A SYNTHESIS OF THE DEBATES OF THE NATIONAL CONFERENCE OF CYBERNETICS

SECTION I: THE THEORY OF CYBERNETIC SYSTEMS

The section was sponsored by Academician Nicolae Teodorescu, prof. dr. eng. Mircea Petrescu, university lecturer, dr. eng. Mariana Beliş, dr. eng. C. V. Negoiţă, and by a scientific secretariate made up of mathematician Radu Şerban, eng. Mugurel Ciochină.

The following conclusions have been drawn from the 11 papers presented and from the debates carried on around 25 questions and 10 supplements:

1. In the socio-economic system (in contradistinction to thermodynamics) the increase of entropy has destructive effects, meaning an informational or organizational disorderliness, causing the perturbation of the system. That is why, the analysis and application of cybernetic methods and techniques in these types of systems have as an effect the combating of the entropic states, their adjustement and proper functioning.

2. The systemic analysis and treatment (from the angle of the theories of the cybernetic science) of the processes and phenomena manifested in science, technics, technology, economy, etc. are favouring a new revolutionary impetus in the efficient development of these domains, vital for mankind.

3. Considering the present evolution of the phenomena both in nature and society, as well as of the computing technique, the approach of automatic control by instructible systems of recognizing the states and situations requiring control, represents one of the most advanced solutions cybernetics can provide in the case of processes with incomplete aprioristic information and with characteristics slowly variable in time.

4. Nature and the natural phenomena can be considered as cybernetic systems with effective possibilities of using the technical and computing means provided by the development of the theoretical and practical basis of cybernetics. To optimize the use of the huge natural resources possessed by mankind simultaneously with the maintenance within normal limits of the basic mechanisms achieving the balance of the considered system, to make aware of this need and to take through adequate bodies and means the necessary measures and restrictions, may create real possibilities for using on our planet the inexhaustible natural resources for the prosperity of mankind.

5. A number of Romanian specialists and scientists have also contributed to the setting up and development of cybernetics.

The papers presented were:

1. Big multifeedback systems and applications (eng. Fl. Stănciulescu — Central Institute of Management and Informatics).

2. Linguistic languages used in modelling human behaviour (scientific researcher Ov. Gheorghiu-Central Institute of Management and Informatics).

3. The fuzzy systems paradigm (dr. eng. C.V. Negoiţă — Central Institute of Management and Informatics).

4. The cognitive functions of the quantity of information in the definitional operation (eng. Cristina Mateescu— Computation Centre of the Ministry of Forestry and Building Materials).

5. The planetary ocean — a cybernetic outlook (dr. Gh. Banu—the Oceanic Fishing Enterprise-Tulcea).

6. Contributions to the control of processes with incomplete aprioristic information by using instructible systems for recognizing the situations of control (prof. dr. eng. E. Ceanga, dr. eng. S. Bumbaru, eng. I. Bivol — Galaţi University).

7. The hyperbolical information entropy-a systems parameter (eng. D. Bersadschi — the Dudeşti Chemical Enterprise).

8. Stefan Odobleja, a forerunner in cybernetics (prof. dr. E. Niculescu-Mizil — the "Ştefan Gheorghiu" Academy; Computation Centre of the Chemical Industry).

9. Ştefan Odobleja's work "Consonantic Psychology and Cybernetics" (eng. St. Bajureanu — the Institute of Nuclear and Energy Reactors-Piteşti).

10. Spiru Haret — a forerunner in cybernetics (prof. dr. eng. M. Petrescu — the Bucharest Polytechnic Institute).

11. Cybernetic modelling modalities in educational processes (Ana Maria Sandi — Bucharest University).

SECTION II — MANAGEMENT AND INFORMATICS

The section was sponsored by prof. dr. eng. Paul Constantinescu, dr. eng. Marius Guran, dr. eng. Vasile Biţă, dr. eng. Nicolae Costake, dr. eng. Adrian Davidoviciu, dr. ec. eng. Valeriu Pescaru and by a scientific secretariate made up of eng. Adriana Gheorghiu, ec. Ion Roxin.

The 50 papers presented, illustrating important achievements obtained in this new and difficult but efficient field — informatics and management have generated interesting exchanges of ideas materialized in many questions and comments (3.5 questions per paper). The following conclusions have resulted from the papers presented and debates:

1. The attention of informaticians in our country was permanently focused on the trends resulting from the Guide-Lines of the Twelfth Congress of the Romanian Communist Party and from other Party and State documents concerning production mechanization, automation and cybernetization.

