IFAC
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

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Honorary Editor of IFAC

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IFAC NEWS

Meetings of the Executive Council and General Assembly of IFAC in Chicago

The Executive Council met prior to the General Assembly on September 14 and 15, 1959. Simultaneously, informal meetings of the Advisory Committee were held and a joint informal meeting with the Executive Council closed this series of discussions between experts from different countries.

On September 16, 17, and 18, the General Assembly discussed the President's, Treasurer's, and Committee's reports, the state of preparations for the Moscow Congress, the time and place for the second IFAC Congress. It also discussed and adopted the modified Constitution of IFAC and the Bye-Laws, and elected Executive Council members.

On September 19, the new Executive Council had a meeting before the whole session was ended. The following decisions and informations should be mentioned more particularly:

Preparation of the Moscow Congress
This Congress will be held in Moscow from June 27 to July 6, 1960, and in the beginning of 1960 IFAC will distribute new invitations with full information on the topics, papers, arrangements etc.

Second IFAC Congress
This Congress will be held the first or second week of September 1963 in Zurich, Switzerland.

New composition of the Executive Council
The General Assembly elected for a two years term the following officers:

President: Prof. A.M. L e t o v (USSR)
1st Vice-President: Prof. Ed. G e r e c k e (Switzerland)
2nd Vice-President: Prof. O. B e n e d i k t (Hungary)
Treasurer: Dr. M. C u é n o d (Switzerland)

Three ordinary members remain in office until 1961; they are:

Prof. J.F. C o a l e s (United Kingdom)
Prof. G. E v a n g e l i s t i (Italy)
Prof. P.J. N o w a c k i (Poland)

Three new ordinary members were elected for a four years term by the General Assembly; they are:

Prof. J.G. B a l c h e n (Norway)
Prof. K. K a n e s h i g e (Japan)
Prof. Zd. T r n k a (Czechoslovakia)

Under the provisions of the modified Constitution, Mr. Harold C h e s t n u t , Past President of IFAC, remains for a two years term member of the Executive Council.

According to the modified Constitution, the Executive Council by appointment re-confirmed two non-voting officers to serve in a personal capacity for one year; they are:

Honorary Secretary: Dr. G. R u p p e l (German citizen)
Honorary Editor: Prof. V. B r o i d a (French citizen).

Technical Committees

The composition of the various Technical Committees was discussed and proposals for membership were submitted to the member organizations.

Prof. Donald P. E c k m a n (USA) remains in office as Chairman of the Advisory Committee; he will be assisted as Vice-Chairman by Mr. J. L o e b (France).

Social Events

The social programme of the meeting was very attractive and the American Automatic Control Council as well as the Instruments Society of America who acted as hosts should be warmly congratulated on and thanked for the large and pleasant hospitality they extended to all delegates.

At the end of the closing banquet, certificates of meritorious service in promoting the science of automatic control among nations were awarded by the Executive Council of IFAC to the members of the IFAC Provisional Committee (consisting of V. B r o i d a , Chairman, France; G. R u p p e l , Secretary, Germany; O. G r e b e , Germany; A.M. L e t o v , USSR; P.J. N o w a c k i , Poland; R. O l d e n b u r g e r , USA; and D.B. W e l b o u r n , United Kingdom) who prepared the first General Assembly of IFAC in Paris in September 1957.

Past President's Farewell Message

On the occasion of the recent General Assembly of IFAC in Chicago, the delegates present had an opportunity to review the progress that has been made by the International Federation of Automatic Control during the first two years of its existence. For the benefit of the many members of technical societies and other groups affiliated with IFAC's member organizations who were not present at Chicago, I would like to go over this growth and development.

Membership

Following the hopeful expression of a number of scientists and engineers at the 1956 Heidelberg Conference of VDI/VDE that an international society of control and regulating system engineers be formed, and much work on the part of the Provisional Committee of IFAC, there was founded in Paris in September 1957, the International Federation of Automatic Control. Although the delegates from 18 different countries present in Paris gave their approval to the constitution and method of operation of IFAC, it was then necessary for many of the countries involved to determine the appropriate member organization to represent them in IFAC and to ratify the IFAC Constitution.

Since the time of the Constitutive Meeting of IFAC in Paris, the following member organizations of the 22 countries noted have become members of IFAC.

Nation	Member Organization and Address
Austria	Österreichischer Arbeitsausschuss für Automatisierung, Österreichisches Produktivitäts-Zentrum, Hohenstaufengasse 3, Wien 1
Belgium	Institut Belge de Régulation et d'Automatisme, 3, rue Ravenstein, Bruxelles
China	Chinese Association of Automation, c/o Institute of Automation, Academia Sinica, Peking
Czechoslovakia	Ceskoslovenska Akademie Ved, Ustav Teorie Informace a Automatisace, Zitna 28, Praha
Denmark	Dansk Ingeniørforening, 29, Vester Farimagsgade, Copenhagen
Finland	Finnish Society of Automatic Control, Mannerheimintie 93, Helsinki
France	Association Française de Régulation et d'Automatisme (AFRA), 19, rue Blanche, Paris IXe

Nation	Member Organization and Address
Hungary	Hungarian National Committee of IFAC, Magyar Tudomaanyos Akademia, Müszaki Tudomaanyok Osztaalya, Naador u. 15, Budapest V
India	The Institution of Engineers (India), 8, Gokhale Road, Calcutta 20
Israel	Ministry of Defense, Scientific Department, Hakirya, P.O.Box 7057, Tel-Aviv
Italy	Consiglio Nazionale delle Ricerche, Ufficio relazioni internazionali, Piazzale delle Scienze 7, Roma
Japan	National Committee of Automatic Control, Science Council of Japan, Ueno Park, Tokyo
Netherlands	Koninklijk Instituut van Ingenieurs, Sectie voor Regeltechniek, Prinsessegracht 23, Den Haag
Norway	Norsk Forening for Automatisering, Kronprinsensgate 17, Oslo
Poland	Polski Komitet Automatyki, Naczelna Organizacja Techniczna, ul. Czackiego 3/5, Warszawa
Roumania	Comisia de Automatizare, Academia Republicii Populare Romine, Calea Victoriei 125, Bucarest
Sweden	Svenska Centralcommitten för internationella ingenjörskongresser, c/o Svenska Teknologforeningen, Brunkebergstorg 20, Stockholm
Switzerland	Schweizerische Gesellschaft für Automatik, Sternwartstrasse 7, Zürich
Turkey	Türk Otomatik Kontrol Kurumu, Istanbul Teknik Üniversitesi, Istanbul
Union of Socialist Soviet Republics	Nazionalny Komitet SSSR po Avtomaticheskomu Upravleniu, Kalantschevskaia ul. 15a, Moskva
United Kingdom	British Conference on Automation and Computation, c/o Institution of Electrical Engineers, Savoy Place, London W.C. 2
United States of America	American Automatic Control Council, 330 West 42nd Street, New York 36, N.Y.

At present, the request for IFAC membership by the Yugoslav Committee of Electronics, Telecommunication, Automatic Control and Nuclear Engineering at Belgrad has been approved by the Executive Council and has been referred to the present member organizations for ratification*)Three other countries are on the verge of applying for membership.

*) The Yugoslav membership has become effective since January 1, 1960.

Executive Council

Since the General Assembly at Paris, the Executive Council has met three times: in Zurich, March 1958; Rome, March 1959, and Chicago, September 1959. For each of these meetings, the Executive Council asked the Advisory Committee to meet at the same time so that maximum benefit could be obtained from the advice of the latter group.

At these council meetings, each attended by at least eight of the eleven Executive Council members, the Council has reviewed current activities and planned future ones. Many of the necessary arrangements for the 1959 General Assembly at Chicago and the 1960 International Congress of IFAC on Automatic Control at Moscow were made at these meetings. Likewise, the basic formulation of the IFAC Advisory and Technical Committees structure was arrived at during these meetings. The fine spirit of cooperation which existed during these Executive Council sessions made possible far more rapid progress than might be reasonably expected.

Constitution

During the process of reviewing the IFAC Constitution after the Paris meeting, a number of member organizations had some sound suggestions for amending it. The Executive Council decided at its meeting in Zurich, March 1958, to have a revised Constitution and separate Bye-Laws drafted by Prof.Evangelisti to be submitted to the next meeting of the Executive Council. Prof. Evangelisti, with the assistance of Dr. Ceccherini of the Italian National Committee of IFAC, had compiled all the suggestions available and made a new revised provisional Constitution together with Bye-Laws, which was at length discussed and amended at the Rome meeting of the Executive Council in March 1959. This new set, again prepared by our Italian friends, was distributed amongst the National Member Organizations. Some additional minor suggestions for amendments arrived in the course of the last few months and were passed on to the National Member Organizations for insertion in their drafts.

At the General Assembly in Chicago still further minor changes were made to simplify and clarify the two documents. Unanimous approval of both Constitution and Bye-Laws were granted by the General Assembly and printed copies of the final form of both these documents have been mailed to each of the member organizations.

IFAC is endebted to Prof. Evangelisti and members of the Consiglio Nazionale delle Ricerche of Italy for their help in this constitutional revision effort.

Advisory, Technical, and Special Committees

At its March meeting in Zurich, the Executive Council appointed an Advisory Committee under Prof. D.P. Eckman of the U.S.A. to advise the Executive Council in its technical work. The Advisory Committee recommended the formation of a number of technical committees to stimulate and encourage international technical

activity in their respective areas. Listed below are the committees recommended by the Advisory Committee with their chairmen's names and addresses.

1.	Applications	J. M o z l e y , Johns-Hopkins Hospital, Baltimore, Maryland, USA
2.	Bibliography	W. O p p e l t , University of Darmstadt, Darmstadt, Germany
3.	Components	G. B o r o m i s s z a , Vesö u. 3, MIKI, Budapest, Hungary
4.	Education	A. M a r i n o , Via Guido d'Arezzo 14, Roma, Italy
5.	Terminology	Ed. G e r e c k e , ETH, Schweizerische Gesellschaft für Automatik, Sternwartstrasse 7, Zürich, Switzerland
6.	Theory	B.N. P e t r o v , Institute of Automatics and Telemechanics, Academy of Science, Kalantschewskaja ul. 15 a, Moscow I-53, USSR

The functions of these committees include the preparation of programs of activity of service in the field of automatic control on an international basis. Included in these programs in the future will be the preparations for Congresses and other special meetings. In addition these committees will prepare periodic reviews of the technical state of the art in automatic control and associated fields. At present, these committees are charged with presenting at the Moscow Congress in June of 1960, reports of progress in drawing up detailed programs and plans. Although some technical committee members have been recommended by their member organizations, there still exist opportunities for other committee members to be recommended.

A special committee chaired by Prof. C.J.D.M. Verhagen of the Netherlands was formed to present for IFAC a program on Instruments and Transducers in Automatic Control at the 1959 Instrument Society of America Conference and Exhibit in Chicago. These presentations by nine speakers were well received and served to show how helpful international meetings can be from the viewpoint of speaker and audience alike.

IFAC Information Bulletin

Thanks to the Editor, Professor Victor Broida of France, and also to John F. Coales of United Kingdom who reviewed their linguist aspects, five IFAC Information Bulletins have been published since the creation of IFAC. Although some National Member Organizations, as well as some individuals were quite active in contributing material, there are still some countries which have not reported much of any activity. Therefore, it has not been possible to spread news of their automatic control work. It is hightly desirable that a more comprehensive exchange of ideas be established in the future. In some cases, merely a listing of current problems and researches might bring about information of solutions to these problems being obtained elsewhere.

Moscow Congress

The date of the First International Congress of IFAC on Automatic Control to be held in Moscow in 1960 is coming closer and this event promises to be a high point in world-wide automatic control activity. Over 400 abstracts have been submitted for presentation. Approximately 300 abstracts have been judged to warrant having complete papers prepared for final consideration. These authors have been invited to prepare their full paper, most of which have by this time been turned over to our IFAC secretary, Dr. G. Ruppel, and to Prof. A.M. Letov for the National Committee of the Soviet Union for Automatic Control. It is anticipated that finally about 200 papers will be presented at Moscow. Separate publications of the Proceedings of the Congress will be prepared in Russian and in English. John F. Coales and Dean John R. Ragazzini of the U.S.A. are co-editors of the English version which will be published by Butterworths Publishing, Ltd. of London.

The extensive preparation of the host group, the National Committee of USSR for Automatic Control, as it is reported on page 11 of this bulletin, is indicative of thoughtful attention being given to making the Congress an outstanding success. It is hoped that the efforts of our hosts, directed by our President, Prof. A.M. Letov, will be matched by corresponding activities by each of the member organizations in arranging for many of their members to attend and participate in the Moscow Congress.

Relations with Other Organizations

During the past two years the IFAC Executive Council has sought ways of strengthening IFAC's relations with a number of other organizations which are active in fields allied to automatic control. The emphasis has been on finding out the scope and activities of these groups and establishing means of communication with their officers so that there would be a minimum of duplication of efforts. Included in these societies are those concerned with Analog Computers, (IAAC), Digital Computers, (IFIPS), the International Electrotechnical Commission, (IEC), the Conference of Representatives from the Engineering Societies of Western Europe and the U.S.A., (EUSEC), and the European Federation of Chemical Engineering, (EFCE). To further our friendly relationships with other international technical associations, IFAC has sought and is being currently considered for admission to the Union of International Technical Associations, (UATI).

Finances

During these first two years of IFAC's existence, a sincere effort has been made to limit the financial expenditures to a minimum level. Many reasonable expenses have been absorbed by organizations and individuals who were desireous of making IFAC a success. Prof. Ed. Gerecke, Treasurer, and Dr. G. Ruppel, Secretary, have done a fine job in maintaining IFAC in its present sound financial position.

As the technical activities of IFAC and its committees increase, it will be necessary for increased publications and other data be available to persons interested in automatic control and affiliated with societies that are members of IFAC. Increased correspondence and coordination will be required. Ways and means must be found for supporting this technically valuable work. Perhaps more support in the form of publishing help and secretarial assistance will have to be forthcoming from the individual member organizations. Perhaps greater direct financial contributions from the various member organizations will be required.

The question has been raised in the Executive Council whether it would be appropriate and necessary for the financial position of IFAC to establish a new category of annual subscription, namely $2000 per year. In view of the increasing importance of automatic control in the years ahead and the value of increased technical cooperation, it seems essential that the annual subscriptions and resources of IFAC be increased in some such fashion.

Conclusions

The first two years of IFAC's existence have seen the development of effective means for engineers and scientists interested in automatic control to cooperate with one another on an international basis. Our organization is strong and our new slate of officers headed by Prof. A.M. Letov are well qualified to carry on the work of IFAC in the years ahead.

