual means and components which allow to fulfill this control (4. "Automatic Control means and components").

d) The reason for including 4. "Automatic computers and dynamic models" in chapter 4. "Automatic Control means and components" is the fact that, as far as I.F.A.C. is concerned, computers and dynamic models are to be only considered when they form a part of an Automatic Control system, i.e. when they are used as means for Automatic Control.

In accordance with these fundamental ideas and after having included a large number of elements of the classification prepared by Dr. K l i m e k - some of which have been completed by additional elements or re-arranged - the proposed tentative classification is as follows:

1. GENERAL AND MATHEMATICAL THEORY OF AUTOMATIC CONTROL

1.1 Mathematical methods

1.1.0 Mathematical methods, general
1.1.1 Algebraic equations
1.1.1.0 Algebraic equations, general
1.1.1.1 Solution of algebraic equations of higher degrees
1.1.1.2 Linear programming
1.1.2 Solution of linear differential equations
1.1.2.0 Linear differential equations, general
1.1.2.1 Laplace transform
1.1.2.2 Fourier transform, Fourier integral
1.1.3 Solution of non-linear differential equations
1.1.3.0 Non-linear differential equations, general
1.1.3.1 Phase plane, phase space
1.1.3.2 Harmonic linearization
1.1.4 Solution of finite difference equations
1.1.4.0 Finite difference equations, general
1.1.4.1 Discrete Laplace transform, Z-transform
1.1.5 Transient regime methods
1.1.5.0 Transient regime methods, general
1.1.5.1 Numerical integration
1.1.6 Random process theory and statistical methods
1.1.6.0 Random processes, general
1.1.6.1 Information theory
1.1.6.2 Correlation functions
1.1.6.3 Spectral density
1.1.7 Symbolic logic
1.1.8 Grapho-analytical methods
1.1.9 Simplified methods of solution, approximations

1.2 Cybernetics

1.2.0 Cybernetics, general
1.2.1 Engineering cybernetics
1.2.2 Bio-cybernetics

2. THEORETICAL AND EXPERIMENTAL INVESTIGATION OF AUTOMATIC CONTROL SYSTEMS AND THEIR COMPONENTS

2.0 Theory of Automatic Control systems and their components, general

2.1 Systems dynamics

2.1.0 Systems engineering
2.1.1 Nuclear reactors
2.1.2 Steam generators, boilers
2.1.3 Steam turbines
2.1.4 Electric machines
2.1.5 Systems of electric power distribution
2.1.6 Heat exchangers
2.1.7 Chemical systems, reactors, destillation and rectification columns
2.1.8 Miscellaneous systems

2.2 Theory of controllers

2.2.0 Theory of controllers, general
2.2.1 Theory of continuous controllers
2.2.1.0 Theory of continuous controllers, general
2.2.1.1 Proportional controllers
2.2.1.2 Integral controllers
2.2.1.3 Combined controllers (PI, PD, PID)
2.2.2 Theory of discontinuous controllers
2.2.3 Theory of extremum controllers and self-adjusting systems

2.3 Theory of continuous Automatic Control

2.3.0 Theory of continuous Automatic Control, general
2.3.1 Continuous linear control systems
2.3.1.0 Continuous linear control systems, general. Methods of analysis and synthesis
2.3.1.1 Feedback
2.3.1.2 Signal transfer (frequency and transient responses)
2.3.1.3 Transfer functions
2.3.1.4 Control characteristics (accuracy, control speed, stability)
2.3.1.5 Optimal control operation
2.3.1.6 Multiple-branch, control systems
2.3.1.7 Multiple-parameter control systems
2.3.2 Continuous non-linear control systems
2.3.2.0 Continuous non-linear control systems, general. Methods of analysis and synthesis
2.3.2.1 Feedback
2.3.2.2 Signal transfer (frequency response)
2.3.2.3 Describing functions
2.3.2.4 Control characteristics (accuracy, control speed, stability)
2.3.2.5 Optimal control operation
2.3.2.6 Other features

2.4 Theory of discontinuous Automatic Control

2.4.0 Discontinuous Automatic Control, general

2.4.0.1 Feedback
2.4.0.2 Signal transfer
2.4.0.3 Control characteristics (stability)
2.4.0.4 Optimal control operation

2.4.1 Two-position and multiple-position control

2.4.1.0 Two-position and multiple-position, general
2.4.1.1 Relay and switching systems (relay algebra, binary systems)

2.4.2 Pulse control

2.4.2.0 Pulse control, general
2.4.2.1 Sampling

2.5 Theory of optimal, self-adaptive and self-learning automatic control

2.6 Experimental investigation of control systems and their components

2.6.1 Investigation of static characteristics
2.6.2 Investigation of dynamic characteristics

2.6.2.1 by frequency response
2.6.2.2.by transient response

2.6.3 Investigation of stochastic characteristics
2.6.4 Investigation of stability

3. PHYSICAL DOMAINS OF APPLICATIONS OF AUTOMATIC CONTROL

3.1 Instrumentation and Control of electric and magnetic magnitudes

3.1.1 Instrumentation and Control of electric magnitudes

3.1.1.1 Tensions
3.1.1.2 Currents
3.1.1.3 Power, energy
3.1.1.4 Parameters of electric systems and devices (resistances, electric conductivities, impedances, inductances, capacities, dielectric constants, dielectric loss factors, etc.)
3.1.1.5 Frequencies
3.1.1.6 Phase, gain
3.1.1.7 Miscellaneous

3.1.2 Instrumentation and Control of magnetic magnitudes

3.1.2.1 Hysteresis cycle
3.1.2.2 Permeability
3.1.2.3 Magnetic field

3.1.2.4 Induction and magnetic flow
3.1.2.5 Magnetic losses
3.1.2.6 Nuclear magnetic resonance
3.1.2.7 Miscellaneous

3.2 Instrumentation and Control of non-electric magnitudes

3.2.1.1 Linear dimensions and surfaces
3.2.1.2 Levels
3.2.1.3 Volumes
3.2.1.4 Flows
3.2.1.5 Pressures and forces
3.2.1.6 Weights, specific gravities, densities
3.2.1.7 Moments (dynamometry)
3.2.1.8 Angular position, angular displacement, angular speeds, angular accelerations
3.2.1.9 Mechanical vibrations

3.2.2 Time
3.2.3 Thermal magnitudes

3.2.3.1 Temperatures, pyrometry
3.2.3.2 Thermal expansion
3.2.3.3 Specific heats, calorimetry
3.2.3.4 Heat flows, quantities of heat
3.2.3.5 Thermal conductivities
3.2.3.6 Miscellaneous