2. The subjects of the papers were anchored into the present and future problems of the development of informatics in our country in keeping with the requirements of improving the management, organization and planning methods and techniques in all fields, of passing to a new quality in the entire socio-economic activity.

3. The development of informatics and its introduction into most diverse fields of activity prove to be, nowadays, major factors of economic and social progress.

4. The impact between the development of the science of management and the improvement of automatic data processing technology has generated numerous ideas and theories in outlining the conceptual model of the management informatic system. Scientific techniques and methods of analysis have been included into the concept of the management informatic system for solving management problems as well as the use of mathematical models and of mathematical and statistical analysis methods in decision-making processes.

5. The introduction of informatic systems in enterprise management directly influences the efficiency and global results of the enterprise.

6. Specialists in management, organizaton and informatics estimate that the use of informatic systems in production management is one of the most efficient applications.

7. The papers presented reflect through their scientific level the experience gained in the promotion of informatics. Many of them distinguished themselves as "top" papers incorporating a large quantity of work and brain, representing starting points for future studies in this field.

8. The papers evince preoccupations with a character of continuity in scientific research in the field of informatics, their authors presenting partial results of long-standing works on major issues in the field approached.

9. The papers confirm the efforts made by the authors for speeding up the development of Romanian informatics, for its orientation along priority coordinates-the increase of production and productivity to the general benefit of our socialist nation.

The large problems discussed during the presentation of the papers might be classified as follows:

— Preoccupations regarding certain aspects of management:

1. *Management in a new outlook* (eng. A. Sotir — Territorial Centre of Electronic Computation).

2. *Optimizing the decisional act* (univ. lect. dr. Mariana Beliş the Bucharest Polytechnic Institute).

3. *On forecasting and optimizing models* (dr. V. Dumitru, dr. Florica Luban — the Academy of Economic Studies — Bucharest).

4. *Model for determining the degree of organization (integration) at an economic unit level* (ec. L. Oprescu — the "Ştefan Gheorghiu" Academy).

5. *Elaborating the plan of technical-organizational measures. Informatic models and procedures* (eng. E. Năstăsel, eng. M. Bittel, eng. V. Sorescu — the "Ştefan Gheorghiu" Academy).

6. *Aspects of cybernetizing production planned scheduling at an industrial group level* (ec. N. Badea-Dincă, scientific researcher I. Rădoi — Central Institute of Management and Informatics).

7. *The cost, an information element in optimal decision-making in the building-erection units* (dr. V. Tieranu — the Timişoara Polytechnic Institute).

8. *Interactive decisional systems used in efficient management of oil-field equipment production* (prof. dr. eng. I. Dumitrescu, univ. lect. dr. eng. V. Marinoiu, L. Dumitraşcu — the Ploieşti Oil and Gas Institute).

— Preoccupations regarding the elaboration of a national informatic system specifying the requirements imposed on the branch and subbranch informatic systems for their integration:

9. *The fundamentals of the concept implementing the National Informatic System* (dr. ec. eng. V. Pescaru — Computation Centre of the Ministry of Technical-Material Supply and of Capital Goods Administration, ec. N. Badea Dincă, dr. ec. C. Boeriu, ec. H. Dragomirescu — — Central Institute of Management and Informatics).

10. *Conception of the national informatic system* (dr. eng. N. Costake — Central Board of Statistics).

11. *The integrative concept of the informatic system for the technical-material supply activity* (dr. ec. eng. V. Pescaru-Computation Centre of the Ministry of Technical-Material Supply and of Capital Goods Administration).

12. *Some trends of development and improvement of the informatic system in the chemical industry* (dr. eng. V. Biţă — Computation Centre of the Chemical Industry).

13. *Informatic system of education — an element of planning and adjustment in the management of Romanian education* (dr. V. Ionescu, mathemat. St. Mustăţea, mathem. G. Diaconescu — the Bucharest Academy of Economic Studies).

— Preoccupations regarding the elaboration of informatic systems in various branches or fields of activity:

14. *For a new conception of the informatic system* (eng. G. Bălţăţeanu (the Industrial Group for Inorganic Products-Rîmnicu Vîlcea).