At this time, I want to thank the officers, members of the Executive Council, presidents of the member organizations, and the many other persons who have contributed so generously of their time and talents to help give IFAC a successful start. It has been a personal pleasure to me to be a part of this important work in the field of automatic control.

I am sure that I speak for many thousands of engineers and scientists interested in automatic control throughout the world when I say to the incoming officers, "Good luck and best wishes for success to you and IFAC in the years ahead".

Harold Chestnut
Past President, IFAC

Incoming President's Message

The General Assembly of IFAC held in Chicago in September has demonstrated the unanimity of views of scientists and engineers of various countries belonging to IFAC on the main problems of the latter and on the methods for solving them. The General Assembly has considered the essential items of the activity of IFAC, such as:

1. The preparation for the 1st Congress of IFAC organized in Moscow by the National Committee of the USSR for Automatic Control
2. The organization and methods of work of the Technical Committees of IFAC
3. The new Constitution of IFAC
4. The election of the new Executive Council of IFAC etc.

The report submitted by the USSR National Committee on the first question shows the very high level of activity of most member organizations of IFAC who are preparing to demonstrate at the Moscow Congress their best scientific and technical achievements in the field of Automatic Control.

The USSR National Committee acting as the "IFAC Papers Committee" has received more than 400 abstracts of papers. It is expected that a very large number of best experts in Automatic Control from various countries will meet in summer 1960 in Moscow and will have the opportunity of exchanging modern ideas, scientific and engineering problems and methods for solving them.

The coming Congress will demonstrate the potential possibilities of science and the suitability for all of the form of organization of IFAC with which the need of co-operation and of a vivid exchange of scientific ideas and results is vitally important and necessary.

The 1st Congress of IFAC is an important coming event of international importance, which will have a strong influence on the development of Automatic Control in the whole world. This explains the constantly growing interest in this Congress on behalf of scientists, engineers, and business people of various countries.

The first aim of IFAC consists in carrying this Congress on the highest possible scientific and technical level.

Another very important aspect of the activity of IFAC is the creation of Technical Committees which already has been mostly achieved. At the present time, the leadership of these Committees and the list of representatives of interested national organizations is being completed.

One of the possible methods of work of these Committees is proposed by the Chairman of the IFAC Theory Committee, B.N. Petrov, member-correspondent of the Academy of Science of the USSR. This proposal consists, in brief, in dividing Automatic Control theory in several main sections grouping more or less neighbouring scientific and technical problems so as to allow the countries represented in the Theory Committee to take part in working out a survey of the present state of art. These surveys of the Theory Committee could find, as scientific works, an appropriate form of publication and would find a large diffusion amongst members of IFAC.

The closest aim of IFAC consists in insuring an efficient activity to all IFAC Committees. It is quite possible that the above mentioned method of work of the Theory Committee would be suitable for other Committees. Of course, there are other forms of activity of IFAC leading to an exchange of knowledge in the field of Automatic Control. This is why it is possible to invite all those who are interested in the activities of IFAC to bring their suggestions under the section "Free opinions, ideas and suggestions" of the present IFAC Bulletin.

These are our main aims and plans for the next two years. The past first two years term of IFAC was, to a large extent, an organizational one, very important for the future activity of IFAC and entirely successful; an enormous task was achieved in order to create IFAC. At the present time IFAC groups 22 countries and it is expected that in a close future some other countries will join IFAC.

The Italian Committee headed by professor G. Evangelisti has prepared the draft of the new Constitution of IFAC which has been actively discussed on several occasions by all the members of the IFAC Executive Council. The contribution of professor J.F. Coales was particularly valuable in these discussions. A great contribution to the creation of IFAC was made by several other members of the Executive Council.

The General Assembly adopted a special motion thanking Mr. Harold Chestnut for his large contribution to the creation of IFAC in his capacity of its first Chairman; a motion of thanks for his very important work was also extended to Dr. G. Ruppel.

The General Assembly has unanimously elected the new Executive Council of IFAC, and I take this opportunity of greeting all its members and of inviting them to co-operate actively.

I also heartily greet all former and newly appointed chairmen and vice-chairmen of all IFAC Committees and invite them to an active co-operation.

The unity of views and of action achieved at the General Assembly on the main problems of IFAC activity and of its relationship with other related scientific organizations gives us the insurance of the successful progress of IFAC. The token of this is the fact that the activities of scientists and engineers grouped in IFAC are strongly linked with the vital interests of the inhabitants of all countries.

It has now become quite clear that the problem of standard of living of the inhabitants of any country in the world cannot be solved without the necessary development of Automatic Control.

I will conclude by thanking, on behalf of IFAC, the American Automatic Control Council and the officers of the Instruments Society of America for the good organization of the General Assembly of IFAC and for the hospitality extended to its delegates.

A.M. Letov
President of IFAC

The Moscow Congress

In January 1960, the IFAC Secretary will distribute Preliminary Programmes to the Member Organizations. These Programmes will include all latest news on the Congress sessions, visits, excursions, and also some recommendations for the travelling arrangements.

Due to the fact that for the inhabitants of many countries the preparations for travelling to Moscow will need a long time, it is necessary to study the Programme and to fill in the official application sheet as soon as possible. The application sheets will be distributed by the Member Organizations as well as by the IFAC Secretary. The total number of application sheets, however, is limited corresponding to the wish of the Organizing Committee of the Soviet Union only to admit not too large a number of attendants to the Congress.

Preprints of the papers read at the Congress will be available prior to the Congress to all who have been admitted to attend the Congress.

A General Assembly of IFAC and meetings of the Advisory Committee as well as of the IFAC Technical Committees are scheduled to take place during the Congress.

WORLDWIDE AUTOMATIC CONTROL

Australia

The Australian National Committee on Computation and Automatic Control was recently formed as an association of the following nine professional societies:

- The Actuarial Society of Australasia
- The Australasian Institute of Cost Accountants
- The Australian Institute of Management
- Australian Society of Accountants
- The Institute of Chartered Accountants in Australia
- The Institute of Physics - Australian Branch
- The Institution of Engineers, Australia
- The Royal Australian Chemical Institute
- Statistical Society of New South Wales

This National Committee announces a Conference on Automatic Computing and Data Processing in Australia to be held on 24th to 27th May 1960 at the University of Sydney and the University of New South Wales. Papers are now invited for consideration in the following broad fields:

- Commercial Data Processing
- Construction and logical design (including Analog Computers)
- Scientific and Engineering Computation
- Scientific and Engineering Data Processing techniques
- Equipment offering in Australia

A title and a brief statement describing the classification under which the paper should fall are asked for as soon as possible. A summary (approximately 200 words) must be submitted by 1st February 1960.

Since there will be no separate proceedings of the Conference published, papers should be submitted to one of the professional journals for publication prior to the Conference in order that preprints may be arranged.

For all further particulars please write to:

Mr. C.H.D. H a r p e r , Secretary,
Australian National Committee on
Computation and Automatic Control,
Attention: Papers Committee,
c/o The Institution of Engineers,
Australia, Science House,
157, Gloucesterstreet, S y d n e y .

France

A preparatory meeting for the creation of the International Federation of Information Processing Societies (IFIPS) was held in Paris on June 18, 1959. This meeting was attended by representatives of the following 15 national organizations:

For Canada:	Computing and Data Processing Society
For Czechoslovakia:	Academy of Sciences
For Denmark:	Danish Computer Society
For Finland:	Finnish National Committee for Information Processing
For France:	Association Française de Calcul
For Germany:	Deutsche Arbeitsgemeinschaft für Rechenanlagen (DARA) representing jointly the Gesellschaft für Angewandte Mathematik und Mechanik (GAMM), Nachrichtentechnische Gesellschaft (NTG), Deutsche Mathematiker-Vereinigung (DMV) and Verband Deutscher Physikalischer Gesellschaften (VDPG)
For Japan:	Joint Committee on Computers representing jointly the Institute of Electrical Engineers of Japan, the Institute of Electrical Communication engineers of Japan, the Mathematical Society of Japan, the Physical Society of Japan, and the Institute of Applied Physics of Japan
For Mexico:	Society for Information Processing
For the Netherlands:	Dutch Computer Society
For Poland:	Academy of Sciences
For Spain:	National Research Council
For Sweden:	Swedish Society for Information Processing (SSI)
For the U.K.	British Conference on Automation and Computation (BCAC)
For the U.S.A.	National Joint Computer Committee representing jointly the Institute of Radio Engineers, the American Institute of Electrical Engineers, and the Association for Computing Machinery
For the U.S.S.R.	Academy of Sciences

These national organizations decided to create the International Federation of Information Processing Societies - of which they became thus the initial members - and adopted the Statutes of IFIPS which will enter into force on the 1st of January 1960 under the condition of being ratified by at least 7 out of the 15 above mentioned national organizations.

The seat of the Federation shall be in Brussels, Belgium. The provisional Bureau has its Secretariat at the UNESCO Office, Paris, France.

The societies members of the Federation will appoint their representatives to the Council of IFIPS which will be convened as soon as possible after the 1st January 1960. Until then, a Provisional Bureau has been established composed of:

Mr. Isaac L. Auerbach (USA), Chairman,
Auerbach Electronics Corporation,
109 North Essex Avenue, Narbeth, Pennsylvania, U.S.A.

Mr. A.A. Dorodnicyn (USSR), Vice-Chairman,
Computing Center of the Academy of Sciences of the USSR,
I Academichesky proezd 28, Moscow - B - 137, USSR.

Mr. A. van Wijngaarden (Netherlands), Vice-Chairman,
Mathematisch Centrum,
2 Boerhaavestraat 49, Amsterdam, Netherlands.

Mr. Jean A. Mussard (Switzerland), Secretary,
Chief Division of Scientific Research,
Department of Natural Sciences, UNESCO,
Place de Fontenoy, Paris 7e, France.

The Second International Conference on Information Processing may be convened by IFIPS in 1963.

Germany

The Committee for Automation in Manufacturing of the VDI-Fachgruppe Betriebstechnik (VDI Professional Group for Manufacturing Techniques) has organized in Stuttgart on October 22 and 23, 1959, in co-operation with the Institute for Production Techniques and Automation of the Technical University of Stuttgart a symposium on Automation in medium series manufacturing. Four sessions were held in this symposium on:

- "Basic features of Automatic Manufacturing" (4 papers)
- "Control and supervision" (5 papers)
- "Feed devices" (4 papers)
- "Tools and machines" (4 papers)

On the other hand, the VDI/VDE-Fachgruppe Regelungstechnik had organized in Karlsruhe on October 29 and 30, 1959 a symposium on Automatic Control in Electric Energy Supplies with the following three sessions:

- "Problems and needs"
- "Technical solutions of frequency- and active power control in distribution installations"
- "Technical solutions for the control of tension and wattless output"

Roumania

The Committee for Automatisation of the Academy of Sciences (Member Organization of IFAC for Roumania) had organized in Bucarest from November 17th to 20th, 1959, a Conference on Electronic Computers. Three sessions were held on:

- Theoretical aspects of computers
- Construction of computers and programming
- Application of computers to economy and to scientific research

The attendants had the opportunity of visiting the digital computing center as well as centers provided for analog computation.

Switzerland

Under the auspices of the Economic Commission for Europe (ECE) a meeting of experts on the economic aspects of Automation was held in Geneva from 28th to 30th September, 1959.

Representatives from Belgium, the Byelorussian SSR, Bulgaria, Czechoslovakia, the Federal Republic of Germany, France, Hungary, Italy, the Netherlands, Norway, Poland, Switzerland, the Ukrainian SSR, the USSR, the United Kingdom, and Yugoslavia participated in this meeting as well as representatives of seven international organizations under the Chairmanship of Mr. A. Léauté (France) and the Vice-Chairmanship of Mr. D.S. Sotzskov (USSR).

The discussions were based on a report "The economic implications of Automation in Europe" prepared by Mr. J. Knox (United Kingdom) and Messrs. D.S. Sotzskov and S.P. Krasivsky (USSR).

It was agreed that a new session would take place in spring 1960, that governments should be asked to supply comments on the report, supported by up-to-date factual information, and that delegates, who had made proposals for specific topics to be examined in the future, should elaborate these in writing.

United Kingdom

The Institution of Mechanical Engineers, 1, Birdcage Walk, Westminster, London S.W. 1, organizes from January 5th to 7th, 1960, a symposium on recent mechanical engineering developments in Automatic Control.

A lecture will be delivered on Tuesday evening, January 5th, by professor J.A. Hrones of the Case Institute of Technology, Ohio, U.S.A., on general applications and developments. All day January 6th and on January 7th morning, some 12 or 15 papers will be presented and discussed. On January 7th afternoon, there will be visits to places in the London area with either manufacture or utilize automatic control equipment.

On the other hand, a series of discussion meetings is organized by the Institution of Electrical Engineers, Savoy Place, London W.C.2,on January 20th and 21th, 1960, on managerial and engineering aspects of reliability and maintenance of Digital Computer systems.

The first day, under the auspices of the British Computer Society, the following topics will be dealt with:

- Methods for determining the functioning status of a system
- Recording techniques for determining operating efficiency of a system
- Programming techniques for protection against transient failures
- Management and organization problems

The second day, the discussions will be concerned with such subjects as:

- Experience of system reliability
- Influence of engineering design on reliability
- Factors affecting the reliability of peripheral equipment

The meetings are being held under the aegis of Group B (the British Group for Computation and Automatic Control) of the British Conference on Automation and Computation (Member Organization of IFAC for the United Kingdom).

USA

The National Automatic Control Conference was held in Dallas, Texas, from November 4th to November 6th, 1959, under the sponsorship of the Institute of Radio Engineers, Professional Group on Automatic Control (IRE-PGAC) with the official participation of the American Institute of Electrical Engineers (AIEE), the Instrument Society of America (ISA), and the IRE Professional Group on Industrial Electronics and with the co-operation of the American Society of Mechanical Engineers (ASME) and the Electrical Engineering Department of Southern Methodist University.

Eight sessions were held on:

- General topics (3 papers)
- Control problems of the Space Age (4 papers)
- Non-linear Control theory (5 papers)
- Automatic Control devices and systems (5 papers)
- Control System synthesis and optimization (5 papers)
- Automatic Flight Control (5 papers)
- Control System design techniques (5 papers)
- Random processes in Control Systems (5 papers)

All papers will be published by the IRE Transactions on Automatic Control or other appropriate media.

The Fifth International Automation Congress and Exposition scheduled for November 16th to 20th, 1959, in New York has been cancelled.