3.2.4 Technical analysis magnitudes

3.2.4.1 Radiations
3.2.4.2 Gas and smoke compositions
3.2.4.3 pH and rH
3.2.4.4 Moisture
3.2.4.5 Viscosity
3.2.4.6 Polarography
3.2.4.7 Mass spectrometry
3.2.4.8 Concentrations of solutions and mixtures, supersaturation
3.2.4.9 Miscellaneous

3.2.5 Pulse magnitudes
3.2.6 Material deficiencies, leaks, non-destructive analysis
3.2.7 Other non-electric magnitudes

4. AUTOMATIC CONTROL MEANS AND COMPONENTS

4.0 General nature of Automatic Control means and components

4.0.1 Electric Control means and components

4.0.1.0 Electric control means and components, general
4.0.1.1 Electromechanical control means and components
4.0.1.2 Electronic and magnetic control means and components

4.0.2 Control means and components using pressurized fluids

4.0.2.0 Control means and components using pressurized fluids, general
4.0.2.1 Hydraulic control means and components
4.0.2.2 Pneumatic control means and components

4.0.3 Mechanical control means and components
4.0.4 Combined control means and components
4.0.5 Automatic Control Computers

4.0.5.0 Automatic Control Computers, general
4.0.5.1 Analog Control Computers
4.0.5.2 Digital Control Computers
4.0.5.3 Digital differential analysers used for Automatic Control
4.0.5.4 On-line Control Computers
4.0.5.5 Off-line Control Computers

4.0.6 Telemetering and Remote Control

4.1 Production, operation and maintenance of Automatic Control components

4.1.1 Production technology, materials
4.1.2 General methods of production, standardization of parts
4.1.3 Assembling
4.1.4 Reliability
4.1.5 Maintenance

4.2 Sensing and measuring elements

4.2.1 Electric sensing elements

4.2.1.0 Electric sensing elements, general
4.2.1.1 Sensing elements using resistances (conductors), semi-conductors, inductances or capacities
4.2.1.2 Sensing elements using force-current compensation
4.2.1.3 Generator-type sensing elements (thermoelectric, photoelectric, piezoelectric, electrolytic-namely pH, dynamoelectric)
4.2.1.4 Contact-type sensing elements (end-of-stroke)
4.2.1.5 High-frequency sensing elements
4.2.1.6 Acoustic and supersonic sensing elements
4.2.1.7 Miscellaneous electric sensing elements

4.2.2 Non-electric sensing elements

4.2.2.0 Non-electric sensing elements, general
4.2.2.1 Mechanical sensing elements (Bourdon tubes, diaphragms, bellows, ring balances, pistons, thermal-expansion, centrifugal, gyroscopic devices, etc.)
4.2.2.2 Photoelastic sensing elements (light-signal modulation)
4.2.2.3 Chemical sensing elements
4.2.2.4 Miscellaneous non-electric sensing elements

4.2.3 Measuring elements

4.2.3.0 Measuring elements, general
4.2.3.1 Continuous (analog) indicating, recording, oscillographic devices
4.2.3.2 Discontinuous (digital) indicating, printing, punching devices

4.3 Conversion and remote-transmitting elements

4.3.1 Magnitude converters

4.3.1.1 Electric-electric converters
4.3.1.2 Electro-hydraulic converters
4.3.1.3 Electro-pneumatic converters
4.3.1.4 Pneumo-electric converters
4.3.1.5 Electro-mechanical converters
4.3.1.6 Mechano-electric converters
4.3.1.7 Pneumatic-pneumatic converters
4.3.1.8 Pneumo-mechanical converters
4.3.1.9 Mechano-pneumatic converters

4.3.2 Remote-transmitting elements

4.3.2.0 Remote-transmitting elements, general
4.3.2.1 Electric remote-transmitting elements (potentiometers, selsyns, pulse-transmitting, etc.)
4.3.2.2 Hydraulic remote-transmitting elements
4.3.2.3 Pneumatic remote-transmitting elements
4.3.2.4 Optical remote-transmitting elements
4.3.2.5 Combined remote-transmitting elements

4.4 Amplifiers and relays

4.4.1 Operating amplifiers

4.4.1.0 Operating amplifiers, general
4.4.1.1 Electric amplifiers (rotative, magnetic, electronic, dielectric, relay-type)
4.4.1.2 Hydraulic amplifiers
4.4.1.3 Pneumatic amplifiers
4.4.1.4 Mechanical amplifiers

4.4.2 Relays

4.4.2.0 Relays, general
4.4.2.1 Electric relays (with contacts or contactless)
4.4.2.2 Pneumatic relays

4.5 Mathematical and logical circuit elements

4.5.1 Function components

4.5.1.1 Continuous linear-function components (derivators, integrators)
4.5.1.2 Continuous non-linear function components (multipliers, dividers, root-extractors, limiters, sine or logarithmic resolvers, etc.)
4.5.1.3 Discontinuous function components
4.5.1.4 Wave generators (sine-wave, rectangular-wave, noise generators, etc.)
4.5.1.5 Analog-digital and digital-analog converters, coders and decoders

4.5.2 Modulators and demodulators

4.5.2.0 Modulators and demodulators, general
4.5.2.1 Magnetic modulators and demodulators
4.5.2.2 Transistorized modulators and demodulators

4.5.3 Memory components

4.5.3.0 Memory components, general
4.5.3.1 Punched tapes
4.5.3.2 Recording tapes
4.5.3.3 Magnetic drums
4.5.3.4 Matrix memories (ferrite cores, twistors)
4.5.3.5 Superconductive memories, cryotrons
4.5.3.6 Electro-acoustic memories
4.5.3.7 Magnetostriction memories
4.5.3.8 Miscellaneous memories

4.5.4 Correlators
4.5.5 Spectral analysers
4.5.6 Adaptive elements
4.5.7 Miscellaneous mathematical and logical circuit elements

4.6 Active elements

4.6.1 Servo-motors

4.6.1.0 Servo-motors, general
4.6.1.1 Electric servo-motors
4.6.1.2 Hydraulic servo-motors
4.6.1.3 Pneumatic servo-motors
4.6.1.4 Combined servo-motors

4.6.2 Final control elements

4.6.2.1 Final elements controlling electric magnitudes (variable resistances, converters, transducers, transformers, switches rectifiers, thyratrons, power transistors, etc.)
4.6.2.2 Final elements controlling non-electric magnitudes (plug and butterfly valves, dampers, clutches, variable-speed drives, etc.)