15. *Modular design with the aid of by exception method of the cybernetic management system of textile enterprise activity* (dr. eng. C. Muţiu — the Timişoara Textile Enterprise, univ. lect. dr. eng. I. Pugna-Timişoara Polytechnic Institute).

16. *Informatic system for simulating complex decisions in the management of marketing activities for the knit-wear industry* (ec. Viorica Bena-Computation Centre of the Institute of Design for the Light Industry).

17. *Method of establishing the necessary materials and semifabs in cooperation* (Gh. Niţulescu Elena Sprea, E. Vasile, Vasilica Mărgărit, Gh. I. Popa — the "Electro-Argeş" Institute of Design for Electro-technical Elements-Curtea de Argeş).

18. *Cybernetizing the maintenance and overhaul activity in a big industrial complex with continuous flow* (dr. P. Pepelea, eng. I. Baciulescu, eng. S. Istrate, mathemat. I. Petra, ec. Viorica Lorinczi, ec. Maria Branca, ec. Clara Gorbe — Territorial Centre of Electronic Computation — Tg. Mureş).

19. *Using the SOFTPLAN system in repair work scheduling of the building equipment and transport for land improvement work* (dr. eng. S. Guţu, eng. I. Niţescu — the "Ştefan Gheorghiu" Academy).

20. *Informatic system for technological engineering of ocean liners* (dr. V. Ionescu, mathemat. Georgia Hera, eng. V. Grigorovici, eng. Fl. Chermez, ec. Larisa Biţă — the Academy of Economic Studies).

21. *Preoccupations concerning staff registration and selection with the aid of the electronic computer* (ec. D. Baia-Computation Centre of the Institute of Design for the Light Industry — — Bucharest).

22. *Automatic system of applying and using coordinated indexing of reference data* (M. Costescu, univ. lect. dr. G. S. Drăgoi, dr. eng. D. Ciobanu, dr. G. Mocanu — Craiova University).

23. *Software package for statistical and informational processing of anthropological measuring data* (univ. lect. dr. G. S. Drăgoi, I. M. Costescu, dr. G. Mocanu — Craiova University).

— Methodological studies for revealing the most advanced experiences in the field of designing and exploiting methods and techniques of informatic systems and software products:

24. *The technical-economic substantiation of software products* (dr. eng. V. Marinescu -the "Stefan Gheorghiu" Academy).

25. *Planning and control system for the implementation of informatic system components for a specialized unit* (dr. mathem. V. Chichernea, C. Davidescu, I. Făgărăşanu — the "Ştefan Gheorghiu" Academy).

26. *D.L.T.—FORTRAN specifications* (dr. eng. Al. Ioachim — the "Ştefan Gheorghiu" Academy).

27. *Generating COBOL, EPSILON programmes — a structured programming precompiler, DELTA — a data description-sharing generator, SIGMA — a software interactive generator* (A. Stoffel — the "Ştefan Gheorghiu" Academy).

28. *Considerations on exploiting the software of applications under the "SUPRA" monitor ontrol* (M. Verban, A. Ieşan — the "Stefan Gheorghiu" Academy).

— Studies on ensuring the quality of software products:

29. *On-line standard programme for introducing, validating and centralizing statistical data* (dr. eng. N. Costake, mathemat. Eliza Cucinschi — the Central Board of Statistics).

30. *Reliability model for software products* (Al. Balog — Central Institute of Management and Informatics, dr. I. Ivan — the Academy of Economic Studies).

31. *Informatic systems terotechnique* (ec. V. Dumitrache, Computation Centre of the State Planning Committee, ec. V. Dumitrache-Computation Centre of the Central Institute of Management and Informatics).

32. *Models for estimating the costs of software products* (dr. I. Ivan- the Academy of Economic Studies, R. Arhire — Al. Balog — Central Institute of Management and Informatics).

— Studies on the elaboration of data base administration models:

33. *Present programme-trends in setting up autochtonous data banks* (ec. V. Dumitrache Computation Centre of the State Planning Committee, ec. Margareta Pencea — the Academy of Economic Studies, ec. Ana Dumitrache — the Central Institute of Management and Informatics).

34. *Data base organization at a territorial level* (analyst Elena Zorilă — the Central Board of Statistics).