FREE IDEAS, OPINIONS AND SUGGESTIONS

Draft of Graphical Symbols for Automatic Control

edited by Professor Ed. GERECKE, Zurich, Switzerland,

with the co-operation of the Sub-Committee (UK-R) for Automatic Control of the Swiss Technical Committee TC-3 of the Swiss Electrotechnical Society,

of Mr. J.F. COALES, Cambridge, University, United Kingdom, and

of Professor V. BROIDA, Paris, France.

PREFACE

The more automatic control penetrates into the various fields of engineering, the more perceptible is the lack of such graphical symbols which could be applied to all engineering fields. Among all international Committees, only the IEC has made an attempt to establish such symbols, and its Technical Committee TC 3 for Graphical Symbols has instructed the Swiss Electrotechnical Society to form a Sub-Committee for "Graphical Symbols of Automatic Control and Computation" and to be in charge of the Secretarial work. The internal discussions of this purely Swiss Committee have proceeded so far that their proposals can soon be submitted to other IEC countries for discussion in accordance with the usual IEC procedure. It will, however, take several years before international recommendations are available.

In order to expedite the matter and to comply with the urgent request for such graphical symbols, the Swiss Electrotechnical Society has asked Professor Ed. Gerecke, the Chairman of the above-mentioned Sub-Committee, in his personal capacity and without any responsibility on the part of the SEV (Swiss Electrotechnical Society), to publish this draft and to invite criticism. The draft contains the result of the preliminary discussions of the Sub-Committee. Another reason for this publication is the fact that the IEC is working only in the field of electrotechnics, whereas automatic control covers all fields of engineering, e.g. the machine-building industry is also extremely interested. Furthermore, analog and digital computation is to be included, since they have much in common with automatic control. The symbols will also serve instrument and system engineers as well as the plant and computing engineers.

Graphical symbols should be as simple as possible and should also be easily understandable and easy to remember. The creation of new symbols should be kept to a minimum, and such symbols of IEC, ISO, ASA etc. which already are standardized, should remain applicable without change or limitation. First, there are some symbols to be established for pieces of equipment and then they must be combined into flow diagrams. The available graphical symbols almost exclusively represent components, devices and instruments. In the field of automatic control it has become necessary to supplement the existing symbols for devices by 4 more symbols

for the controller, the regulator, the transmitter, and the storage. Apart from that, automatic control also requires the representation of information flow through various transfer elements in "flow diagrams", which necessitates symbols for signal characteristics, for the combination of signals and for signal transfer. These symbols should also contain data on the computation of transient processes within automatic control systems.

Furthermore, the symbols should form, taken together, a closed system free from contradictions and inconsistencies. If possible, the symbols should be graphical and not "calligraphical", i.e. as far as possible free from letter symbols. There is also a need to distinguish the differnt fields, such as mechanics, electrotechnics, optics etc., by means of simple symbols, e.g. it should be possible to discriminate between optical and electrical signals.

As can be seen from the attached survey, the symbols have been combined into various groups. For each group, the knowledge of only very few principal symbols is essential; all the other symbols are formed through combinations, the principles of which can easily be understood from a limited number of characteristic examples. These combinations result in a number of new and unexpected ways of representation. The combination of symbols leads to block and flow diagrams which can be divided into 5 main categories. The standardization of these symbols will be of assistance in the literature as well as to practising control engineers.

All the tables appanded have their text in English but they are followed by the corresponding French and German texts. All texts have been worked out as a result of personal co-operation between Prof. Ed. Gerecke, Mr. J. F. Coales and Professor V. Broida, on the basis of the original text in German.

Table I gives a survey of graphical symbols and diagrams for control systems. The left-hand side depicts the symbols as single elements and the right-hand indicates here they may be combined into diagrams. The table includes 5 main categories. Category Ia includes the well-known symbols for various components, instruments or machinery, as they have been standardized by IEC, ISO, ASA etc. for the machine-building and electrotechnical industries. Ib gives a schematic diagram, combining several single symbols, such as is customary in the whole field of engineering, and all details are included.

In order to make it clearer, the various pieces of equipment shown can be drawn in IIa as "block symbols" by means of rectangles, and these block symbols, can be combined in IIb into block diagrams by indicating the actual relationships. Thus they represent instruments and plants in abbreviated form.

Categories III, IV and V give the flow of signals or information. Various transfer elements are grouped under IIIa and each of them can have one or more input signals and one or more output signals. It is here a matter of directional elements; it is assumed that there is no reaction of the output signal upon the input signal. The "signal flow diagram" IIIb shows the path of signals or information through transfer elements.

In category IV a the transfer elements are more specifically characterized in that mathematical relationship between input and output signals can be directly ascertained from them. They are called transfer elements incorporating mathematical transforms. The mathematical relationship can be either analytical or graphical and can represent either a logical function or an experimental result. The signal flow diagram IVb incorporating mathematical transforms is made up of such transfer elements and therefore contains all the data necessary for computation of transient processes in automatic control systems.

Diagrams Va and Vb are similar to diagrams IVa and IVb and only the way in which they are drawn is different, their basis remaining unaltered. Information is represented by small circles and transfer elements by connecting paths on which the transfer functions are written.

Proceeding in Table I from category I to category V, the trend is in the direction of progressive abstraction. Categories I and II are useful for plant construction, categories IV and V for calculations. Usually categories IIa, IIIa and IVa are designated as block symbols and IIb, IIIb,and IVb as block diagrams. Categories IIIb, IVb and Vb can be considered as flow diagrams. It would be convenient, if characteristic designations could be found for the 10 categories of this table.

The symbols listed in this table should be considered only as an example and are not claimed to be complete.

The author thanks the Swiss Electrotechnical Society (a member of IEC) for the permission to publish this list of symbols. He also thanks cordially all members of the Subcommittee (UK-R) for Automatic Control of the Swiss Technical Committee TC 3 for their valuable criticism and suggestions and Mr. Coales and Prof.Broida for translation work.

FIVE MAIN CATEGORIES OF SIGNALS

In the field of measuring techniques and automatic control, continuous signals have first to be considered but recently methods using digital and pulsed signals and sampling have penetrated into the field of automatic control and logical and random signals are now also used.

Therefore, it is necessary to distinguish the afore mentioned signals graphically in the various kinds of flow diagram.

The following table gives the 5 main categories of signals:

Number	1	2	3	4	5
Symbol					

No. 1 Continuous signals

In a given interval, they can have any intermediate value whatever. Sometimes, they are also called "analog" signals, since they appear in analog computation. They occur in connection with "measuring".

No. 2 Digital signals

They only have given discrete values which amount to a complete multiple of a unit. Values below this unit cannot take place. These signals occur in connection with "computing" and digital computation.

No. 3 Random or stochastic signals

Their value is indeterminate and randomly distributed. They can proceed either continuously or digitally. It is also possible that time intervals in which certain events occur, can be of interest, such as lightning-stroke or emissions of gamma rays.

No. 4 Pulsed-coded signals

They occur in the form of single discrete, time-limited, signals and such quantities as their shape, amplitude or pulse-width are determining factors. The values of these quantities can be varied either continuously or digitally. Alternatively the number of single pulses in a sequence of pulses can be the determining factor. The signal can consist of direct-current pulses or of periodic, mostly high frequency, alternating current pulses.

No. 5 Logical signals with two values

These signals adopt only 2 values "O" or "L". They indicate two conditions, such as "ON" or "OFF", "TRUE" or "FALSE", "LIGHT" or "DARK", "CONDUCTIVE" or "NON-CONDUCTIVE".

The suggested symbols Nos. 1-4 respectively recall a potentiometer , the symbol used in the United States for "number", lightning and the oscillogram of a rectangular pulse. Instead of the letter L the figure 1 is also used.

GRAPHICAL SYMBOLS FOR THE DIFFERENT TECHNIQUES EMPLOYED OR DOMAINS INVOLVED

Since automatic control now covers the entire field of engineering, there is need for precise graphical designation of the different techniques employed or domains involved and for a more detailed description of the types of signals and instruments. In Table II the techniques employed and domains involved are listed in a numerical order and designated with a specific symbol.

Group 1: Signals and quantities transferred

Table III contains a list of the different kinds of signals and quantities transferred. Occasionally, there is, apart from the first symbol, a second symbol given as a variant. Symbols 100 ... 106 give the basic symbols for the representation of quantities transferred, namely the path, the designation of the quantity transferred, the flow direction (to be omitted if obvious) as well as the input with the particular case of a message distinguished from an input from a function generator and the output. These few symbols are sufficient for the representation of quantities transferred. Symbol 107 indicates that all standard letter symbols can be used for the designation of quantities. Symbols 108 ... 137 result from the combination of the symbols of the 5 main categories of signal with the symbols of techniques and domains of the Table II. They are given as examples to indicate the possibilities of combination.

Group 2: Symbols for the mathematical combination of signals

Since the laws of combination for algebraic and logical signals are different, it is necessary that the type of the symbol should show at a glance, whether it is a matter of algebraic or logical operation. The circle or the rectangle is used in Table IV for algebraic combinations and the semicircle for logical operations.

Group 2a: Algebraic Operations (Table IV)

This includes, first of all, the addition and substraction of two or more signals as well as their linear combinations. The multiplication is generally shown by the capital letter Π . Symbols 206 and 207 are suggested for division. The graphical symbolization of the indefinite and the definite integral requires numerous equivalent manners of representation, according to whether computation takes place in the original domain or in the complex variable domain of the Laplace transform. Symbols 208, 211, 212, and 213 apply to both domains. Symbol 209 applies to the original domain; it shows graphically the step response of the integral. Symbol 210 shows the transfer function in the complex variable domain, and in order to avoid confusion, the complex variable domain may generally be marked by a double line on

the rectangle. The letter symbol $\tilde{x}$ means the Laplace transform,

$$L[x(t)] \equiv \tilde{x}$$

p the Laplace operator, which may also be replaced by s.

Since the differentiation is the reverse operation of the integration, symbols 214 and 217 are the reverse of symbols 208 and 211.

Group 2b: Logical Operations (Table IV)

Generally, the semicircle is chosen for these operations. Usually there would be n input signals and m output signals. Symbol 251 represents a logical identity; the output signal is logically identical to the input signal. In symbol 252, a small circle is attached to the output to indicate the logical inverse. Thus, in symbol 253 the identity and the inverse can be represented at the output simultaneously.

For the combination of two logical signals x_1 and x_2 only both the basic operations, disjunction ["OR"] and conjunction Π ["AND"] have been represented. Since the latter frequently is called the "product", the capital letter Π has been chosen for it. As a principle, no lines etc. should be drawn inside the semicircle for logical operations, so that the letters etc. may be inserted.

The definition of the "inhibitor" for input and output signals had to be made more general than is usual, (symbol 258). The inhibitor x_i is indicated by means of a small circle on the input side. As long as it has the value "0", it has no influence on the output. If, however, it has the value "L", all output signals change into their inverses. The output signals can mean, for instance, resting- and operating-contacts of a relay. If the inhibitor has the value "L", then all these contacts change their positions to the opposite ones.

Symbols of logical operations also cover digital pulse counters (symbol 259); in this case all pulses which overrun the value "L" are added. The difference pulse counter (symbol 260) can be represented in this way as well as the coincidence pulse counter (symbol 261) which counts the value "L" only if both pulses x_1 and x_2 coincide simultaneously, i.e., if the number of conjunctions has to be counted.

Since multivibrators have two states, the semicircle is subdivided in two parts in symbol 262.

Group 3: Transfer Elements (Table V)

The main characteristic is the mathematical relationship between the input and output signals of a transfer element. The relationship may be linear or non-linear. Since the second case leads to very great mathematical difficulties, it is extremely desirable to select a special form for symbols of non-linear transfer elements. Therefore, this group given by table V is divided into two sections.

Group 3a: Linear transfer elements

A rectangle is used, inside which explanatory details can be added. The letters P, I, D are reserved for proportional, integrating, and differentiating transfer elements. With the proportional transfer element, the gain K can be mentioned; if $K = -1$, this would mean a sign-reversing element.

The input and output signals can be represented in either the time or complex variable domains. The asterisk in symbol 305 means the convolution:

$$x_1 * g(t) = x_2$$

$g(t)$ is here the "impulse response", i.e. the inverse function of the transfer function $G(p)$ if it exists:

$$L[g(t)] = G(p)$$

In the second symbol 305 the step response $\gamma(t)$ is given graphically with respect to the time axis t :

$$\gamma(t) = \int_0^t g(t)dt = 1*g(t)$$

This makes it possible to represent, in principle, all relationships for transfer elements in the time domain. Symbol 306 gives the representation in the complex variable domain by means of the transfer function $G(p)$:

$$L(x_1) \cdot G(p) = L(x_2)$$

In the case of a possibility of confusion, the lower part (because of the "lower" complex variable domain) of the rectangle is to bear a double line.

In a later edition, transfer elements shall be represented with matrix or dead time elements.

Group 3b: Non-linear transfer elements

Here a rectangle which ends at the output in the shape of a wedge (wedged rectangle) is usually used. In this way a clear definition of the direction of transfer is achieved. The output is located near the wedge. The inner space remains free for further information. The value of 120° is recommended for the wedge angle.

The output signal x_2 is a function of the input signal x_1 independent of time. The mathematical relationship

$$x_2 = \Phi(x_1)$$

is described by the function Φ and can be analytical, graphical or experimental. In symbol 351 the analytical law of Φ can be

mentioned, for instance Kx_1^2 or $K\sqrt{x_1}$.

The curve of symbol 352 is often called characteristic curve or characteristic control curve. The following symbols are typical examples; the absolute value element, the square law element, the square-root law element and other transfer elements which often occur in relay circuits. Transfer elements with dead band, with threshold, with backlash, with limitation, with hysteresis and saturation are also shown.

This ends the sequence of symbols which express given mathematical operations and relationships. The following symbols are proposed for components and instruments.

Amplifiers and Transmitters (Table VI)

Group 4a: Amplifiers

The output power of an amplifier is greater than its input power. There are, for instance, hydraulic, pneumatic, electric, magnetic, operational, amplidyne, metadyne and electronic amplifiers. In the field of analog computation, there is a need to discriminate between computation amplifiers and power amplifiers required at the output; the following combinations are also important; summing amplifiers, integrating amplifiers, and feedback amplifiers.

Group 4b: Transmitters (Symbols 450 ... 458)

So far, the definition of a Sender has not yet been stated precisely. Definitions as applied in other fields (heavy-current engineering, light-current engineering, power devices, measuring instruments) have to be abandoned in the case of automatic control.