4.7 Controllers

4.7.0 Controllers, general

4.7.0.1 Direct-acting controllers
4.7.0.2 Indirect-acting controllers (using an auxiliary source of power)

4.7.1 Electric controllers

4.7.1.1 Continuous controllers with rotative amplifier
4.7.1.2 Continuous controllers with magnetic amplifier
4.7.1.3 Continuous controllers with electronic amplifier
4.7.1.4 Discontinuous relay-type controllers
4.7.1.5 Combined electric controllers

4.7.2 Hydraulic controllers

4.7.2.1 with nozzle distribution
4.7.2.2 with slide-valve distribution

4.7.3 Pneumatic controllers

4.7.3.1 Low-pressure controllers
4.7.3.2 High-pressure controllers

4.7.4 Mechanical controllers

4.7.5 Combined controllers

4.7.5.1 Electro-hydraulic controllers
4.7.5.2 Electro-pneumatic controllers
4.7.5.3 Pneumo-hydraulic controllers

4.7.6 Variable set-point controllers

4.7.6.1 Programme controllers
4.7.6.2 Follow-up controllers

4.7.7 Special controllers

4.7.7.1 Controllers with adaptive elements (extremal controllers)
4.7.7.2 Controllers with logic elements

5. APPLICATIONS OF AUTOMATIC CONTROL, AGRICULTURE, MINING, HANDLING, BUILDING, POWER PRODUCTION, TRANSFORMATION INDUSTRY, TRANSPORTATION OF PERSONS AND GOODS AND COMMUNICATIONS

5.1 Applications of Automatic Control in agriculture

5.2 Applications of Automatic Control in mining

- 5.2.1 Automatization of geological research and industrial measurements
- 5.2.2 Mining signalization and remote control
- 5.2.3 Automatic Control of extracting equipment
- 5.2.4 Automatic Control in ore extraction
- 5.2.5 Automatic Control in coal extraction
- 5.2.6 Automatic Control in oil extraction

5.3 Automatic Materials Handling

- 5.3.1 Automatic transportation of materials
  - 5.3.1.1 Continuous transportation (conveyors,etc.)
  - 5.3.1.2 Discontinuous transportation (cranes,etc.)
  - 5.3.1.3 Automatic weighing in transportation of materials
- 5.3.2 Automatic cutting of materials
- 5.3.3 Automatic crushing and grinding of materials
- 5.3.4 Automatic winding of materials
- 5.3.5 Automatic proportioning of materials
- 5.3.6 Automatic blending of materials in given proportions
- 5.3.7 Automatic sorting of materials
- 5.3.8 Automatic packaging of materials
- 5.3.9 Automatic storage of materials

5.4 Automatic Control in building and civil engineering

5.5 Automatic Control in power and energy production and utilization

- 5.5.0 Automatic Control in power and energy production and utilization, general
- 5.5.1 Automatic Control in heat techniques
  - 5.5.1.0 Automatic Control in heat techniques, general
  - 5.5.1.1 Automatic Control of steam boilers
  - 5.5.1.2 Automatic Control of steam and gas turbines
  - 5.5.1.3 Automatic Control of steam engines
  - 5.5.1.4 Automatic Control of combustion engines and locomobiles
  - 5.5.1.5 Automatic Control in heating, conditioning, refrigeration
  - 5.5.1.6 Automatic Control in drying

- 5.5.2 Automatic Control of hydraulic machines and water distribution
  - 5.5.2.0 Automatic Control of hydraulic machines and water distribution, general
  - 5.5.2.1 Automatic Control of hydraulic turbines
  - 5.5.2.2 Automatic Control of water reserves
- 5.5.3 Automatic Control in the nuclear industry
  - 5.5.3.0 Automatic Control in the nuclear industry, general
  - 5.5.3.1 Automatic Control of nuclear reactors
  - 5.5.3.2 Automatic Control of accelerators
  - 5.5.3.3 Automatic Control in isotope separation
  - 5.5.3.4 Automatic Control of miscellaneous nuclear systems
- 5.5.4 Automatic Control of electric energy production, distribution and utilization
  - 5.5.4.0 Automatic Control of electric energy production, distribution and utilization, general
  - 5.5.4.1 Automatic Control of generators
  - 5.5.4.2 Automatic Control of transformers
  - 5.5.4.3 Automatic Control of compensators and capacitors
  - 5.5.4.4 Automatic Control of distribution networks
  - 5.5.4.5 Automatic Control of electric motors
  - 5.5.4.6 Automatic Control of miscellaneous electric power production, distribution and utilization systems
- 5.5.5 Automatic Control of the production and distribution of compressed air
  - 5.5.5.0 Automatic Control of the production and distribution of compressed air, general
  - 5.5.5.1 Automatic Control of compressor stations
  - 5.5.5.2 Automatic Control of blowers
  - 5.5.5.3 Automatic Control of aerodynamic tunnels
- 5.5.6 Automatic Control of the production and distribution of gas

5.6 Automatic Control in transformation industry

- 5.6.0 Automatic Control in transformation industry, general

5.6.1 Automatic Control in metallurgy

5.6.1.0 Automatic Control in metallurgy, general
5.6.1.1 Automatic Control of furnaces
5.6.1.2 Automatic Control of foundry
5.6.1.3 Automatic Control of forging
5.6.1.4 Automatic Control of rolling mills
5.6.1.5 Automatic Control of electrolysis
5.6.1.6 Automatic Control of miscellaneous metallurgical processes

5.6.2 Automatic Control in machine-building, ship-building and electrotechnical manufacturing

5.6.2.0 Automatic Control in machine-building, ship-building and electrotechnical manufacturing, general
5.6.2.1 Automatic Control of machine-tools
5.6.2.2 Automatic Control of welding
5.6.2.3 Automatic Control of heat treatments of metals
5.6.2.4 Automatic Control of assembling
5.6.2.5 Automatic Control in machine-building shops
5.6.2.6 Automatic Control in motor-car industry
5.6.2.7 Automatic Control in ship-building
5.6.2.8 Automatic Control in aeronautical industry
5.6.2.9 Automatic Control in electrotechnical manufacturing

5.6.3 Automatic Control in chemical industry

5.6.3.0 Automatic Control in chemical industry, general
5.6.3.1 Automatic Control of furnaces
5.6.3.2 Automatic Control of driers
5.6.3.3 Automatic Control of heat exchanges
5.6.3.4 Automatic Control of evaporators
5.6.3.5 Automatic Control of contact boilers
5.6.3.6 Automatic Control of reactors
5.6.3.7 Automatic Control of destillation and rectification columns
5.6.3.8 Automatic Control of coke works
5.6.3.9 Automatic Control of oil refineries

5.6.4 Automatic Control in artificial fiber, textile, laundry and dyeing, rubber and plastics and leather industries

5.6.4.1 Automatic Control in artificial fiber industry
5.6.4.2 Automatic Control in textile industry
5.6.4.3 Automatic Control in laundry and dyeing
5.6.4.4 Automatic Control in rubber and plastics industry
5.6.4.5 Automatic Control in leather industry