35. *Concept and methods for a data bank with spontaneous retrieval* (dr. G. Diaconescu, ec. M. Magda, ec. T. Vlăduţ, mathemat. Viorica Ştefănescu-the Academy of Economic Studies).

36. *Concept of a data base within the self-management information system* (univ. reader Gh. Nistorescu, dr. Al. Taşnadi— the "Ştefan Gheorghiu" Academy).

37. *Interpretative system for administrating a technological data base* (dr. eng. Al. Ioachim, N. Dinu, I. Leau, D. Martinov- the "Ştefan Gheorghiu" Academy).

— Studies on the elaboration of computer-aided designing system of informatic systems:

38. *The analysis and computer-aided designing of an economic enterprise informatic system. Conclusions resulting from use* (scientific researcher A. Cojocaru—Central Institute of Management and Informatics, ec. I. Tamaş—the Academy of Economic Studies).

— Studies on process mathematical modelling and optimization:

39. *Optimization of dynamic models* (prof. dr. eng. I. Dumitrescu, I. Macri—the Oil and Gas Institute—Ploieşti).

40. *Simple model of simulation at a macroeconomic level* (dr. eng. N. Costake, Georgeta Haneş—the Central Board of Statistics).

41. *On optimizing isoperivolumetric processes* (dr. V. Dumitru, dr. Florica Luban, mathemat. T. Dumitrescu—the Academy of Economic Studies).

42. *Optimization by dynamic scheduling of production launching* (I. Macri, I. Iarca— the Oil and Gas Institute —Ploieşti).

43. *Diagram of calculus with finite differences used in elaborating mathematical models of simulation of the dynamic regime for isotopic separating installations* (G. Isbăşescu, M. Peculea the State Committee for Nuclear Energy, D. M. Constantinescu—Industrial Group for Inorganic Products—Rîmnicu Vîlcea).

44. *Simulation model and optimization algorithm for scheduling drilling winch production* (S. Minoiu—the Oil and Gas Institute—Ploiești).

45. *Applications of dynamic linear programming in optimizing crude—oil transport on pipelines* (dr. eng. P. Mănescu, S. Minoiu—the Oil and Gas Institute—Ploiești).

46. *Microcomputer system for optimizing the storing of products in a petrolium product yard* (univ. reader, dr. eng. G. Ionescu, eng. H. Ion, eng. M. Epure—the Bucharest Polytechnic Institute).

47. *The judicious administration of petroleum components in preparing fuel for industrial furnaces with the aid of mathematical—technological modelling and of the electronic computer* (dr. eng. I. Bărbatu, Gabriela Rusu—Chimpex, Constanța, dr. V. Ionescu—the Academy of Economic Studies).

48. *Structure classifying algorithm* (prof. dr. eng. P. Constantinescu, E. Stan—the "Ștefan Gheorghiu" Academy).

— Studies and developments in the field of computer networks:

49. *Teleprocessing networks used in education* (eng. V. Dumitrescu, eng. O. Paiu—the Academy of Economic Studies).

50. *Considerations on the reliability of the computer networks* (dr. eng. Fl. Pilat—the Academy of Economic Studies).

SECTION III: CYBERNETICS OF LIVING SYSTEMS

The section was sponsored by Acad. Eugen Macovschi, acad. Ștefan Milcu, prof. dr. eng. Edmond Nicolau, dr. Constantin Bălăceanu, dr. Victor Săhleanu, dr. Eugenia Tocineanu and by a scientific secretariate made up of dr. Liliana Spircu and Maria Hînsa, chemist.

19 papers were announced and included into the conference agenda and 13 papers were presented.

The discussions carried on in connection with the 13 papers presented were materialized in 6 questions and 20 supplements, the following conclusions being drawn:

1. One of the essential fronts of contemporary science is that of biology.

2. Besides the second fundamental link of unitary science which may be considered as the relationship between "the living" and "the nonliving", the study of the living matter which surrounds us at its different levels up to the investigation of the human being still implies many unknown facts, in spite of the great progress scored during the past few decades, and, for this reason, it is an object of activity for specialists in various fields, including those of cybernetics, automatics, electronics.

3. The qualitative differences between "nonliving" and "living", then, between "living" and "the conscious living" inherently implies interdisciplinary, and both cybernetics and informatics can make an important contribution to the scientific explanation of these problems.