The output power of Senders is smaller than their input power or (at the very utmost) equivalent . The following features should determine the classification of Senders.

a) Physical natures of input and output

They can be identical or different. If they are identical, the definition is often that of a transformer; if they are different, the definition is often that of a converter. These definitions are not fixed. Current- and voltage-transmitters are transformers, whilst tachometers are mechanical-electrical converters.

b) Forms or oscillograms of input and output

This is, for instance, the case of rectifiers, inverters, transverters, frequency converters, phase converters, modulators (amplitude-, frequency-, and pulse-modulators) etc.

c) Types of input and output signals

The signals can be analog, digital, random, pulsed-coded, or logical. For instance, the devices can be differentiated as follows:

Analog to analog converters.
Analog to digital converters (encoders, digitizers, quantizers)
Digital to digital converters.
Digital to analog converters (decoders).

A sampler converts a continuous input into a pulsed-coded output.

It would be worthwhile for the Technical Committee of Terminology of IFAC to establish precise definitions. The nine symbols 450 ... 458 give only a small fraction of this field.

Group 5: Storage Elements (Table VII)

There are two main categories, energy storage and information storage. Both should be represented by means of subdivided rectangles. If the input means, the storage medium, and the output means are separately marked, the rectangle should be divided into three sections. The input("writing") can take place mechanically, thermally, electrically (galvanic, magnetic, spark), photographically, or photo-electrically, just as well as the output ("reading"). Punched cards, tape-films, magnetic films, optical films, magnetic drums, ferrite cores etc. can be used as storage media. The symbols given represent only a small fraction of those possible.

Control Devices and Equipment (Table VIII)

Group 6a: Symbols for control devices

For the representation of complete automatic control systems there is a need of symbols for control devices which are a part of a control system. All standardized symbols of IEC, ISO, ASA, ASME, BS, DIN, SEV etc. can be used by inserting them in a rectangle. This rectangle can also be numbered or provided with a letter. This enables the use quite early of all previous symbols for control devices in automatic control diagrams. This also avoids the necessity of finding new symbols.

It is often essential to mention the kind of power supply (pressure medium, pressure, tension, type of current etc.) which can be done at the corners of the rectangle. Occasionally there is a need for a combined symbol for control devices containing the control characteristic and the step response.

Group 6b: Measuring and recording devices

Measuring points can be represented by indications, e.g. 610, by the signal path. The measuring device can be indicating (continuous or numerical), recording (continuous or numerical,) or counting. The cathode-ray oscilloscope which is often used, belongs to the group of recording devices.

Group 6c: Regulators (Signal controlling elements)

A new smybol has had to be created for regulators (in the form of a square with diagonals). Servo-motors are represented separately and can be mechanical, hydraulic, pneumatic, thermal, electric, magnetic etc. Potentiometers also belong to this group.

Group 6d: Control equipment

The control equipment includes all elements from the measuring unit to the regulator, and is represented by means of a square with diagonals and an inside circle. If the regulator is missing (case of a control unit) the symbol will be simplified (rectangle with semicircle). If there is no danger of confusion, the semicircle could be omitted. The symbols of the different kinds of controllers can easily be combined from the symbols already known.

Translation

The tables on page 27-49 are drawn up in English language.

The translation of the terms into French is given on page 50-61, and into German on page 62-72.

The terms in the tables and in the translations have got the same numbers.

Übersetzung

Die Tabellen auf den Seiten 27 bis 49 sind in englischer Sprache abgefaßt.

Eine Übersetzung ins Französische ist auf den Seiten 50 bis 61 und ins Deutsche auf den Seiten 62 bis 72 gegeben.

Die Nummern in den Tabellen stimmen mit denen der Übersetzungen überein.

Traduction

Les tableaux aux pages 27 à 49 ont été établis en langue anglais.

La traduction en français se trouve aux pages 50 à 61 et en allemand aux pages 62 à 72.

Les numéros dans les tableaux sont les mêmes comme dans les traductions.

GRAPHICAL SYMBOLS FOR AUTOMATIC CONTROL

proposed by

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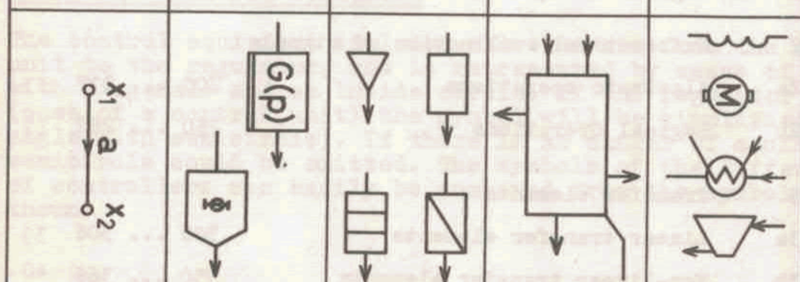
TABLE I. SURVEY OF GRAPHICAL SYMBOLS AND DIAGRAMS FOR CONTROL SYSTEMS

	NO.	DESIGNATION	SYMBOL	NO.	DESIGNATION	DIAGRAM
I	Ia	SYMBOLS FOR COMPONENTS		Ib	SCHEMATIC DIAGRAM	
II	IIa	BLOCK SYMBOL REPRESENTING A PIECE OF EQUIPMENT		IIb	BLOCK DIAGRAM	
III	IIIa	SYMBOLS FOR TRANSFER ELEMENTS		IIIb	SIGNAL FLOW DIAGRAM	
IV	IVa	SYMBOLS FOR TRANSFER ELEMENTS INCORPORATING MATHEMATICAL TRANSFORMS		IVb	SIGNAL FLOW DIAGRAM INCORPORATING MATHEMATICAL TRANSFORMS	
V	Va	SYMBOL FOR AN INFORMATION TRANSFER ELEMENT IN A LINE FLOW DIAGRAM		Vb	LINE FLOW DIAGRAM	



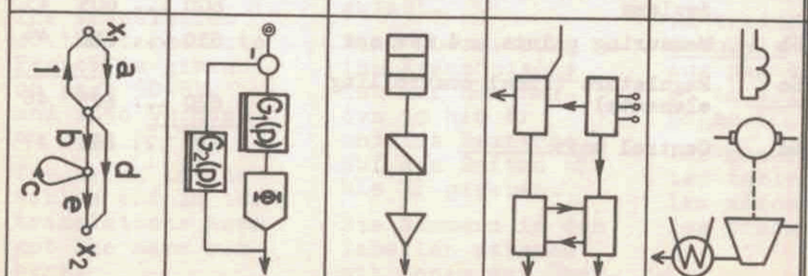


TABLE II.

GRAPHICAL SYMBOLS FOR THE DIFFERENT TECHNIQUES EMPLOYED OR DOMAINS INVOLVED

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
11	GEOMETRY		
12	TIME		
13	MECHANICS		
14	HYDRAULICS		
15	PNEUMATICS		
16	THERMODYNAMICS		
17	ACOUSTICS		
18	OPTICS		
19	ELECTRICAL ENGINEERING		
20	ELECTRONICS		
21	CHEMISTRY		
22	α -RADIATION		
23	β -RADIATION		
24	γ -RADIATION		
25	NEUTRON-RADIATION		
26	NUCLEONICS		

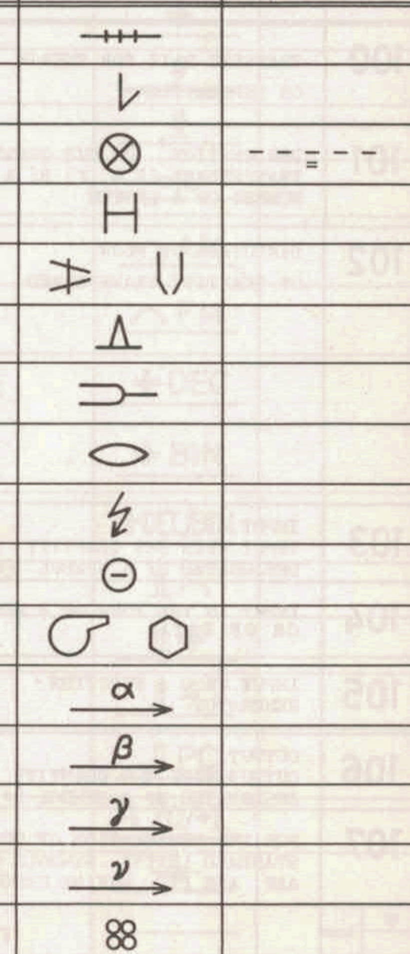


TABLE III.

GROUP 1 SIGNALS AND QUANTITIES TRANSFERRED

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
100	TRANSFER PATH FOR ENERGY OR INFORMATION		
101	DESIGNATION OF THE QUANTITY TRANSFERRED (E.G. x) BY A NUMBER OR A LETTER	x	x
102	DIRECTION OF FLOW OF QUANTITY TRANSFERRED		
103	INPUT. INPUT WITH THE QUANTITY DESIGNATED BY A SYMBOL (e.g. x)		x
104	INPUT IN THE FORM OF A MESSAGE OR OF DATA		
105	INPUT FROM A FUNCTION GENERATOR		FG
106	OUTPUT. OUTPUT WITH THE QUANTITY DESIGNATED BY A SYMBOL (e.g. x)		x
107	FOR THE DESIGNATION OF QUANTITIES, STANDARD LETTER SYMBOLS OF IEC, ASA, AEF, ASE ETC. MAY BE USED, E.G.:		
	ELECTRIC VOLTAGE u	u	
	ELECTRIC CURRENT i	i	
	TEMPERATURE ϑ	ϑ	
	pH-SIGNAL pH	pH	

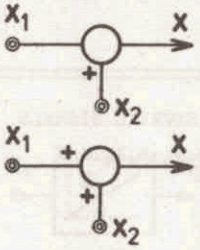
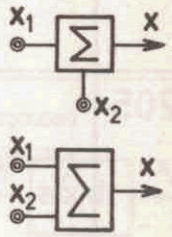
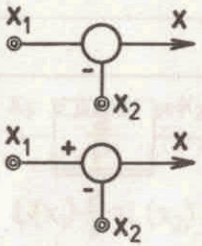
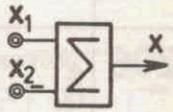
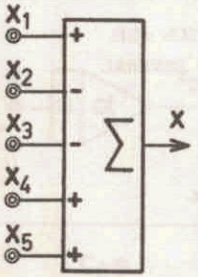
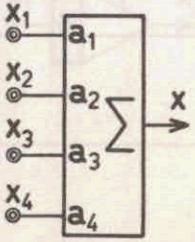
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
108	CONTINUOUS SIGNAL		
109	DIGITAL SIGNAL		
110	RANDOM SIGNAL		
111	PULSED SIGNAL		
112	LOGIC SIGNAL WITH TWO VALUES "0" OR "L"	0|L	
113	CONTINUOUS SIGNAL AMPLITUDE-MODULATED	AM	
114	CONTINUOUS SIGNAL FREQUENCY-MODULATED	FM	
115	DIGITAL SIGNAL EXPRESSED IN THE DECIMAL SYSTEM	DEC	
116	DIGITAL SIGNAL EXPRESSED IN THE BINARY SYSTEM	BIN	
117	BINARY-CODED DECIMAL DIGITAL SIGNAL	DEC/BIN	
118	CONTINUOUSLY-MODULATED PULSED SIGNAL		
119	DISCONTINUOUSLY-MODULATED PULSED SIGNAL		
120	RANDOMLY-MODULATED PULSED SIGNAL		
121	PULSED-CODED SIGNAL	PC	
122	LOGIC SIGNAL WITH 3 VALUES "-L" OR "0" OR "+L"	-L/0/+L	
123	TRANSFER OF A SPATIAL QUANTITY		
124	TRANSFER OF A MECHANICAL QUANTITY		⊗
125	TRANSFER OF A HYDRAULIC QUANTITY	H	
126	TRANSFER OF A PNEUMATIC QUANTITY		U
127	TRANSFER OF A THERMAL QUANTITY		

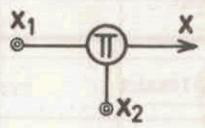
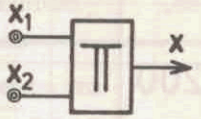
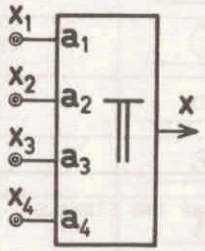
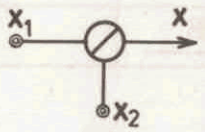
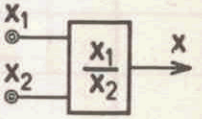
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
128	TRANSFER OF AN ACOUSTIC QUANTITY		
129	TRANSFER OF AN OPTICAL QUANTITY		
130	TRANSFER OF AN ELECTRIC QUANTITY		
131	TRANSFER OF AN ELECTRONIC QUANTITY		
132	TRANSFER OF A CHEMICAL QUANTITY		
133	α -RADIATION SIGNAL	α	
134	β -RADIATION SIGNAL	β	
135	γ -RADIATION SIGNAL	γ	
136	NEUTRON SIGNAL	ν	
137	GENERAL NUCLEONIC SIGNAL		

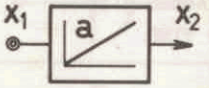
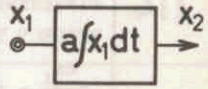
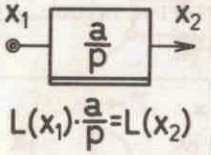
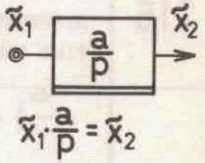
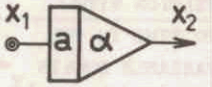
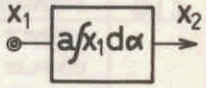
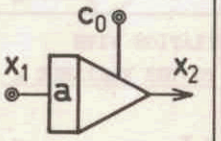
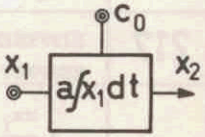
TABLE IV

MATHEMATICAL COMBINATION OF SIGNALS

GROUP 2a ALGEBRAIC OPERATIONS

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
200	SUM OF TWO SIGNALS $x_1 + x_2 = x$		
201	DIFFERENCE OF TWO SIGNALS $x_1 - x_2 = x$		
202	ALGEBRAIC SUM OF SEVERAL SIGNALS, E.G.: $x_1 - x_2 - x_3 + x_4 + x_5 = x$		
203	LINEAR ALGEBRAIC COMBINATION OF SEVERAL SIGNALS: $a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 = x$		

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
204	PRODUCT OF TWO SIGNALS $x_1 \cdot x_2 = x$		
205	PRODUCT OF SEVERAL SIGNALS $a_1x_1 \cdot a_2x_2 \cdot a_3x_3 \cdot a_4x_4 = x$		
206	QUOTIENT OF TWO SIGNALS $x_1 : x_2 = x$		
207	MULTIPLICATION AND DIVISION OF SEVERAL SIGNALS e.g.: $\frac{x_1x_4}{x_2x_3x_5} = x$		