5.6.5 Automatic Control in wood-processing industries

5.6.5.1 Automatic Control in wood-sawing and wood-shaping industry
5.6.5.2 Automatic Control in cellulose industry
5.6.5.3 Automatic Control in paper industry

5.6.6 Automatic Control in polygraphic industries and printing

5.6.7 Automatic Control in glass, ceramics and cement works

5.6.7.1 Automatic Control in glass works
5.6.7.2 Automatic Control in porcelain works
5.6.7.3 Automatic Control in brick works
5.6.7.4 Automatic Control in cement works
5.6.7.5 Automatic Control in miscellaneous ceramics

5.6.8 Automatic Control in food industry

5.6.8.1 Automatic Control in sugar industry
5.6.8.2 Automatic Control in canned goods industry
5.6.8.3 Automatic Control in mills
5.6.8.4 Automatic Control in bakeries
5.6.8.5 Automatic Control in dairy
5.6.8.6 Automatic Control in spirit and wine industry
5.6.8.7 Automatic Control in brewery
5.6.8.8 Automatic Control in fruit juice and mineral water industry
5.6.8.9 Automatic Control in miscellaneous food industries

5.6.9 Automatic Control in miscellaneous transformation industries

5.7 Automatic Control in transportation of persons and goods

5.7.1 Automatic Control in road transportation
5.7.2 Automatic Control in railway transportation
5.7.3 Automatic Control in funicular railways and lifts
5.7.4 Automatic Control in shipping
5.7.5 Automatic Control in aircraft
5.7.6 Automatic Control in missile and space techniques

5.8 Automatic Control in communication techniques

5.8.0 Automatic Control in communication techniques, general
5.8.1 Automatic Control in telephony
5.8.2 Telescriptors and automatic telegraphy
5.8.3 Automatic Control in broadcasting
5.8.4 Automatic Control in television
5.8.5 Automatic Control in postal services
5.8.6 Automatic Control in remote signalisation, dispatching and security installations
5.8.7 Automatic Control in cinematography and acoustics

5.9 Special uses of Automatic Control

5.9.1 Automatic Control in astronomy

6. MISCELLANEOUS INFORMATION RELATED TO AUTOMATIC CONTROL

6.1 History of Automatic Control

6.2 Economical, social and political aspects of Automatic Control

6.3 Human control and its regularity

6.4 Standards of Automatic Control

6.5 Definition of conceptions, terminology, symbols of Automatic Control

6.5.1 Definition of conceptions of Automatic Control
6.5.2 Terminology of Automatic Control
6.5.3 Bi-lingual and multi-lingual dictionaries of Automatic Control
6.5.4 Letter symbols of Automatic Control
6.5.5 Graphical symbols of Automatic Control

6.6 Patent information on Automatic Control

6.7 Bibliography and documentation of Automatic Control

6.8 Teaching of Automatic Control

6.9 Scientific and technical societies devoted to Automatic Control

6.9.1 Meetings and Proceedings
6.9.2 Exhibitions

EIGHT EXAMPLES FOR THE APPLICATION OF GRAPHIC SYMBOLS OF AUTOMATIC CONTROL

by Professor Ed. G e r e c k e , Zurich, Switzerland +)

A draft of graphical symbols for automatic processing was published in October 1960 in "New Techniques", in no. 9, pages 6 to 35, with the intention to initiate discussion and criticism (see also I.F.A.C. Information Bulletin no. 6, pages 17 to 72). 8 examples of application have been prepared since for publication by a team of 8 Swiss engineers. These 8 examples correspond to the following problems:

1) - Position control,
2) - Speed control of a water turbine,
3) - Voltage control of a synchronous generator,
4) - Frequency-power control of interconnected power networks,
5) - Temperature control of a chemical reactor,
6) - Air temperature control,
7) - Digital control of motor speed,
8) - Digital control of machine-tools.

The examples show the way of developing from schematic diagrams, i.e. from wiring diagrams, different kinds of signal flow diagrams. They were elaborated starting from the author's drafts which were discussed during 6 full-day sessions.

The quoted publications contained 5 main groups of diagrams:

I. Schematic diagrams,
II. Block diagrams with material connections,
III. Physical signal flow diagrams,
IV. Mathematical signal flow diagrams,
V. Signal line flow diagrams.

(I) and (II) represent diagrams of components and devices as usual in electrical and general engineering. The connection lines between symbols have the meaning of material connections (electrical wires and cables, mechanical shafts, pipings for water, oil, steam etc.). All recommended symbols can be applied to diagrams (I) and (II). In block diagrams (II) the components and devices are grouped in blocks so as to allow an easy survey of the behaviour of the whole plant. These groups are represented as rectangles. All the basic symbols of elements, units, devices and equipments can be applied to block diagrams (II). It is, generally, easy to develop these block diagrams from schematic diagrams (I). Block diagrams are usual, for instance, in control panel rooms of large plants.

+) abstracted from "New Techniques", Zurich, no. 4, April 1961

We have to proceed now from diagrams (I) and (II) to signal flow diagrams. A signal represents a physical quantity or an idea. Signal flow diagrams represent the flow of signals throughout the plant. Connection lines do no more, therefore represent a material connection, but the signal path. According to different degrees of abstraction, we can distinguish between physical signal flow diagrams (III) and mathematical signal flow diagrams (IV). Line flow diagrams (V) do not include more data than (IV), but the representation is different.

The transition from diagrams (I) and (II) to signal flow diagrams (III), (IV), (V) is not always very easy. We can divide a large plant into components which have to fulfill a single operation. We can then select for these operations the corresponding graphical symbols. All the 10 basic symbols for signals and operations with signals included in the previously quoted publications can be applied here.

The physical signal flow diagramm (III) represents the signal flow with the signal operations without a very detailed indication of the latter. On the contrary, the mathematical signal flow diagram (IV) requires the exact relationship which exists between the input and output signals of all components. It includes therefore all the data necessary for the computation of the steady and transient states of the whole plant. It is therefore possible, starting from the mathematical signal flow diagram, to program the behaviour of the plant on an analog or digital computer. As non-linear elements are the source of many mathematical difficulties, it is recommended to represent them by a special symbol (pentagon). The signal line flow diagram (V) which was originally developed for linear systems only, has found more and more applications in the literature (see M i s c h k i n E. and B r a u n L.: Adaptive Control Systems, pages 23-49).

In the example 3.) - "Voltage control of a synchronous motor" we had to take further steps in representing in signal line flow diagrams also non-linear elements. This need arose from the non-linear form of the magnetization curve. Non-linear operations are represented by a dotted line and the corresponding non-linear function.