4. The application of the principles and engineering methods to the biological and medical problems in the world of "living" (papers 3, 7, 14, 16, 17, 18), the introduction of cybernetic and mathematical languages and the attempts at modelling vital processes with technical devices and mainly with the aid of the electronic computer represent the new ways of research used in systems bioengineering.

5. A clear trend is distinguished at present towards fundamental problems, towards knowing the "living" systems with the aid of mathematical and technical instruments (in contrast with the period of beginning when the living system cybernetics was directed towards immediate medical applications).

6. The living systems cybernetics (as a branch of cybernetics) is an active branch proposing itself much more than a number of gnoseological objectives. It aims at finding ways and means by which a biosystem may be determined, to have a desired behaviour, by which it can be brought within certain limits, considered as normal, as well as the procedures by which its behaviour can be optimized, in other words, the prevailing trend is towards synthesis, towards transformation (7, 13, 14, 16, 17).

7. The National Conference of Cybernetics has provided a happy opportunity for specialists in most different fields (biologists, physicians, cyberneticians, and others) to share and confront their opinions, to express their viewpoints in connection with certain aspects regarding

methods and technics of investigating the living which are used thanks to a science which will dominate the future century.

The papers presented were:

1. *The ontogenesis of endocrine biorhythms* (acad. Ştefan Milcu, vice-president of the Academy of the Socialist Republic of Romania).

2. *On the Hodken-Huxley equations* (univ. reader, dr. Claudia Lidia Simionescu – the Braşov University).

3. *Biological information and symmetry-asymmetry mollecular systems* (dr. C. Portelli- the Bucharest Faculty of Medicine).

4. *Computer-aided simulation of ionic currents implied in nervous influx generation* (physicists Cornelia Zaciu, Mioara Tripşa, V. Vasilescu – the Bucharest Faculty of Medicine).

5. *Cybernetic aspects in the bionic estimation of the neuromuscular system* (univ. reader, dr. M. D. Nicu, eng. S.F.G. Petcu – the Bucharest Polytechnic Institute).

6. *The living matter, a hierarchized cybernetic system* (prof. dr. E. Niculescu-Mizil- the "Ştefan Gheorghiu" Academy, Computation Centre of the Chemical Industry).

7. *Formal aspects of ageing* (dr. Constantin Bălăceanu- the National Institute of Gerontology-Bucharest).

8. *The electro-encephalographic chart, an automatic method of investigating the electric activity of the cortex with applicability in clinical and experimental neurophysiology* (mathemat. M. Poliac, prof. L. Popoviciu – Territorial Centre of Electronic Computation – Tîrgu Mureş).

9. *The subatomic-transmutational nature of the biocybernetic processes* (D. Ionescu-Pantelimon).

10. *The study of coordinating the movements of muscles of frog limbs controlled by a microprocessor* (dr. eng. E. Petriu, dr. in medicine Al. Cristescu, dr. eng. I. Naforniţă- the "Traian Vuia" Polytechnic Institute-Timişoara).

11. *Maize production optimization in relation to water and soil fertilization* (dr. D. D. Săndoiu – the "Nicolae Bălcescu" Agronomical Institute – Bucharest).

12. *The plant, cybernetic systems* (dr. D. D. Săndoiu- the "Nicolae Bălcescu" Agronomical Institute – Bucharest).

13. *On a methodological error in the electronographic investigation of living systems* (eng. Gabriel Constatinescu, dr. E. Celan – the "Electronica" plant-Bucharest).

SECTION IV: TECHNICAL SYSTEMS CYBERNETICS

The section was sponsored by univ. reader, dr. eng. Adrian Gheorghe, prof. dr. eng. Dolphi Drimer, prof. dr. Eugeniu Niculescu-Mizil and by a scientific secretariate made up of eng. M. Gruescu, dr. Gh. Ciobanu.

The discussions on the 24 papers presented were materialized in 12 questions and 31 supplements.

The following conclusions were drawn from the papers and debates:

1. Technical cybernetics is one of the most dynamic subbranches of cybernetics, its rapid development both in point of theory and applications acquiring a new scope following the creation of new production technologies engendered by the very application of the cybernetic gains in technics.

2. The development of technical cybernetics is outlining new branches which are trying to detach themselves from the original branch, such as for example: energetic cybernetics, robotics, telematics, testomatics, branches which are added to the already existent ones: automatics, industrial informatics, the production systems cybernetics.