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
208	INDEFINITE INTEGRAL WITH RESPECT TO TIME $\int ax_1dt = x_2$		
209	INDEFINITE INTEGRAL IN THE TIME DOMAIN $\int ax_1dt = x_2$		
210	INDEFINITE INTEGRAL WITH RESPECT TO TIME IN THE COMPLEX VARIABLE DOMAIN. p : LAPLACE OPERATOR $L(x_1) = \tilde{x}_1$: LAPLACE TRANSFORM OF x_1		
211	INDEFINITE INTEGRAL WITH RESPECT TO A VARIABLE α $\int ax_1d\alpha = x_2$		
212	DEFINITE INTEGRAL WITH RESPECT TO TIME $\int_0^t ax_1dt + c_o = x_2$		

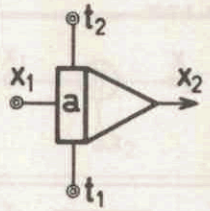
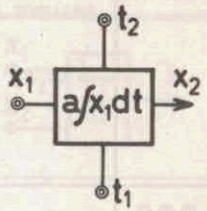
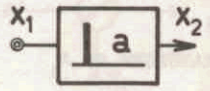
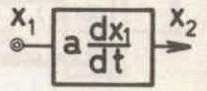
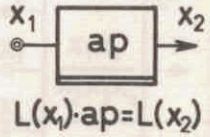
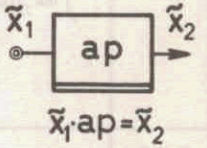
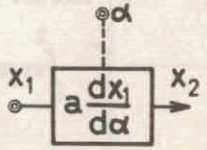
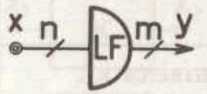
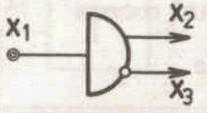
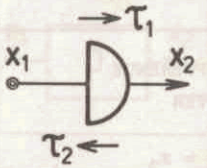
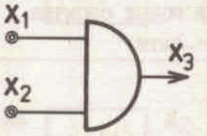
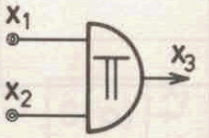
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
213	DEFINITE INTEGRAL WITH RESPECT TO TIME BETWEEN THE TIME LIMITS t_1 to t_2 $\int_{t_1}^{t_2} a x_1 dt = x_2$		
214	DIFFERENTIATION WITH RESPECT TO TIME $a\frac{dx_1}{dt} = x_2$		
215	DIFFERENTIATION IN THE TIME DOMAIN $a\frac{dx_1}{dt} = x_2$		
216	DIFFERENTIATION WITH RESPECT TO TIME IN THE COMPLEX VARIABLE DOMAIN OF THE LAPLACE TRANSFORM $L(x_1)\cdot ap = L(x_2)$ $\tilde{x}_1 \cdot ap = \tilde{x}_2$		
217	DIFFERENTIATION WITH RESPECT TO THE VARIABLE α $a\frac{dx_1}{d\alpha} = x_2$		

TABLE IV (continued)
MATHEMATICAL COMBINATION OF SIGNALS
GROUP 2b LOGICAL OPERATIONS

NO	DESIGNATION	SYMBOL	SECOND SYMBOL
250	GENERAL BASIC SYMBOL FOR LOGICAL OPERATIONS WITH n INPUTS AND m OUTPUTS		
251	LOGICAL IDENTITY $x_1 \equiv x_2$		
252	LOGICAL INVERSION $\bar{x}_1 \equiv x_2$		
253	LOGICAL IDENTITY AND INVERSION $x_1 \equiv x_2$ $\bar{x}_1 \equiv x_3$		
254	PURE DELAY ELEMENT. RISE-DELAY TIME τ_1 AND FALL-DELAY TIME τ_2		
255	"OR"-GATE (DISJUNCTION)		
256	"AND"-GATE (CONJUNCTION)		

x_1	0	0	L	L
x_2	0	L	0	L
x_3	0	L	L	L

x_1	0	0	L	L
x_2	0	L	0	L
x_3	0	0	0	L

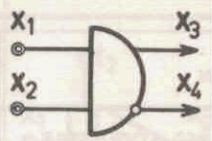
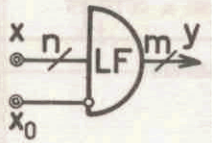
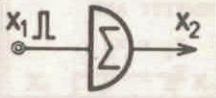
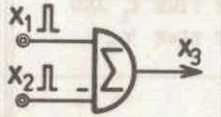
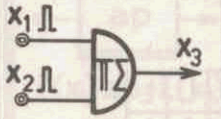
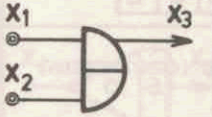
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
257	"OR"-GATE FOR x_3 WITH x_4 INVERSE OF x_3 $\bar{x}_3 = x_4$		
258	GENERAL INHIBITOR x_0. IF $x_0 = 0$, x_0 HAS NO INFLUENCE ON y. IF $x_0 = L$, ALL m VALUES OF y CHANGE INTO THEIR INVERSES $\bar{y}$.		
259	DIGITAL PULSE COUNTER $\Sigma x_1 = x_2$		
260	DIGITAL DIFFERENCE PULSE COUNTER $\Sigma(x_1 - x_2) = x_3$		
261	COINCIDENCE PULSE COUNTER (WITH "AND"-GATE)		
262	BISTABLE ELEMENT OR FLIP-FLOP		

TABLE V TRANSFER ELEMENTS

GROUP 3a LINEAR TRANSFER ELEMENTS

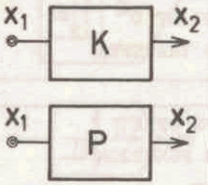
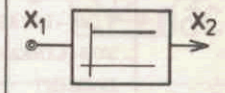
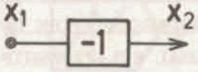
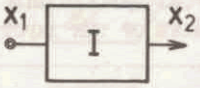
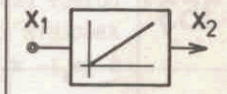
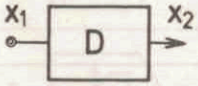
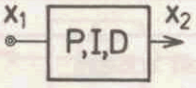
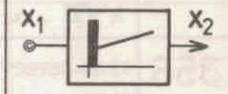
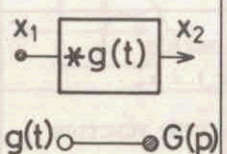
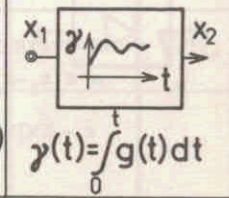
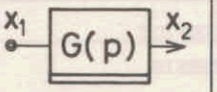
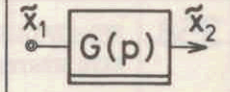
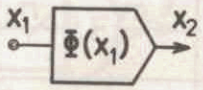
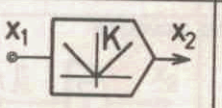
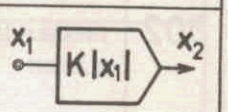
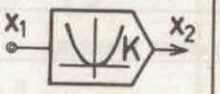
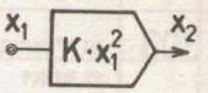
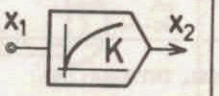
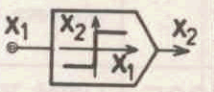
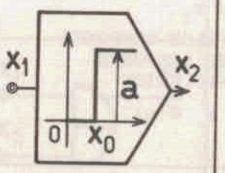
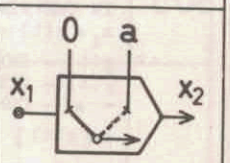
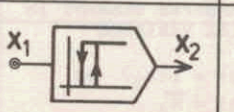
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
300	PROPORTIONAL TRANSFER ELEMENT $x_1 \cdot K = x_2$		
301	SIGN-REVERSING ELEMENT $x_1(-1) = x_2$		
302	INTEGRATING TRANSFER ELEMENT		
303	DIFFERENTIATING TRANSFER ELEMENT		
304	PROPORTIONAL, INTEGRATING AND DIFFERENTIATING TRANSFER ELEMENT		
305	LINEAR TRANSFER ELEMENT IN THE TIME DOMAIN $x_1 * g(t) = x_2$ $g(t)$ - IMPULSE RESPONSE $\gamma(t)$ - STEP RESPONSE $*$ - CONVOLUTION $L[g(t)] = G(p)$		
306	LINEAR TRANSFER ELEMENT IN THE COMPLEX VARIABLE DOMAIN $L(x_1) \cdot G(p) = L(x_2)$ or $\tilde{x}_1 \cdot G(p) = \tilde{x}_2$		

TABLE V. TRANSFER ELEMENTS (continued)

GROUP 3b NON-LINEAR TRANSFER ELEMENTS

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
350	TIME-INVARIANT NON-LINEAR TRANSFER ELEMENT		
351	DESIGNATION OF A NON-LINEAR FUNCTION $\Phi(x_1) = x_2$		
352	GRAPHICAL REPRESENTATION OF THE FUNCTIONAL RELATIONSHIP BETWEEN INPUT x_1 AND OUTPUT x_2		
353	OUTPUT PROPORTIONAL TO THE ABSOLUTE VALUE OF THE INPUT $K\,\|x_1\| = x_2$		
354	SQUARE LAW TRANSFER ELEMENT $Kx_1^2 = x_2$		
355	SQUARE-ROOT LAW TRANSFER ELEMENT $K\sqrt{x_1} = x_2$		
356	SIGN-DETECTING ELEMENT SIGN $x_1 = x_2$		
357	TWO-STATE DEVICE $a \cdot \varepsilon(x_1 - x_0) = x_2$ ε - UNIT STEP FUNCTION		
358	TWO-STATE DEVICE WITH HYSTERESIS		

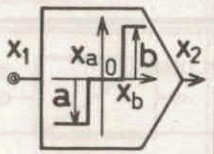
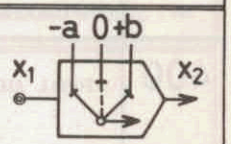
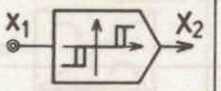
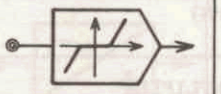
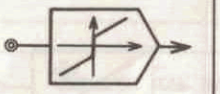
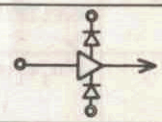
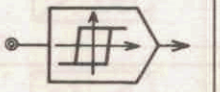
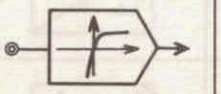
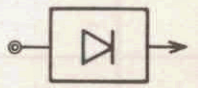
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
359	THREE-STATE DEVICE $-a\,\varepsilon(x_1-x_a)+b\,\varepsilon(x_1-x_b) = x_2$		
360	THREE-STATE DEVICE WITH HYSTERESIS		
361	TRANSFER ELEMENT WITH DEAD BAND		
362	TRANSFER ELEMENT WITH BACKLASH		
363	TRANSFER ELEMENT WITH THRESHOLD		
364	TRANSFER ELEMENT WITH LIMITATION (SATURATION)		
365	TRANSFER ELEMENT WITH HYSTERESIS AND SATURATION		
366	RECTIFIER		

TABLE VI.

AMPLIFIERS, SENDERS, TRANSDUCERS, MODULATORS AND ENCODERS

GROUP 4a AMPLIFIERS

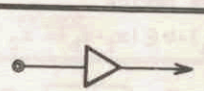
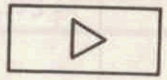
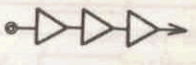
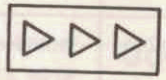
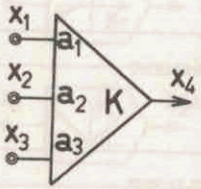
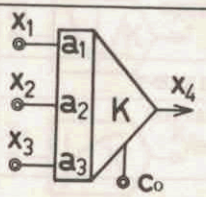
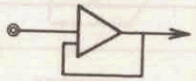
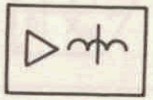
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
400	SIGNAL AMPLIFIER		
401	MULTI-STAGE SIGNAL AMPLIFIER		
402	POWER AMPLIFIER (IN ANALOG COMPUTATION)		
403	SUMMING AMPLIFIER $(a_1x_1+a_2x_2+a_3x_3)K = x_4$		
404	INTEGRATING AND SUMMING AMPLIFIER $\int_0^t (a_1x_1+a_2x_2+a_3x_3)Kdt+c_o = x_4$		
405	FEEDBACK AMPLIFIER		
406	MAGNETIC AMPLIFIER		

TABLE VI. (continued)

AMPLIFIERS, SENDERS, TRANSDUCERS, MODULATORS AND ENCODERS

GROUP 4b SENDERS, TRANSDUCERS, MODULATORS AND ENCODERS

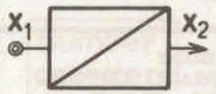
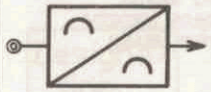
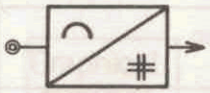
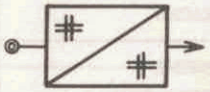
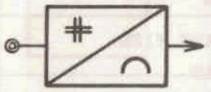
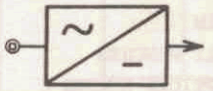
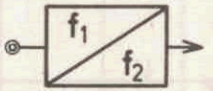
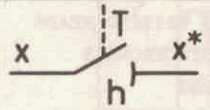
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
450	TRANSFORMER, CONVERTER, INVERTER, TRANSMITTER, TRANSDUCER		
451	ANALOG TO ANALOG CONVERTER		
452	ANALOG TO DIGITAL CONVERTER (DIGITIZER, QUANTIZER, ENCODER)		
453	DIGITAL TO DIGITAL CONVERTER		
454	DIGITAL TO ANALOG CONVERTER (DECODER)		
455	BINARY TO DECIMAL CONVERTER		
456	AC-DC CONVERTER (RECTIFIER)		
457	FREQUENCY CONVERTER f_1 - INPUT FREQUENCY f_2 - OUTPUT FREQUENCY		
458	SAMPLER WITH SAMPLING TIME T AND PULSEWIDTH h x - CONTININUOUS INPUT x* - SAMPLED OUTPUT		