It is often desirable to indicate in the physical signal flow diagram the physical nature of the signal and its form. It is furthermore important to distinguish between analog and digital signals.

If we wish to establish a diagram, we have therefore to decide first whether it has to be an schematic or block diagram (I, II) for components, devices and plants with material connections or a signal flow diagram (III, IV, V) with signal paths and signal operation.

These points of view were applied to the 8 examples investigated. Where it was possible, the transfer functions were also indicated. It was found during the elaboration of these 8 examples that there exists a real need for simple graphical symbols for complex operations and for combined control components. One of our future tasks will be therefore to establish a restricted number of such symbols.

One of these symbols is necessary for the conversion of an analog signal to a two-state signal. We can quote as an example an electro-mechanical relay which commutates when the coil current exceeds a given value. If the current increases continuously, the position of the relay has only two discrete values. Solid state relays (either magnetic or semiconductor) work in a similar way.

On fig. 1 the output signal y increases suddenly from the lower value b_1 to the higher value b_2 when the input signal x exceeds the value a. The matrix of fig. 2 has the same meaning. Fig. 3 shows a simplified symbol where a step symbolizes a two-state signal. The symbol of fig. 4 uses the general symbol of a converter; it represents an "analog to two-state converter".

The value a is often called a threshold and therefore the symbol of fig. 4 could be designated as a threshold converter. Fig. 5 shows an analog to multistate converter where the output signal y can have m different values. For m = 3 we can consider an analog to three-state converter. If the m output values are equidistant, we obtain an analog to digital converter (fig. 6).

If the value b_1 equals O and the value b_2 equals L, the output signal can be written as O/L.

We find often these two- or multistate signals in commutators, switches, selectors, relays, distributors, latches, etc. Fig. 7 shows a selector switch which can send the input signal x to any of the m output paths. The selection of a given output path is effected by the m-state control or position signal x_o which is to be considered as an independent variable. The input signal x can be of any form, the output signal y has the same form or a zero value and is a function of the variables x and x_o.

Fig. 8 represents an operation inverse to that of fig. 7: any of the m input signals can be sent to the single output path. The broadened end of the switch indicates that there exists no signal interruption between the positions successively switched (the contrary happens in the case of fig. 7). Fig. 9 shows a general representation of a switching element with m input paths, n output paths and p discrete positions.

Is has been assumed up to this point that the control signal x_o is independent of the signals $x_1 \ldots\ldots x_m$. It may happen that x_o depends on these values. In this case, there should exist a mathematical function or relationship or an algorithm which determines x_o from $x_1 \ldots\ldots x_m$. Fig. 10 shows such a dependency.

The example n° 6 "Air temperature control" where switching from cold to warm air was needed was the origin of these considerations. When looking for a simpler symbol replacing those of fig. 8, 9 and 10, the symbols of fig. 11, 12 and 13 were found.

Fig. 11 shows a signal switching device with m input paths, n output paths and a multistate control signal x_o. Fig. 12 indicates a dependency of x_o on $x_1 \ldots\ldots x_m$ which has still to be formulated. Such a prescription could require, for instance, that the output signal y always equals the highest of the m input signals $x_1 \ldots\ldots x_m$. In the case of only 2 input signals (fig. 13) two values 0 and L could be assigned to x_o as follows:

$$x_o = 0 \text{ if } x_1 > x_2$$

$$x_o = L \text{ if } x_1 < x_2$$

It was decided, starting from these examples, to propose a restricted number of simple symbols for combined operations.

In the 8 examples of application quoted above, the authors have established first the technological diagrams (I) and have then represented some of the diagrams (II) to (V).

(Remark: The English and French texts of the following tables have been amended as compared with the text of the original publication.)

PUBLICATIONS

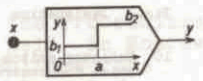
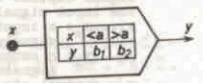
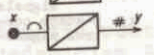
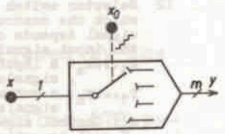
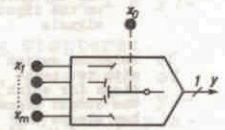
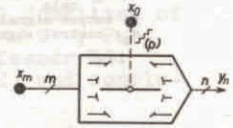
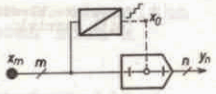
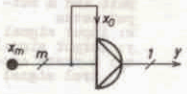
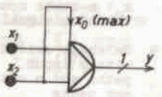
Fig.	Designation	Désignation	Bezeichnung	
1	Two-state element (with graph)	Elément de transfert à deux échelons d'action (avec caractéristique)	Zweipunktglied (mit Kennlinie)	
2	Two-state element (with matrix)	Elément de transfert à deux échelons d'action (avec matrice)	Zweipunktglied (mit Matrix)	
3	Two-state element (simplified symbol)	Elément de transfert à deux échelons d'action (représentation simplifiée)	Zweipunktglied (abgekürzte Darstellung)	
4	Analog to two-state converter	Convertisseur d'analogique en bivalent	Analog-Zweiwert-Wandler	
5	Analog to multi-state converter	Convertisseur d'analogique en multivalent	Ánalog-Mehrwert-Wandler	
6	Analog to digital converter (digitizer, quantizer, encoder)	Convertisseur d'analogique en numérique (quantificateur, codeur)	Analog-Digital-Wandler	
7	Selector switch with one input path and m output paths x: input signal y: output signals x_o: m-state control signal	Sélecteur avec un trajet d'entrée et m trajets de sortie x: signal d'entrée y: m signaux de sortie x_o: signal de commande à m valeurs (positions)	Wählschalter mit einem Eingangspfad und m Ausgangspfaden x: Eingangspfad y: m Ausgangspfaden x_o: m-wertiges Steuersignal	
8	Selector switch with m input paths and one output path $x_1 \ldots x_m$: m input signals y: output signal x_o: m-state control signal	Sélecteur avec m trajets d'entrée et un trajet de sortie $x_1 \ldots x_m$: m signaux d'entrée y: signal de sortie x_o: signal de commande à m valeurs (positions)	Wählschalter mit m Eingangspfaden und einem Ausgangspfad $x_1 \ldots x_m$: m Eingangssignale y: Ausgangssignal x_o: m-wertiges Steuersignal	
9	Selector switch with m input paths and n output paths $x_1 \ldots x_m$: m input signals $y_1 \ldots y_n$: n output signals x_o: p-state control signal	Sélecteur avec m trajets d'entrée et n trajets de sortie $x_1 \ldots x_m$: m signaux d'entrée $y_1 \ldots y_n$: n signaux de sortie x_o: signal de commande à p valeurs (positions)	Allgemeiner Wählschalter mit m Eingangspfaden und n Ausgangspfaden $x_1 \ldots x_m$: m Eingangssignale $y_1 \ldots y_n$: n Ausgangssignale x_o: p-wertiges Steuersignal	