3. The management of technological processes in the conditions of a judicious administration of the energy and material resources requires the deepening of cybernetic studies of the production systems and utilities, extending the limits of the system over the urban consumers bordering on the industrial platform.

4. The design of the control systems of processes and installations regardless of their nature and complexity can no longer be conceived without implying the computation systems in the optimal solving of decisional processes.

5. The use of microprocessors in technological process control represents the solution of the future management systems which should be taken into consideration and turned into deed both by applicative research and technological engineering.

6. The use of industrial robots is efficient and feasible in the technological conditions attained by the Romanian industry. The practical application of robotics in industry requires the effort of providing it with the necessary equipment and the designers' intellectual effort to reconsider the designing conception which has been applied so far. The very technological flows and their components must be reconsidered and adapted.

7. We already have the mathematical apparatus and the technical equipment necessary for estimating the technical risk conditions of the installations and the necessary measures for securing a reliability corresponding to the perilousness of processes, as a result of the cybernetic approach of the design of these systems.

8. The National Conference of Cybernetics has provided the framework necessary for the interdisciplinary debates on problems focusing the attention of specialists enabling them to express their opinions and to make a fruitful exchange of ideas to be turned to best account by Romanian research in the field of a science of major importance.

The papers presented were:

1. *Using spleen functions in optimal data processing* (physicist R. Homescu — the Academy of Economic Studies).

2. *Dynamic systems with commands and distributions* (prof. dr eng. N. Racoveanu — the Bucharest Polytechnic Institute, dr. eng. D. Somnea — the Academy of Economic Studies).

3. *Decisional model in choosing the optimal variants for programming digital controlled machine-tools* (dr. C. Tudor, Nicoleta Ionescu — Computation Centre of the Braşov University).

4. *Contributions to the forecasting and automatic control of energy consumption in industrial enterprises* (dr. eng. Gh. I. Bărbatu-CHIMPEX-Constanţa, dr. V. Ionescu — the Academy of Economic Studies, eng. Gh. Lepădatu-the Wine Industrialization Enterprise-Constanţa, eng. Olguţa Lepădatu — the Milk Industrialization Enterprise — Constanţa).

5. *Cybernetic concept of the MAN/PROCESS/COMPUTER interface* (eng. M. T. Gruescu-Computation Centre of the Chemical Industry-Bucharest).

6. *Modelling the thermo-power balancesheets of the systems with time variable parameters* (eng. A. Cutcudache, mathemat. I. Belcea-Computation Centre of the Chemical Industry-Bucharest, dr. eng. L. Badea-Institute for Technological Engineering and Design for the Chemical Industry).

7. *Optimizing the materials balancesheets of the multiple-objective complex systems* (dr. eng. L. Badea — Institute for Technological Engineering and Design for the Chemical Industry).

8. *New results concerning the computer-aided control of fractionary processes* (univ. reader, eng. V. Marinoiu, Gh. Sorescu — the Oil and Gas Institute-Ploieşti).

9. *Multi-processor system for technological process control* (dr. eng. T. Ionescu, dr. eng. T. Borangiu, eng. C. Constantinescu, eng. D. Carstoiu — the Bucharest Polytechnic Institute).

10. *Considerations on designing the basic unit for the automatic adjustment of a management distributed system* (dr. eng. T. Ionescu, eng. D. Carstoiu — the Bucharest Polytechnic Institute).

11. *Automatic reservation of the adjustment functions in a management distributed system* (dr. eng. T. Borangiu- the Bucharest Polytechnic Institute).

12. *Digital control of machine-tools by using multiprocessor-systems* (dr. eng. T. Borangiu, dr. eng. R. Dobrescu, dr. eng. T. Ionescu — the Bucharest Polytechnical Institute).

13. *Cybernetic elements in the reconditioning technologies of machines parts* (prof. dr. eng. D. Drimer, S. Ionescu, M. Pleşa — the Bucharest Polytechnic Institute).

14. *Contributions to the technical-economic estimation of the use of industrial robots* (prof. dr. eng. D. Drimer, P. Stel, A. Paris, S. Ionescu- the Bucharest Polytechnic Institute).

15. *Anthropomorphic characteristics of industrial robots* (dr. eng. M. Stănescu — the Bucharest Polytechnic Institute).