TABLE VII

GROUP 5 STORAGE ELEMENTS

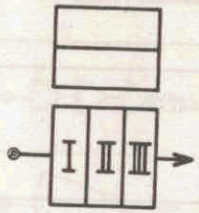
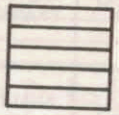
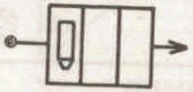
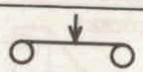
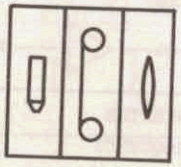
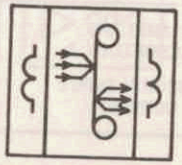
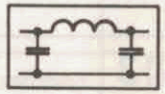
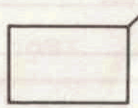
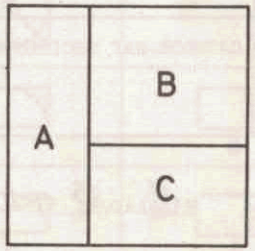
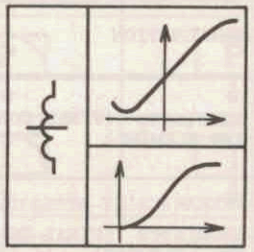
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
500	STORAGE ELEMENT (ENERGY STORAGE, INFORMATION STORAGE, MEMORY) I - INPUT MEANS II - STORAGE MEDIUM III - OUTPUT MEANS		
501	PUNCHED CARD		
502	TAPE OR FILM WITH n PARALLEL TRACKS		
503	STORAGE ELEMENT RECORDED MECHANICALLY BY PUNCHING		
504	MAGNETIC TAPE WITH WRITING HEAD		
505	MAGNETIC TAPE WITH READING HEAD		
506	MAGNETIC TAPE WITH ERASER HEAD		
507	TAPE OR FILM MECHANICALLY PUNCHED AND WITH OPTICAL READER		
508	MAGNETIC TAPE WITH THREE SYNCHRONOUS WRITING HEADS AND THREE SYNCHRONOUS READING HEADS		

TABLE VIII

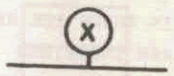
CONTROL DEVICES AND EQUIPMENT

GROUP 6a GENERAL SYMBOLS FOR CONTROL DEVICES

NO.	DESIGNATION	Symbol	Example
600	THE GENERAL SYMBOL FOR A CONTROL DEVICE CONSISTS OF A RECTANGLE IN WHICH THE RELEVANT DATA ARE INSCRIBED BY NUMBERS, LETTERS, NOUNS OR OTHER SYMBOLS ALREADY APPROVED BY IEC, ISO, ASA, AEF, SEV ETC.	Number or letter Designation Graphical symbol	14a Filter 
601	POWER SUPPLIES ARE TO BE SHOWN AT THE CORNERS OF THE RECTANGLE		220V 50Hz 3~
602	COMBINED SYMBOL FOR A DEVICE SHOWING: A. SYMBOL FOR THE DEVICE B. STATIC CHARACTERISTIC C. STEP RESPONSE (E. G. 603 BELOW)		
603	MAGNETIC AMPLIFIER WITH CONTROL CHARACTERISTIC AND STEP RESPONSE		

CONTROL DEVICES AND EQUIPMENT

GROUP 6b MEASURING POINTS AND DEVICES

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
610	MEASURING POINT WITH MEASURING UNIT x - MEASURED VALUE		
611	DIGITAL MEASURING UNIT		
612	RECORDER		
613	CONTINUOUS RECORDER		
614	NUMERICAL RECORDER		
615	COUNTER		
616	CATHODE-RAY OSCILLOSCOPE		

GROUP 6c REGULATORS (FINAL CONTROLLING ELEMENTS)

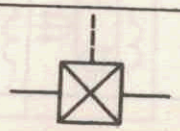
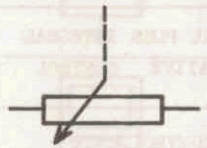
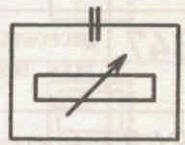
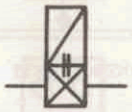
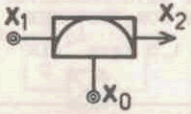
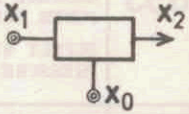
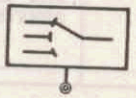
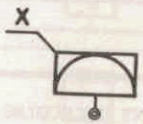
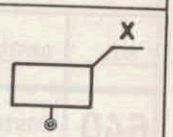
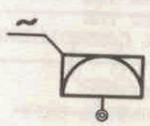
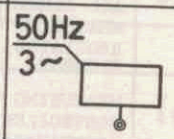
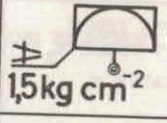
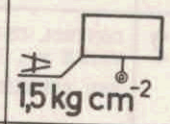
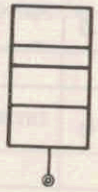
NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
620	REGULATOR (FINAL CONTROLLING ELEMENT)		
621	MECHANICALLY-ACTUATED REGULATOR (FINAL CONTROLLING ELEMENT)		

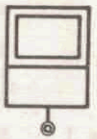
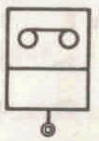
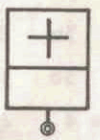
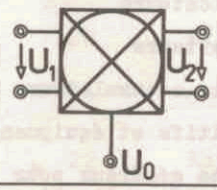
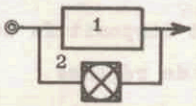
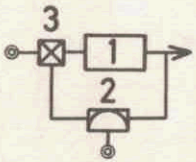
TABLE VIII CONTROL DEVICES AND EQUIPMENT (continued)

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
622	MECHANICALLY-ACTUATED POTENTIOMETER		
623	REGULATOR (FINAL CONTROLLING ELEMENT) WITH SERVOMOTOR		

GROUP 6d CONTROL UNIT

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
640	CONTROL EQUIPMENT INCLUDING ALL ELEMENTS FROM THE MEASURING UNIT TO THE REGULATOR (FINAL CONTROLLING ELEMENT)		
641	MEASURING UNIT WITH CONTROLLER = CONTROL UNIT (GOVERNOR)		
642	CONTROL UNIT WITH INPUT VALUE x_1, OUTPUT VALUE x_2, AND REFERENCE VALUE x_o		
643	PROPORTIONAL CONTROL UNIT		
644	INTEGRAL CONTROL UNIT		
645	DERIVATIVE CONTROL UNIT		

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
646	PROPORTIONAL PLUS INTEGRAL CONTROL UNIT		
647	PROPORTIONAL PLUS INTEGRAL PLUS DERIVATIVE CONTROL UNIT		
648	TWO-STATE CONTROL UNIT		
649	THREE-STATE CONTROL UNIT		
650	DISCONTINUOUS CONTROL UNIT		
651	CONTROL UNIT WITH POWER SUPPLY x		
652	CONTROL UNIT WITH ELECTRIC SUPPLY, FOR INSTANCE: 3-PHASE VOLTAGE SUPPLY WITH 50 C.p.sec.		
653	CONTROL UNIT WITH PNEUMATIC POWER SUPPLY, FOR INSTANCE: SUPPLY WITH 1,5 $kgcm^{-2}$ AIR PRESSURE		
654	ADDITIONAL FUNCTIONS OF THE CONTROL UNIT SHOULD BE INDICATED BY AFFIXED RECTANGLES		

NO.	DESIGNATION	SYMBOL	SECOND SYMBOL
655	CONTROL UNIT WITH INDICATOR		
656	CONTROL UNIT WITH RECORDER		
657	CONTROL UNIT WITH STORAGE FILM OR TAPE		
658	CONTROL UNIT WITH COMPUTER		
659	VOLTAGE REGULATOR U_1 - INPUT VOLTAGE U_2 - CONTROLLED VOLTAGE U_o - REFERENCE VOLTAGE		
660	CONTROL SYSTEM COMPRISING CONTROLLED PLANT (1) AND COMPLETE CONTROL EQUIPMENT (2)		
661	CONTROL SYSTEM WITH: CONTROLLED PLANT (1) CONTROL UNIT (2) AND REGULATOR (FINAL CONTROLLING ELEMENT) (3)		

Traduction

SYMBOLES GRAPHIQUES POUR LA REGULATION AUTOMATIQUE

proposés par
le prof. Ed Gerecke, Zurich.

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	Revue des symboles graphiques et des schémas de systèmes automatiques	Ia ... Vb
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Table I

Revue des symboles graphiques et des schémas de systèmes automatiques

Ia:	Symboles d'éléments technologiques
IIa:	Symbole fonctionnel représentant un élément technologique
IIIa:	Symboles d'éléments de transfert
IVa:	Symboles d'éléments de transfert incorporant de relations mathématiques
Va:	Symbole d'un élément de transfert d'information dans un schéma fonctionnel de lignes de transfert
Ib:	Schéma technologique
IIb:	Schéma fonctionnel d'éléments de transfert
IIIb:	Schéma fonctionnel de circulation de signaux
IVb:	Schéma fonctionnel de circulation de signaux incorporant des relations mathématiques
Vb:	Schéma fonctionnel de lignes de transfert

Table II

Symboles graphiques pour les diverses techniques utilisées ou les domaines interessés

No.	
11	Géométrie
12	Temps
13	Mécanique
14	Hydraulique
15	Pneumatique
16	Thermodynamique
17	Acoustique
18	Optique
19	Electrotechnique
20	Electronique
21	Chimie
22	Rayonnement α
23	Rayonnement β
24	Rayonnement γ
25	Rayonnement neutroniqu
26	Nucléonique

Table III

Groupe 1: Signaux et grandeurs transfèrées

100 Ligne de transfert d'énergie ou d'information

101 Désignation x de la grandeur transferée (par exemple x) au moyen d'un chiffre ou d'une lettre

102 Direction de circulation de la grandeur transferée

103 Grandeur d'entrée
Grandeur d'entrée désignée par un symbole (par exemple, x)

104 Grandeur d'entrée sous la forme d'un message ou de données

105 Grandeur d'entrée provenant d'un générateur de fonctions

106 Grandeur de sortie
Grandeur de sortie designée par un symbole (par exemple, x)

107 Pour la désignation des grandeurs les lettres-symboles normalisées de CEI, ASA, AEF, ASE etc. peuvent etre employées, par exemple:

Tension électrique	u
Courant électrique	i
Température	ϑ
Signal de pH	pH

108 Signal continu

109 Signal numérique

110 Signal aléatoire

111 Signal à impulsions

112 Signal logique avec deux valeurs "0" ou "L"

113 Signal continu à modulation d'amplitude

114 Signal continu à modulation de fréquence

115 Signal numérique exprimé dans le système décimal

116 Signal numérique exprimé dans le système binaire

117 Signal décimal codé dans le système binaire

118 Impulsions à modulation continue

119 Impulsions à modulation discontinue

120 Impulsions à modulation aléatoire

121 Signal codé par impulsions

122 Signal logique avec 3 valeurs "-L" ou "0" ou "+L"

123 Transfert d'une grandeur spatiale (géométrique)

124 Transfert d'une grandeur mécanique

125 Transfert d'une grandeur hydraulique

126 Transfert d'une grandeur pneumatique

127 Transfert d'une grandeur thermique

128 Transfert d'une grandeur acoustique

129 Transfert d'une grandeur optique

130 Transfert d'une grandeur électrique

131 Transfert d'une grandeur électronique

132 Transfert d'une grandeur chimique

133 Signal d'un rayonnement α

134 Signal d'un rayonnement β

135 Signal d'un rayonnement γ

136 Signal neutronique

137 Signal nucléonique, en général

Groupe 2 : Combinaison mathématique de signaux

Groupe 2a: Opérations algébriques

200 Somme de deux signaux

$x_1 + x_2 = x$

201 Différence de deux signaux

$x_1 - x_2 = x$

202 Somme algébrique de plusieurs signaux, par exemple:

$x_1 - x_2 - x_3 + x_4 + x_5 = x$

203 Combinaison algébrique linéaire de plusieurs signaux

$a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 = x$

204 Produit de deux signaux

$x_1 \cdot x_2 = x$

205 Produit de plusieurs signaux

$a_1x_1 \cdot a_2x_2 \cdot a_3x_3 \cdot a_4x_4 = x$

206 Quotient de deux signaux

$x_1 : x_2 = x$

207 Multiplication et division de plusieurs signaux; par exemple:

$$\frac{x_1x_4}{x_2x_3x_5} = x$$

208 Intégrale indéfinie par rapport au temps

$$\int ax_1 dt = x_2$$

209 Intégrale indéfinie par rapport au temps dans le domaine du temps

$$\int ax_1 dt = x_2$$

210 Intégrale indéfinie par rapport au temps dans le domaine de la variable complexe

p = opérateur de Laplace
$L(x_1) \equiv \tilde{x}_1$: transformée de Laplace de x_1

211 Intégrale indéfinie par rapport à une variable α

$$\int ax_1 d\alpha = x_2$$

212 Intégrale indéfinie par rapport au temps

$$\int_0^t ax_1 dt + c_o = x_2$$

213 Intégrale définie par rapport au temps entre les temps t_1 et t_2

$$\int_{t_1}^{t_2} ax_1 dt = x_2$$

214 Dérivation par rapport au temps

$$a\frac{dx_1}{dt} = x_2$$

215 Dérivation par rapport au temps dans le domaine du temps

$$a\frac{dx_1}{dt} = x_2$$

216 Dérivation par rapport au temps dans le domaine de la variable complexe

$L(x_1) \cdot ap = L(x_2)$

$\tilde{x}_1 \cdot ap = \tilde{x}_2$

217 Dérivation par rapport à une variable α

$$a\frac{dx_1}{d\alpha} = x_2$$

Table IV (continuée)

Groupe 2: Combinaison mathématique de signaux

Groupe 2b: Opérations logiques

250 Symbole général de base pour des opérations logiques avec n grandeurs d'entrée et m grandeurs de sortie

251 Identité logique:

$x_1 \equiv x_2$

252 Complément logique (négation)

$\bar{x}_1 \equiv x_2$

253 Identité et complément logiques

$x_1 \equiv x_2$
$\bar{x}_1 \equiv x_3$

254 Elément de retard.
Retard à l'enclenchement τ_1 à l'apparition de la cause x_1 et retard au déclenchement τ_2 à disparition de la cause x_1

255 Disjonction "OU" de deux signaux

256 Conjonction "ET" de deux signaux

257 Disjonction "OU" x_3 de x_1 et x_2 et complément (négation) x_4 de x_3 : $\bar{x}_3 = x_4$

258 Inhibiteur général x_o.
Si $x_o = 0$, x_o n'a aucune influence sur y; si $x_o = L$, toutes les m valeurs de y sont remplacées par leurs compléments $\bar{y}$