Fig.	Designation	Désignation	Bezeichnung	
10	Selector switch which the control signal depends on the input signals $x_1 \dots x_m$: m input signals $y_1 \dots y_n$: n output signals x_o: control signal depending on the input signals	Sélecteur dont le signal de commande dépend des signaux d'entrée $x_1 \dots x_m$: m signaux d'entrée $y_1 \dots y_n$: n signaux de sortie x_o: signal de commande dépendant des signaux d'entrée	Allgemeiner Wählschalter mit von den Eingangssignalen abhängigem Steuersignal $x_1 \dots x_m$: m Eingangssignale $y_1 \dots y_n$: n Ausgangssignale x_o: von $x_1 \dots x_m$ abhängiges mehrwertiges Steuersignal	
11	Selector switch with m input paths and n output paths $x_1 \dots x_m$: m input signals $y_1 \dots y_n$: n output signals x_o: p-state control signal	Sélecteur avec m trajets d'entrée et n trajets de sortie $x_1 \dots x_m$: m signaux d'entrée $y_1 \dots y_n$: n signaux de sortie x_o: signal de commande à p valeurs (positions)	Wählschalter mit m Eingangspfaden und n Ausgangspfaden $x_1 \dots x_m$: m Eingangssignale $y_1 \dots y_n$: n Ausgangssignale x_o: p-wertiges Steuersignal	
12	Selector switch which the control signal depends on the input signals $x_1 \dots x_m$: m input signals $y_1 \dots y_n$: n output signals x_o: Control signal depending on the input signals	Sélecteur dont le signal de commande dépend des signaux d'entrée $x_1 \dots x_m$: m signaux d'entrée $y_1 \dots y_n$: n signaux de sortie x_o: signal de commande dépendant des signaux d'entrée	Wählschalter mit von den Eingangssignalen abhängigem Steuersignal $x_1 \dots x_m$: m Eingangssignale $y_1 \dots y_n$: n Ausgangssignale x_o: von $x_1 \dots x_m$ abhängiges mehrwertiges Steuersignal	
13	Selector switch with two positions for which the output signal has always the value of the higher input signal x_1, x_2: input signals y: output signal x_o: control signal	Sélecteur à deux positions pour lequel le signal de sortie y est toujours égal au plus grand des deux signaux d'entrée x_1, x_2: signaux d'entrée y: signal de sortie x_o: signal de commande	Signalpfad-Umschalter mit zwei Eingangssignalen und einem Ausgangssignal, wobei letzteres stets dem größeren Eingangssignal entspricht x_1, x_2: Eingangssignale y: Ausgangssignal x_o: Steuersignal	

PUBLICATIONS

International

PROCEEDINGS OF THE FIRST INTERNATIONAL CONGRESS OF I.F.A.C. MOSCOW, 1960

Under the title "Automatic and Remote Control", the Proceedings of the First International Congress of I.F.A.C. held in Moscow in June-July 1960, have just been published by Butterworths & Co. Ltd., 4 & 5 Bell Yard, London W.C. 2.

Edited by Mr. J.F. C o a l e s (United Kingdom) and co-edited by Dean J.R. R a g a z z i n i (U.S.A.) and by Dr. A.T. F u l l e r (United Kingdom), this publication is certainly the largest one on automatic control ever known up to this day.

The figures of 4 volumes totalizing 2,016 pages, which contain the 7 introductory and closing speeches, the 286 papers with their discussions and the 3 general reports, plus 43 pages of general information (reproduced in each volume), give an idea of the scale of this undertaking which has been unchallenged up to now in the field of automatic control.

Volumes 1 and 2 are devoted to the theory of automatic control (149 papers followed by the general report of Academician B.N. P e t r o v).

Volume 3 is devoted to Components (58 papers followed by the general report of Dr. G. B o r o m i s z a).

Volume 4 is devoted to automatic control applications (79 papers followed by the general report of Dr. J.M. M o z l e y).

Volume 1 (43 + 546 pages) contains the following chapters:

- opening speech by professor A.M. L e t o v , president of I.F.A.C., address of welcome by Vice-Premier A.N. K o s y g i n , inaugural address by professor A.N. N e s m e y a n o v , president of the Academy of Science of the U.S.S.R., "Automation and Mankind" by Academician V.A. T r a p e z n i k o v , chairman of the U.S.S.R. National Committee of Automatic Control, address by H. C h e s t n u t , Past President of I.F.A.C., closing address by professor Ed. G e r e c k e , 1st Vice-President of I.F.A.C. and concluding speech by professor A.M. L e t o v
- 1.1 Theory of continuous linear systems (23 papers),
- 1.2 Theory of continuous non-linear systems (14 papers),
- 1.3 Theory of discrete systems (25 papers),
- 1.4 Theory of optimal systems (12 papers).

Volume 2 (43 + 545 pages) contains the following chapters:

- 1.5 Theory of self-adjusting systems (20 papers),
- 1.6 Statistical methods of investigation (18 papers),
- 1.7 Theory of structure and signal composition (7 papers),
- 1.8 Special mathematical problems (13 papers),
- 1.9 Simulation and experimental methods (12 papers),
- Terminology and education (5 papers)
- The general report of Academician B.N. P e t r o v (U.S.S.R.), Chairman of the I.F.A.C. Technical Committee on Theory.

Volume 3 (43 + 412 pages) contains the following chapters:

- .2.1 Electric and magnetic components (9 papers),
- 2.2 Electrical simulation, computing components and governors (10 papers),
- 2.3 Components and systems for remote and supervisory control (8 papers),
- 2.4 Pneumatic components and computing devices (12 papers)
- 2.5 Automatic Control instruments and devices (19 papers)
- The general report of Dr. G. B o r o m i s z a (Hungary), Chairman of the I.F.A.C. Technical Committee on Components.

Volume 4 (43 + 513 pages) contains the following chapters:

- 3.1 Automation in metal working (9 papers),
- 3.2 Automation of electrical power systems (9 papers),
- 3.3 Automatic electrical drives and machines (13 papers),
- 3.4 Automation in transport (4 papers),
- 3.5 Automation of industrial processes (7 papers),
- 3.6 Automation in chemical and oil industries (8 papers),
- 3.7 Automatic control of thermal and nuclear power (15 papers)
- 3.8 Automation of metallurgical processes (14 papers)
- The general report of Dr. J.M. M o z l e y (U.S.A.), Chairman of the I.F.A.C. Technical Committee on Applications.