16. *A system of sensors for industrial robots control* (univ. reader, dr. eng. G. Ionescu, univ. reader, dr. eng. N. Sprînceană, dr. eng. R. Dobrescu — the Bucharest Polytechnic Institute).

17. *Industrial energetic cybernetics and the chemical technological engineering* (dr. eng. I. Grigoriu, eng. Alexandra Gruescu -the Institute for Technological Engineering and Design for the Chemical Industry).

18. *Cybernetic system on optimizing the functioning parameters of energy installations* (prof. dr. eng. S. Puşcaşu, dr. L. Ricu, Fl. Bică — the Craiova University).

19. *Analysing the risk and safety of complex technical systems — a cybernetic approach* (univ. reader, dr. eng. A. Gheorghe, univ. reader Al. Popovici, D. Mircea — the Bucharest Polytechnic Institute).

20. *Preventing floods in Transylvania- a cybernetic approach* (D. Ionescu-Pantelimon.)

21. *Multiprocessor control system for experimental robot with flexible elements* (dr. eng. E. Petriu, eng. Dorina Petriu, eng. V. Creţu- the "Traian Vuia" Polytechnic Institute-Timişoara)

22. *Theoretical considerations on an isotopic distillation column with mutiple feedings* (dr. D. M. Constatinescu-Industrial Group for Inorganic Products-Rîmnicu Vîlcea, mathemat. T. Constantin, eng. M. Marinescu, eng. I. Ştefănescu—the State Committee for Nuclear Energy-Bucharest).

23. *On the reliability of some chemical installations* (eng. I. Ursateanu, eng. P. Lăzăruţ-Industrial Group for Inorganic Products-Rîmnicu Vîlcea).

24. *Library of mathematical models and programmes for a minimal complex analysis* (eng. E. Ritzinger—the Galaţi Iron and Steel Works, dr. eng. E. Ceanga, dr. eng. S. Bumbacea, eng. S. Bivol, eng. E. Roşu, mathemat. V. Leahu, eng. I. Bogdan, dr. eng. I. Pătraşcu, eng. V. Ivănescu—the Galaţi Universiry).

SECTION V: CYBERNETICS OF SOCIO-ECONOMIC SYSTEMS

The section was sponsored by prof. dr. Mircea Bulgaru, prof. dr. Constantin Ionescu, prof. dr. Eugeniu Niculescu-Mizil, dr. Moise Altăr and by a scientific secretariate made up of ec. Liliana Dumitrache, mathemat, C. Arsene.

The discussions on the 25 papers presented were materialized in 39 questions and 11 suggestions, comments and supplements.

The papers and debates led to the following conclusions:

1. The unitary character of the socio-economic activity, the complexity of its structure and the multiple direct connexions and feedback established within it represent the main attributes which are defining the cybernetic system concept for the socio-economic activity as a whole.

2. Through the applicative values of its modern methods and techniques, socio-economic cybernetics is considerably stimulating scientific research being a real instrument for a still deeper investigation of the complex phenomena taking place within the national economy and internationally, being also an active factor in the management and planning of the socio-economic development in the optimal economic growth process, in the general progress of society.

3. Through the vast systemic horizon, through the techniques and methods of economic-mathematical and informational simulation and modelling, through its problems, the cybernetics of socio-economic systems contributes to the practical activity of substantiating decisions on production optimization and economic management, of elaborating the forecasts, programmes and plans of socio-economic development beginning with the enterprise and ending with the entire national economy.

4. The application of the methods, techniques and models elaborated by economic cybernetics in establishing the optimal directions of economic growth, in the efficient management of production in industry, agriculture, constructions, in the technical-material supply, in achieving a continuous dialogue between command-decision and its complement control-adjustment, turns into an active component of scientific management;

5. On the line of the socio-economic optimum, the direction of development of a territorial system (region, area, hydrographic basin, county, locality) is estimated as optimal in proportion as it is integrated into the trend of development of the national economy macro-system. In this context, some components may estimate in conditions of "suboptimum" and others of "superoptimum" in comparison with the situation in which the optimum would be established for each component taken separately—which proves the subordination relation existing between the general, social interests and the group, local or partial interests (dr. R. Stroe, Gr, Focşeneanu—the Academy of Economic Studies-Bucharest).