259 Totalisateur numérique d'impulsions:

$\sum x_1 = x_2$

260 Totalisateur numérique differentiel d'impulsions

$\sum (x_1 - x_2) = x_3$

261 Totalisateur de coincidence d'impulsions (avec conjonction "ET")

262 Vibreur bistable (multivibreur)

Table V

Groupe 3 : Eléments de transfert

Groupe 3a: Eléments de transfert linéaires

300 Eléments de transfert à action proportionelle

$x_1 \cdot K = x_2$

301 Elément inverseur de signe

$x_1 \cdot (-1) = x_2$

302 Elément de transfert à action par intégration

303 Elément de transfert à action par dérivation

304 Elément de transfert à action proportionnelle, par intégration et par dérivation

305 Elément de transfert linéaire dans le domaine du temps

$x_1 * g(t) = x_2$

$g(t)$ = réponse impulsionnelle

$\gamma(t)$ = réponse indicielle

$*$ = convolution

$L[g(t)] = G(p)$ = fonction de transfert

306 Elément de transfert linéaire dans le domaine de la variable complexe

$L(x_1) \cdot G(p) = L(x_2)$

ou $\tilde{x}_1 \cdot G(p) = \tilde{x}_2$

Table V (continuée)

Groupe 3: Eléments de transfert

Groupe 3b: Eléments de transfert non-linéaires

350 **Elément de transfert non-linéaire sans retard.**

351 Désignation d'une fonction non-linéaire :

$\Phi(x_1) = x_2$

352 Représentation graphique de la relation fonctionnelle entre la grandeur d'entrée x_1 et la grandeur de sortie x_2

353 Grandeur de sortie proportionnelle à la valeur absolue de la grandeur d'entrée

$K \cdot |x_1| = x_2$

354 Elément de transfert régi par une loi quadratique

$Kx_1^2 = x_2$

355 Elément de transfert extracteur de la racine carrée

$K\sqrt{x_1} = x_2$

356 Elément de transfert détectant le signe de la grandeur d'entrée

$\text{SIGN } x_1 = x_2$

357 Elément de transfert à deux échelons d'action

$a \cdot \varepsilon \cdot (x_1 - x_0) = x_2$

ε= réponse indicielle

358 Elément de transfert à deux échelons d'action avec hystéresis

359 Elément de transfert à 3 échelons d'action

$-a\varepsilon(x_1 - x_a) + b\varepsilon(x_1 - x_b) = x_2$

360 Elément de transfert à 3 échelons d'action avec hystéresis

361 Elément de transfert avec seuil d'insensibilité de la réponse (zone morte)

362 Elément de transfert avec jeu

363 Elément de transfert avec seuil d'incertitude de la réponse

364 Elément de transfert avec limitation (saturation)

365 Elément de transfert avec hystéresis et saturation

366 Redresseur

Table VI

Groupe 4: Amplificateurs et transmitteurs

Groupe 4a: Amplificateurs

400 Amplificateur de signaux

401 Amplificateur de signaux à plusieurs étages

402 Amplificateur de puissance (en calcul analogique)

403 Amplificateur sommateur

$(a_1x_1+a_2x_2+a_3x_3)K = x_4$

404 Amplificateur intégrateur et sommateur

$\int_o^t (a_1x_1+a_2x_2+a_3x_3)Kdt+c_o=x_4$

405 Amplificateur à réaction

406 Amplificateur magnétique

Groupe 4b: Transmetteurs

450 Transformateur linéaire, convertisseur de mesure, transmetteur, traducteur.

451 Convertisseur d'analogique en analogique

452 Convertisseur d'analogique en numérique (quantificateur, codeur)

453 Convertisseur de numérique en numérique

454 Convertisseur de numérique en analogique (decodeur)

455 Convertisseur de binaire en décimal

456 Convertisseur de courant alternatif en courant continu (redresseur)

457 Convertisseur de fréquence

f_1 = fréquence d'entrée

f_2 = fréquence de sortie

458 Echantillonneur avec durée d'échantillonnage T et durée d'impulsion h

x = signal continu d'entrée

x*= signal à impulsions de sortie

Table VII

Groupe 5: Eléments accumulateurs

500 Elément accumulateur (accumulateur d'énergie, accumulateur d'information, mémoire)

I Elément d'entrée
II Accumulateur
III Elément de sortie

501 Carte perforée

502 Bande ou film avec n pistes parallèles

503 Elément accumulateur avec enregistrement mécanique par perforation

504 Bande magnétique avec tête d'enregistrement

505 Bande magnétique avec tête de lecture

506 Bande magnétique avec tête d'effacement

507 Bande ou film perforé mécaniquement avec tête de lecture optique

508 Bande magnétique avec trois têtes d'enregistrement synchrones et trois têtes de lecture synchrones

Table VIII

Groupe 6: Dispositifs et équipement automatiques

Groupe 6a: Symboles généraux pour les dispositifs automatiques

600 Le symbole général pour un dispositif automatique consiste en un rectangle dans lequel les informations correspondantes sont inscrites à l'aide de nombres, de lettres, de mots ou d'autres symboles déjà approuvés par CEI, ISO, ASA, AEF, ASE etc.

601 Les alimentations doivent être indiquées aux coins du rectangle

602 Symbole combiné pour un dispositif indiquant:

A: Le symbole du dispositif

B: La caractéristique de règlage automatique

C: La réponse indicielle

(voir exemple 603 ci-dessous)

603 Amplificateur magnétique avec caractéristique de réglage et réponse indicielle

Groupe 6b: Lieux et dispositifs de mesure

610 Lieu de mesure avec **indicateur** de mesure

x = grandeur mesurée

611 Indicateur numérique de mesure

612 Enregistreur

613 Enregistreur continu

614 Enregistreur numérique

615 Totalisateur

616 Oscillographe cathodique

Groupe 6c: Organes de réglage

620 Organe de réglage **(par exemple, soupape)**

621 Organe de réglage commandé mécaniquement

622 Potentiomètre actionné mécaniquement

623 Organe de réglage avec servo-moteur (ensemble régleur)

Table VIII (continuée)

Groupe 6: Dispositifs et équipment automatiques

Groupe 6d: **Ensemble directeur.**

640 **Equipement de réglage complet comprenant tous les éléments, de l'élément détécteur à l'organe de réglage**

641 L'élément de mesure avec l'élément comparateur = ensemble directeur (sans ensemble régleur)

642 Ensemble directeur avec grandeur réglée x_1, valeur de référence x_o et grandeur de réglage x_2

643 Ensemble directeur à action proportionnelle

644 Ensemble directeur à action par intégration

645 Ensemble directeur à action par dérivation

646 Ensemble directeur à action proportionnelle et par intégration

647 Ensemble directeur à action proportionnelle, par intégration et par dérivation

648 Ensemble directeur à deux échelons d'action

649 Ensemble directeur à trois échelons d'action

650 Ensemble directeur à action discontinue

651 Ensemble directeur avec alimentation x

652 Ensemble directeur avec alimentation electrique. Par exemple: alimentation electrique triphasée à 50 **Hz.**

653 Ensemble directeur avec alimentation pneumatique. Par exemple: alimentation en air comprimé sous 1,5 kg cm^2

654 Les fonctions supplémentaires de l'ensemble directeur devraient être indiquées par des rectangles accollés

655 Ensemble directeur avec indicateur

656 Ensemble directeur avec enregistreur

657 **Ensemble directeur avec bande ou film accumulateur d'informations**

658 Ensemble directeur avec élément calculateur

659 Régulateur de tension électrique:
U_1 : tension d'entrée non-réglée
U_2 : tension de sortie réglée
U_o : valeur de référence de la tension

660 **Ensemble à réglage automatique** comprenant:

1. - L'installation réglée
2. - **L'equipement de réglage complet**

661 Ensemble à réglage automatique avec: 1. L'installation réglée
2. L'ensemble directeur
3. L'ensemble régleur

Übersetzung

VORSCHLÄGE FÜR GRAPHISCHE SYMBOLE DER REGELUNGSAUTOMATIK

von
Prof. Ed. Gerecke, Zürich

Tabelle I

Übersicht über die graphischen Symbole und Schaltbilder der Regelungsautomatik

Ia:	Apparatesymbole
IIa:	Blocksymbol für einen Apparateteil
IIIa:	Wirkglieder, Übertragungsglieder
IVa:	Mathematische Wirkglieder, Mathematische Übertragungsglieder
Va:	Liniensymbol für ein Wirkglied
Ib:	Geräteschaltbild, Anlagenschaltbild
IIb:	Blockbild
IIIb:	Flussbild, Signalflussbild
IVb:	Mathematisches Flussbild
Vb:	Linienflussbild

Tabelle II

Graphische Symbole für die verschiedenen Fachgebiete der gesamten Technik

Nr.	Fachgebiete
11	Geometrie
12	Zeit
13	Mechanik
14	Hydraulik
15	Pneumatik
16	Thermodynamik
17	Akustik
18	Optik
19	Elektrizität
20	Elektronik
21	Chemie
22	α - Strahlung
23	ß - Strahlung
24	ϒ - Strahlung
25	Neutronen-Strahlung
26	Nukleonik

Gruppe 1: Signale

100 Signal- oder Verbindungsleitung
Wirkkanal

101 Signal x
Weisung x

102 Wirkrichtung

103 Eingangssignal (z.B.: x)

104 Formular

105 Funktionsgeber, Funktionsgenerator

106 Ausgangssignal (z.B.: x)

107 Für die Signalbezeichnung können alle genormten Buchstabensymbole der IEC, ASA, AEF, SEV etc. verwendet werden, z.B.:

Elektrische Spannung	u
Elektrischer Strom	i
Temperatur	ϑ
pH - Signal	pH

108 Kontinuierliches (oder analoges) Signal

109 Digitales oder numerisches Signal

110 Stochastisches Signal

111 Impulsartiges Signal

112 Logisches Signal mit zwei Werten "0" oder "L"

113 Kontinuierliches, amplitudenmoduliertes Signal

114 Kontinuierliches, frequenzmoduliertes Signal

115 Im Dezimalsystem ausgedrücktes Signal

116 Im Dualsystem ausgedrücktes Signal

117 Im Dezimalsystem, binär verkodet, ausgedrücktes Signal

118 Analoges Impulssignal

119 Digitales Impulssignal

120 Stochastisches Impulssignal

121 Impulsartig verkodetes Signal

122 Logisches Signal mit 3 Werten "-L" oder "0" oder "+L"

123 Geometrisches Signal

124 Mechanisches Signal

125 Hydraulisches Signal

126 Pneumatisches Signal

127 Thermisches Signal

128 Akustisches Signal

129 Optisches Signal

130 Elektrisches Signal

131 Elektronisches Signal

132 Chemisches Signal

133 α - Strahlen - Signal

134 β - Strahlen - Signal

135 γ - Strahlen - Signal

136 Neutronen - Signal

137 Allgemeines nukleonisches Signal

Tabelle IV

Gruppe 2: Signalverknüpfung

Gruppe 2a: Algebraische Operationen

200 Addition zweier Signale
$x_1 + x_2 = x$

201 Subtraktion zweier Signale,
$x_1 - x_2 = x$

202 Algebraische Summe mehrerer Signale, z.B.:
$x_1 - x_2 - x_3 + x_4 + x_5 = x$

203 Lineare algebraische Kombination mehrerer Signale:
$a_1x_1+a_2x_2+a_3x_3+a_4x_4 = x$

204 Multiplikation zweier Signale:
$x_1 \cdot x_2 = x$

205 Multiplikation mehrerer Signale:
$a_1x_1 \cdot a_2x_2 \cdot a_3x_3 \cdot a_4x_4 = x$

206 Division zweier Signale:
$x_1 : x_2 = x$

207 Multiplikation und Division mehrerer Signale; z.B.:
$x_1 \cdot x_4 : x_2x_3x_5 = x$

208 Unbestimmtes Integral nach der Zeit
$\int ax_1 dt = x_2$

209 Unbestimmtes Integral nach der Zeit, dargestellt im Originalbereich
$\int ax_1 dt = x_2$

210 Unbestimmtes Integral, dargestellt im Bildbereich der Laplace-Transformation
p = Laplaceoperator
$L(x_1) \equiv \tilde{x}_1$: Laplace-Transformation von x_1

211 Unbestimmtes Integral nach einer beliebigen Variablen α
$\int ax_1 d\alpha = x_2$

212 Bestimmtes Integral nach der Zeit:
$\int_0^t ax_1 dt + c_o = x_2$

213 Bestimmtes Integral nach der Zeit zwischen den Zeiten t_1 und t_2
$\int_{t_1}^{t_2} ax_1 dt = x_2$

214 Differentiation nach der Zeit im Originalbereich:
$a \frac{dx_1}{dt} = x_2$

215 Differentiation nach der Zeit im Originalbereich
$a \frac{dx_1}{dt} = x_2$

216 Differentiation nach der Zeit im Bildbereich der Laplace-Transformation
$L(x_1) \cdot ap = L(x_2)$
$\tilde{x}_1 \cdot ap = \tilde{x}_2$

217 Differentiation nach der Variablen α
$a \cdot \frac{dx_1}{d\alpha} = x_2$

Tabelle IV (Fortsetzung)

Gruppe 2: Signalverknüpfung

Gruppe 2b: Logische Operationen

250 Allgemeines Grundsymbol für logische Operationen von n Eingangs- und m Ausgangsgrössen

251 Logische Identität: $x_1 \equiv x_2$

252 Logische Negation: $\bar{x}_1 \equiv x_2$

253 Logische Identität und Negation:
$x_1 \equiv x_2$
$\bar{x}_1 \equiv x_3$

254 Verzögerungsglieder
Einschaltverzögerung τ_1 beim Einschalten der Ursache x_1 und Abfallverzögerung τ_2 bei Abfall der Ursache x_1

255 Disjunktion zweier Signale, "ODER"

256 Konjunktion zweier Signale, "UND"

257 Disjunktion x_3 von x_1 und x_2 sowie Negation x_4 von x_3 : $\bar{x}_3 = x_4$

258 Allgemeiner Inhibitor x_o. Wenn $x_o = o$, so hat x_o keinen Einfluss auf die Ausgangsgrössen.
Für $x_o = L$ gehen jedoch alle Ausgangsgrössen in deren Negation über

259 Impulszähler $\sum x_1 = x_2$

260 Differenz - Impulszähler
$\sum (x_1 - x_2) = x_3$

261 Koinzidenzimpulszähler (mit Konjunktion "UND")

262 Bistabiler Kipper (Flip-Flop, Multivibrator)

Tabelle V

Gruppe 3: Wirkglieder, Übertragungsglieder

Gruppe 3a: Lineare Übertragungsglieder

300 Proportionalglied
$Kx_1 = x_2$

301 Umkehrglied
$(-1)x_1 = x_2$

302 Integrierendes Glied $\int x_1 dt = x_2$

303 Differenzierendes Glied
$\frac{dx_1}{dt} = x_2$

304 Proportionales, integrierendes und differenzierendes Glied

305 Lineares Wirkglied im Originalbereich:
$x_1 * g(t) = x_2$
$g(t)$ = Stossantwort
$\gamma(t)$ = Schrittantwort, Übergangsfunktion
$*$: Faltung
$L[g(t)] = G(p)$ = Übertragungsfunktion