278 papers are published in English by authors from Austria, Belgium, Canada, China, Czechoslovakia, Germany, Hungary, India, Italy, Japan, Norway, Poland, Rumania, Switzerland, Sweden, United Kingdom, U.S.A., U.S.S.R. and Yugoslavia as well as by one of the French authors.

8 papers are published in French by authors from France.

All papers are followed by abstracts in English, French and German.

Discussions are published in English; with a few papers and parts of discussions in French.

The 43 pages of general information reproduced in each of the 4 volumes, contain the editorial note by Mr. J.F. C o a l e s, the Contents of the 4 volumes (in English, French and German) and a list of author's names and addresses, classified according to the 20 countries to which they belong.

The pages of the volumes 1 and 2 have been printed as one (volume 2 starting on page 547). Volumes 3 and 4 are printed starting each on page 1.

The total price of the 4 volumes is 45 pounds sterling, (£ 12 for one volume). The special price for delegates to the Congress is £ 20 for the 4 volumes (£ 5 for one volume). Postage and packing cost 17s.6d. for the 4 volumes (5 shillings for one volume).

Orders from Austria, Germany and Switzerland are to be sent to R. Oldenbourg Verlag, München.

PREPARATION OF AN INTERNATIONAL MULTILINGUAL COMPUTER GLOSSARY

I.F.I.P.S. (International Federation of Information Processing Societies) and C.I.P.C. (Centre International Provisoire de Calcul - Provisional International Computation Centre) have agreed to develop a "Multilingual Glossary of Automatic Data Processing Terminology" and, upon its completion, to make it available to I.S.O. (International Standardization Organization) which will accept it as a first draft of an International Standard Glossary.

Starting from the latest draft of the British Standard's glossary, the latter is reviewed by the I.F.I.P.S. Committee for the standardization of terminology and symbols under the chairmanship of G.C. T o o t i l l , in order to determine what alterations to the concepts are necessary to make the glossary suitable for international use and to ensure its completeness and accuracy.

Starting from the same draft of the British Standards Institution, C.I.P.C. is preparing, with the co-operation of Dr. J.E. H o l m s t r ö m , a draft of the multilingual glossary in five languages.

It is hoped that the multilingual glossary will be available by August, 1962.

Belgium

"PROCEEDINGS OF THE SEMINAR ON ANALOGUE METHODS IN NUCLEAR ENERGY PROBLEMS" (April 21 to 23, 1960).
Edited by R. G o m p e r t s , 144 pages, 325 Belgian francs. Published by Presses Académiques Européennes, Brussels, 1961.

Germany

BOOKS

"AUTOMATIC CONTROL IN THE SUPPLY OF ELECTRIC ENERGY" ("Regelung in der elektrischen Energieversorgung").
Report on a meeting of the VDI/VDE-Fachgruppe Regelungstechnik held in Karlsruhe, October 1959, and on an additional discussion held in Cologne, December 1959. Edited by Dr. Ing. H. H e n n i n g , 174 pages, 262 figures, price: 38 German marks. Publ. by R. Oldenbourg, München.

Contents:

1) Problems and requests in operating power networks,
2) Technical solutions for control of frequency and real output in compound operations,
3) Technical solutions for control of voltage and wattless output.

Each of the three chapters includes several papers.

"SKETCH OF PRACTICAL AUTOMATIC CONTROL" ("Grundriß der praktischen Regelungstechnik").
by Dr. Ing. E. S a m a l . 334 pages, 195 figures, 24 German marks. Publ. by R. Oldenbourg Verlag, München, 1960.

"THE COMPUTER AND THE BRAIN" ("Die Rechenmaschine und das Gehirn")
by Prof. Dr. J. von N e u m a n n , translated from English into German by C. and H. G u m i n . 80 pages, 7,40 German marks. Publ. by R. Oldenbourg Verlag, München, 1960.

"INTRODUCTION TO THE USE OF OPERATIONAL CALCULUS IN ELECTRIC CONTROL PROCESSES" ("Einführung in die Anwendung der Operatorenrechnung auf elektrische Schalt- und Regelvorgänge")
by Dr.-Ing. P. W e r n e r s . 156 pages, 74 figures, 33,50 German marks. Publ. by R. v. Decker's Verlag, Hamburg, 1961.

"OPERATIONS RESEARCH" ("Eine Einführung in die Unternehmensforschung")
by Prof. C.W. C h u r c h m a n , Prof. R u s s e l , L. A c k o f f and E. L. A r n o f f .

Translated from American into German by Dr. E. S c h l e c h t and Dr. F. F e r s c h l . 580 pages, 116 fig., 52 German marks. Publ. by R. Oldenbourg Verlag, München, 1961.

"AUTOMATIZATION IN WATER WORKS" ("Automatisierung in Wasserwerken")
by Dr. Ing. K. B e c k . 150 pages, 36 German marks. Publ. by R. Oldenbourg Verlag, München, 1961.

"INTRODUCTION TO LINEAR PROGRAMMING AND TO THE THEORY OF GAMES" ("Einführung in die Linearplanung und die Theorie der Spiele")
by Dr. S. V a j d a . Translated from English into German by W. R i e d l e r . 70 pages, 8 fig., 10,80 German marks. Publ. by R. Oldenbourg Verlag, München, 1961.

"DEAD TIMES IN TRANSMISSIONS OF INFORMATION WITH STORAGES" ("Wartezeiten in Nachrichtenvermittlungen mit Speichern"
by G.O. Z i m m e r m a n n and H. S t ö r m e r . 109 pages, 48 figures, 13 German marks. Publ. by R. Oldenbourg Verlag, München, 1961.

"CONTROL PROCESSES IN LIVING ORGANISMS" ("Regelungsvorgänge in lebenden Wesen")
edited by Dr. H. M i t t e l s t a e d t . In preparation by R. Oldenbourg Verlag, München.

"STATISTICAL COMPUTING PROCEDURES AND THEIR USE IN AUTOMATIC CONTROL THEORY" ("Statistische Rechenverfahren und ihre Anwendung auf die Regelungstheorie")
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"INSTRUMENTATION AND CONTROL OF NUCLEAR REACTORS" ("Instrumentierung und Regelung von Kernreaktoren")
by Prof. Dr. L. M e r z . Volume 1. "Physical and technological fundamentals". In preparation by R. Oldenbourg Verlag, München.

"INTERKAMA 1960".
Papers of the international congress with exhibition of measuring techniques and automatic control held in Düsseldorf in 1960. 55 German marks. Publishers: R. Oldenbourg Verlag (München), VDE-Verlag (Berlin), VDI-Verlag (Düsseldorf), and Friedr. Vieweg u. Sohn (Braunschweig).