306 Lineares Wirkglied im Bildbereich:
$L(x_1) \cdot G(p) = L(x_2)$ oder
$\tilde{x}_1 \cdot G(p) = \tilde{x}_2$

Gruppe 3b: Nichtlineare Wirkglieder

350 Nichtlineares Wirkglied (ohne Zeitverzögerung)

351 Statische Wirkfunktion Φ :
$\Phi(x_1) = x_2$

352 Funktionsgenerator mit Steuerkennlinie

353 Absolutwert
$K|x_1| = x_2$

354 Quadrierglied
$K \cdot x_1^2 = x_2$

355 Radizierglied
$K\sqrt{x_1} = x_2$

356 Vorzeichenglied
$SIGN\ x_1 = x_2$

357 Zweipunktglied
$a \cdot \varepsilon(x_1 - x_o) = x_2$
ε = Einheits-Schrittfunktion

358 Zweipunktglied mit Schaltunempfindlichkeit (Hysterese)

359 Dreipunktglied
$-a \cdot \varepsilon(x_1 - x_a) + b \cdot \varepsilon(x_1 - x_b) = x_2$

360 Dreipunktglied mit Schaltunempfindlichkeit (Hysterese)

361 Wirkglied mit Ansprechempfindlichkeit

362 Loose, Spiel

363 Wirkglied mit Vorlast

364 Begrenzer

365 Lineare Hysteresis mit Sättigung

366 Gleichrichter

Tabelle VI

Gruppe 4: Verstärker und Wandler

Gruppe 4a: Verstärker

400 Rechenverstärker
Verstärker

401 Mehrstufiger Verstärker

402 Leistungsverstärker(in der Analogierechentechnik)

403 Summier-Verstärker
$(a_1x_1 + a_2x_2 + a_3x_3)K = x_4$

404 Integrier- und Summierverstärker
$\int_o^t (a_1x_1 + a_2x_2 + a_3x_3)K \cdot dt + c_o = x_4$

405 Rückgekoppelter Verstärker

406 Magnetischer Verstärker

Gruppe 4b: Wandler

450 Linearer Wandler, Messgrössenwandler, Transmitter

451 Analog - Analog - Wandler

452 Analog - Digital - Wandler (Grössenwerter, Verschlüssler, Verkoder)

453 Digital - Digital - Wandler (Umschlüssler, Umkoder)

454 Digital - Analog - Wandler (Rückwerter, Entschlüssler, Entkoder)

455 Binär - Dezimal - Wandler

456 Wechselstrom-Gleichstrom-Wandler (Gleichrichter)

457 Frequenzwandler
f_1 = Eingangsfrequenz
f_2 = Ausgangsfrequenz

458 Prober, Zerhacker, Probenschalter, "Sampler" mit Periodendauer T und Kontaktdauer h:
x = kontinuierliches Eingangssignal
x^* = pulsartiges Ausgangssignal, getastetes Ausgangssignal

Tabelle VII

Gruppe 5: Speicherelemente

500 Speicher,(Energiespeicher, Informationsspeicher, Gedächtnis)
I Eingangselement
II Speicher
III Ausgangselement

501 Lochkarte

502 Band, Film, Streifen, mit n parallelen Spuren

503 Speicher mit mechanischem Schreibmittel (Stempel)

504 Magnetisches Band mit Aufnahmekopf

505 Magnetisches Band mit Wiedergabekopf

506 Magnetisches Band mit Löschkopf

507 Lochstreifen, mechanisch gestanzt und mit optischer Leseeinrichtung

508 Magnetisches Band mit drei synchronen Aufnahmeköpfen und drei synchronen Wiedergabeköpfen

Tabelle VIII
Gruppe 6 : Regelgeräte und Zubehör
Gruppe 6a: Apparatesymbole

600 Das Apparatesymbol besteht grundsätzlich aus einem Rechteck, in welches Angaben über die nähere Bezeichnung des Apparates eingetragen werden. Z.B.: Nummern, Buchstaben und Wörter oder alle bestehenden Apparatesymbole der IEC, ISO, ASA, AET, SEV etc.

601 Speisestellen werden an den Enden des Rechteckes eingetragen

602 Kombiniertes Apparatesymbol bestehend aus:
A: Einfaches Apparatesymbol
B: Statische Wirkfunktion oder Steuerkennlinie
C: Uebergangsfunktion
z.B.:(siehe 603)

603 Magnetverstärker mit Steuerkennlinie und Uebergangsfunktion

Gruppe 6b: Messstellen und Messgeräte

610 Messstelle
Zeigendes Messgerät
x = Messgrösse

611 In Ziffern zeigendes Messgerät (Digitizer)

612 Schreibendes Gerät

613 Analog schreibendes Gerät

614 Digital schreibendes Gerät

615 Zählendes Messgerät, Zähler

616 Kathodenstrahl-Oszillograph

Gruppe 6c: Stellglied

620 Stellglied, Steller
(z.B.: Ventil)

621 Stellglied mit mechanischer Betätigung

622 Potentiometer mit mechanischer Einstellung

623 Stellglied mit Servomotor

Tabelle VIII

Gruppe 6d: Der Regler als Baueinheit

640 Regeleinrichtung:
Enthält Messorgan, Zwischenorgan und Stellorgan

641 Regler, als Baueinheit, ohne Stellorgan

642 Regler mit Eingangsgrösse x_1
Einstellwert x_o
Ausgangsgrösse x_2

643 Proportionalregler

644 Integralregler

645 Differentialregler

646 Proportional-Integral-Regler

647 Proportional-Integral-Differential-Regler

648 Zweipunktregler

649 Dreipunktregler

650 Unstetiger Regler

651 Regler mit Speisequelle x

652 Regler mit elektrischer Speisung
Beispiel: Speisung mit 50Hz Dreiphasenwechselspannung

653 Regler mit pneumatischer Speisung
Beispiel: Speisung mit Druckluft von 1,5 kg/cm^2

654 Zusätzliche Funktionen des Reglers werden durch angehängte Rechtecke dargestellt

655 Anzeigender Regler

656 Registrierender Regler

657 Regler mit Bandspeicherung

658 Regler mit Rechengerät

659 Elektrischer Spannungsregler:
U_1 : Ungeregelte Eingangsspannung
U_2 : Geregelte Ausgangsspannung
U_o : Sollwert der Spannung

660 Geregelter Teil einer Anlage
1. Regelstrecke
2. Regeleinrichtung

661 Geregelte Anlage:
1 Regelstrecke
2 Regler
3 Stellglied

PUBLICATIONS

Germany

New Books

Patent Documentation Control Engineering (Classification). German title: Patentdokumentation Regelungstechnik (Ordnungssysteme) edited by VDI/VDE-Fachgruppe Regelungstechnik, published by VDI-Verlag, Düsseldorf, and VDE-Verlag, Berlin, 1959.

Contents, among other matters:

1. Extract from the German classification of patents for tracing patents in the field of control engineering.
As it is known, the classification of the German Patent Office for Inventions does not comprise at one particular point all the patent specifications in the field of automatic control, but these are distributed amongst the numerous classes according to the respective field of application. Therefore, the German specialists represented in the "Ausschuß Patentwesen der VDI/VDE-Fachgruppe Regelungstechnik" have made an extract from all such classes, groups and subgroups, wherein patent specifications on automation and control engineering can be traced. This extract represents a valuable tool for all those who are looking for patent specifications in the field of automatic control, and this does not only concern the patent engineer but also control engineers and staff to documentation divisions for special branches.

2. Suggestions made by the "Ausschuß Patentwesen der VDI/VDE-Fachgruppe Regelungstechnik" for the subdivision of class G 05 "Controllers and Regulators" of the International Classification for Patents.

   The study of the international patent literature is rendered more difficult by the fact that each country has another classification of patent specifications and applications. Therefore, on December 19, 1954 in Paris, a number of countries agreed on an international classification to be gradually put in the place of the national classifications. This agreement of 1954 scheduled only a rough classification to be worked out in detail by experts. As regards the field of automatic control, this work has been done by the Ausschuß Patentwesen der VDI/VDE-Fachgruppe Regelungstechnik and is now being submitted to the public as a German suggestion, in accordance with the German Patent Office.

3. Survey of the newly divided sections of general and electric automation and control engineering in the International Decimal Classification.

   The International Federation for Documentation, in charge of the further development of the International Decimal Classifi-

cation as a joint international classification, had appointed a Committee which brought the chapter for Control Engineering up to date. Based upon suggestions made by O. F r a n k , the Committee has provided some material modifications to the present classification as well as some textual supplementations which are in line with the presentday terminology in the field of automation and control engineering. This newly established classification, which was submitted to the public for discussion some time ago and to which no essential objections are expected, is very well qualified if publications are to be classified.

"Industrielle Rationalisierung 1959" ("Industrial Development 1959") edited by Prof. Leo Brandt, Robert Gardellini, Dr. Alexander King and Maurice Lambilliotte, published by Verkehrs- und Wirtschafts-Verlag G.m.b.H., Dortmund, Postfach 748, 210 pages of text, 48 pages of photos and advertisements, 17,50 German marks.

This book is divided into 3 sections:

1°. - The economic aspect of the industrial development.
2°. - The technical aspect of the industrial development.
Under this section, three articles refer directly to automation:

Dr. Hans Kerschbaum (Germany) "Measuring engineering and automation"
Felix F. Fluss (USA) "Latest American developments regarding complete automation of production units and lines"
P. Corvolain (France) "The problems of mechanization, automation and control and their solutions in the second continuous glass production line of the Chantereine glass works"

3°. - The social aspect of the industrial development.
Under this section, three articles refer directly to automation:

Prof. C.M. Dolezalek (Germany) "The influence on labour requirements of automation in industry"
Stephan E.Schattman (United Kingdom) "Britain and employment problems of automation"
Dr. Wilhelm Lejeune (Germany) "The psychological and physiological problems of mechanization and automation"

"Information Processing". Proceedings of the International Conference held under the auspices of UNESCO in Paris on 15-20 June 1959 (Text in English and French with abstracts in German, Spanish and Russian). To be published in spring 1960 by R. Oldenbourg Verlag, München. Subscription price 72 German marks (later 84 German marks).

These Proceedings will be divided into 8 sections:

1. - Methods of digital computing: linear programming, numerical analysis of computers, methods of solving linear systems.
2. - Common symbolic language for digital computers: automatic programming.
3. - Automatic translation of languages: machine translation.
4. - Pattern recognition and machine learning.

5. - Logical design of digital computers: switching algebra, logical organization of very small computers, logical organization of very high speed computers.
6. - Computer techniques of the future: influence of very large memory designs and capabilities of information retrieval.
7. - Other topics: relationship between digital and analog computing, error detection and correction, collection, storage and retrieval of information.
8. - General report on the Conference.

Roumania

New Books

- C.L.Penescu, "Automatics and telemechanics in energetic systems", Vol.1,published by the Academy of Sciences.1959. 785 pages.
- I. Grigoriu and C. Badea, "Measurement and Automatic Control in Chemical Industry" 1959.
- Group of authors: "Automatization of industrial processes" (Lectures for industrial engineers). Published by the Scientific Association of Engineers of Roumania.

Reviews

"Automatics and Electronics" (3rd year) published every 2 months by the Scientific Association of Engineers of Roumania

United Kingdom

- "Sampled-data Control Systems" by Eliahu I. Jury, Associate Professor of Electrical Engineering, University of California, Berkeley, USA.
(For detailed analysis of this book see Bulletin No.4, page 23).
Published by Chapman & Hall Ltd. (from the John Wiley list) January 1959, 453 pages, 128 shillings.
- "Handbook of Automation, Computation and Control" Volume 2 by S. Ramo, D.E. Wooldridge and E.M. Grabbe. Published by Chapman & Hall Ltd. (a John Wiley book), 1100 pages, 140 shillings. A comprehensive technical handbook on all aspects of control; covers the design of analog and digital computers and their applications to science, engineering and business, stressing systems engineering rather than components.

- "The programming programmefor the B.E.S.M. Computer" by A.P. Ershov, translated from the Russian by M. Nadler. To be published shortly by I.R. Maxwell & Co., Ltd., 4 and 5 Fitzroy Square, London W.1., 150 pages, 63 shillings; initial information, programming algorithms, description of the programming plan, a brief description of the B.E.S.M. ("High Speed Electronic Computer") of the USSR Academy of Sciences.
- New Russian books and reviews translated into English and published by the Pergamon Institute, Headington Hill Hall, Oxford:
  - "The technological principles of continuous-flow and automated production by F.S. Demianiuk, 1959.
  - "Automation of production processes" by V.L.Lossievskii, 1959, I.V. Butusov (to be published in 1960)
  - "Automation and mechanisation of production processes in the instrument industry" by A.N. Gavrilov (to be published in 1960)
  - "Fundamentals of automatics and telemechanics" by S.A.Ginsburg (to be published in 1960)
  - "Basic principles of Automatic Control in metal cutting tools" by V.A. Barum and A.A. Budinskii (under consideration for publication).
  - "Economic efficiency of the automation of industrial production in the USSR" by A.D. Emelianov (under consideration for publication).
  - "Synthesis of correcting devices in Automatic Control Systems" by M.V. Meerov (under consideration for publication)
  - "Automatic Control (Basic Principles)" by E.P. Popov (under consideration for publication)
  - "Devices and Means of Control" by V.A. Rukhadze (under consideration for publication).
  - "Automatization based on new methods of measurement in the USSR and abroad", by Iu.V. Demidov and K.S.Furman (under consideration for publication).
  - Review "Problems of Cybernetics" (2 issues per annum, first issue published) edited by A.A. Liapunov, subscription price per volume: 200 shillings.

USA

Further to the list of periodicals published in our No. 2 Bulletin, we are asked to add, that the review "Electrical Manufacturing" mentioned on page 26 of this Bulletin is published monthly by the Conover-Mast Publications, 205 East 42nd Street, New York 17, N.Y. This review largely applies to design engineers concerned with the research and development of electrical and electronic equipment and components and this aims to serve the creative needs of its readers.

Note on Information Bulletin No. 7

The Information Bulletin No. 7 is expected to be published in April 1960. Information to appear in this issue should therefore reach the Editor:

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

not later than March 15th, 1960.