PERIODICALS

KYBERNETIK

We have already announced in Bulletin n° 9 (page 32) and in Bulletin n° 10 (page 32) the first issue of the review "Kybernetik" published by Springer-Verlag, Berlin-West.
The second issue of this review has been published and contains the following papers:

"On the optical resolution ability of the facet eyes of the limulus" ("Über das optische Auflösungsvermögen der Facettenaugen von Lumulus") by W. R e i c h a r d t (in German).

"Contribution to an automatic control theory analysis of the dynamics of pupil reflexes" ("Beitrag zu einer regeltheoretischen Analyse der Pupillenreflexdynamik") by H. K ü n k e l (in German).

"A neural mechanism for the immediate recall of sequences" by P.M. M i l n e r (in English).

"An investigation of the mechanisms of eye movement control" by D.H. F e n d e r and P.W. N y e (in English).

The price of this second issue of "Kybernetik" is 7,80 German marks.

Italy

"INTERNATIONAL REPERTORY OF COMPUTATION LABORATORIES".
Detailed and up-to-date information (name, address and officers of each institution, type of equipment installed or contemplated, field of experience, training available, periodical publications) on approximately 300 computing laboratories in 30 countries, grouped by countries classified in alphabetical order. Price: 6,50 dollars. Published by C.I.P.C. (Provisional International Computation Center), Palazzo degli Uffici, Zona dell'EUR, Rome, 1961.

Japan

"MATHEMATICS OF AUTOMATIC CONTROL"
by Toshie T a k a h a s c h i . Publ. by the Ohm Co., 1961.

United Kingdom

"AUTOMATIC CONTROL AND COMPUTER ENGINEERING"
by V.V. S o l o d o v n i k o v . Volume 1. Translated from the Russian by J. Y e o m a n . Translation edited by T. P r a s a d (Bihar Institute of Technology, Sindri, India). Publ. by Pergamon Press, Oxford, 1961. 512 pages, £ 5.

We have already announced in Bulletin n° 10 (pages 33 and 34) the future publication of volumes 1 and 2 of this work which is the result of a recent conference held in Moscow. Since our announcement, volume 1 has been published. Edited by professor S o l o d o v n i k o v, it contains 24 papers written by Soviet authors and covering various aspects of the use of computer techniques in automatic control. We believe that the topics covered could be roughly classified in the following 5 categories (the numbers below refer to the order in which the papers areaactually published):

I. Papers dealing mainly with theoretical aspects of the use of computer (and, more particularly, of digital) Techniques in automatic control

1) Methods of mathematical statistics and the theory of automatic control. This introductory paper, written by professor S o l o d o v n i k o v himself and 3 other authors, is an attempt to synthesize various existing theories and lays a particular stress on the theory of decision functions.

3) The application of Z-conversion to an analysis of control systems with computers.

4) Extreme control systems and certain means of improving their quality and stability.

5) Comparative characteristics of digital automatic computers.

22) The analysis and synthesis of linear automatic control systems with simulators.

23) The use of high-speed computers to calculate and examine automatic control systems.

24) Working out a random quantity on high-speed computers.

II. Papers dealing mainly with components and actual hardware allowing to introduce digital computer techniques into automatic control

2) Principles of construction of control computers based on universal high-speed digital machines.

6) Non-contact magnetic devices for control systems.

7) Magnetic high-speed pulse relay elements.

8) The use of semiconductor instruments in computer engineering.

9) The logical circuits of computers with semiconductor instruments.

10) Feeding and extracting information in high-speed digital computers.

11) Systems for converting continuous quantities into codes and codes into continuous quantities.

III. Papers dealing mainly with applications of digital computer techniques to automatic control

12) The development of systems for controlling machines.

13) Coding commands in a digital programme system for controlling machines.

IV. Papers dealing mainly with applications of analog computer techniques to automatic control

14) The use of computers for controlling primary objects in the ferrous metal industry.

15) The use of computer systems for automating blast-furnace production.

16) The use of computers for automating the steel-smelting process in arc furnaces.

17) The automatic control of the dimensions of rolled metal.

V. Papers dealing mainly with applications of hybrid (analog and digital) and special computer techniques to automatic control

18) A computer system for determining optimum cutting conditions.

19) Specialized continuous-action computers for the statistical handling of random processes. This paper is mainly devoted to correlators of various types.

20) The principles of constructing continuous computers for solving integral equations. This paper describes the combined use of conventional analog computer techniques with iterative and logical devices.

21) An electrical analogue for automatically selecting the optimum solution of a problem for a given system of equations. The Computer described in this paper uses both continuous and discrete pulse elements.

Although the main scope of this book refers to the use of digital computer techniques in automatic control, it can be seen from the above, that due attention has also been given to the use in this field of analog and hybrid computer techniques.

"THEORY OF AUTOMATIC CONTROL"
by M.A. A i z e r m a n, approximately 600 pages, 63 shillings. Translated from the Russian. To be published by Pergamon Press, Oxford.

"THE DYNAMICS OF AUTOMATIC CONTROL SYSTEMS"
by E.P. P o p o v . 761 pages, £ 6. Translated from the Russian. To be published by Pergamon Press, Oxford.

"TRANSISTOR ELECTRONICS IN INSTRUMENT TECHNOLOGY"
Editor N.I. C h i s t y a k o v . 370 pages, 84 shillings. Translated from the Russian. To be publ. by Pergamon Press, Oxford.

"ANALOGUE COMPUTERS"
by I.I. E t e r m a n . 274 pages, 50 shillings. Translated from the Russian. Publ. by Pergamon Press, Oxford.

"SYNTHESIS OF OPTIMUM CONTROL SYSTEMS"
by Sheldon S.L. C h a n g . 400 pages, about 93 shillings. Publ. by Mac Graw-Hill Publishing Co., Ltd.

"ELEMENTS OF QUEUEING THEORY"
by Thomas L. S a a t y . 348 pages, about 77s.6d. To be published in January 1962 by Mac Graw-Hill Publishing Co., Ltd.

"PROGRESS IN AUTOMATION" Volume 1
Edited by Dr. Andrew D. B o o t h . 42 shillings. Published by Butterworths, London, 1961.

"PRINCIPLE OF SELF-ORGANIZATION" (International Tracts in Computer Science and Technology and their application, volume 9: Principles of Self-Organizing Systems)
edited by Heinz von F o e r s t e r and George W. Z o p f . 526 pages, approximately 84 shillings. To be published by Pergamon Press, Oxford.

NOTE ON INFORMATION BULLETIN NO. 12

Information to appear in the Information Bulletin No. 12 should reach the Editor:

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

not later than December 31st, 1961.