6. The territorial models presented have been elaborated by establishing the territorial decision-making levels and the efficient operating indices for the local bodies, by defining as final output variables the indices which had not intrinsically been included into the model (indices of the population living standards) allowing to harmonize the various optimum criteria and by using the results obtained in fuzzy mathematical programming (I. Wasluian, Imre Balint-Territorial Centre of Electronic Computation-Tîrgu Mureş).

7. The cybernetic modelling of economic activities in various fields implies the knowing and analysis of the economic systems by specifying the interference sectors of the economy, as a big system and the component subsytems (eng. ec. I. Ungureanu).

8. One of the important categories linked with production systems modelling under an intermittant adjustment or in free disorder is that of organizational entropy examined from the

point of view of its evolution and propagation (with the aid of the propagation speed and acceleration, the inertial phenomena of propagation, entropic pressure and other dimensions), the models which have been formulated and the studies made allow for a complex optimizing of the activity of any manager, in conditions of organizational entropy and emphasizes the need for any manager to adapt himself to the concrete conditions of the macrosystem he belongs to and of the system run by him (prof. dr. eng. M. Rafiroiu).

9. The checking of entropy propagation into production systems can be achieved by their optimal structuring (still more reduced masses of subsystems and intensity of connexions, a limited number of subsystems) by reducing the entropy of resource deliveries with the aid of reserves and by ensuring buffer working fronts for manpower and for the working means (prof. dr. eng. M. Rafiroiu).

10. The stimulation of the fabrication flows for verifying the different management strategies (the so-called enterprise games) is a direct application of the systemic approach in design and resides in examining the whole in interdependence with its components; the production flow materializes the interaction of the components of the material, energy and information exchange of the economic unit with the environment, representing the headquarters of the entropic and material transformations and the generator of the state transformations of the system identified by the economic unit (univ. reader, dr. Eduard Rădăceanu).

11. The modelling of the Markovian cybernetic systems devoted to problems pertaining to the analysis of reliability and quality control of industrial products introduces as an appropriate modelling means the optimators which include, in the form of constraints, certain data ensuring the dynamic character of the model and referring to the ergotic character of the system, to the existence of absorbing states, to certain probabilities of transition; the optimators allow for the best use of data resulting from measurings for predicative purposes, for forecasting the trends of the examined working process and the taking of adequate corrective measures (Dan Teodorescu).

12. The establishment of the optimal energy level which is registered in phases of the technological processes by taking into account the influence factors ensures the rhythmic character of the technological flow so that the loss and, therefore, the energy consumption should be minimal (a collective of the Galaţi University and the Iron and Steel Works-Galaţi).

13. By solving the technical-economic model of selfadjustment of the products quality level in the conditions of maximum efficiency (suggested by eng. Paul Adrian and ec. Zara Ştefan) it is possible to obtain information as to the quality of a product in a life-time.

The papers presented were:

1. *Some aspects of the systemic-cybernetics approach of the problem of production multilevel management* (dr. I. Băncilă, dr. Gh. Ciobanu, dr. Cs. Fabian- the Academy of Economic Studies-Bucharest).

2. *Cybernetic modelling in economic-financial selfmanagement and selfadministration at a territorial level* (dr. R. Stroe, scient. res. Gr. Focşeneanu—the Academy of Economic Studies).

3. *Cybernetic modelling of hydrological processes through the medium state concept of the systems* (dr. V. Ionescu, dr. U. Berar, eng. V. Huţeanu- the Academy of Economic Studies).

4. *Demo-food models and typologies. Typologies of enterprise labour resources* (prof. dr. M. Bulgaru- the Academy of Economic Studies).

5. *Stackelberg strategies* (univ. reader, dr. Claudia Lidia Simionescu, Eleonora Cazacu—the Braşov University).

6. *Input-output systems, Leontief languages and automata.* (univ. lect. dr. Aurora Baciu, dr. Anca Pascu—the "Ştefan Gheorghiu" Academy-Bucharest).

7. *Simulation models of agricultural work in real conditions* (mathem. E. Popescu- the "Ştefan Gheorghiu" Academy-Bucharest).

8. *Control and classification on reasons of the anomalies in carrying out agricultural work* (mathem. E. Popescu—the "Ştefan Gheorghiu" Academy—Bucharest).

9. *Applications of simulation in production flows design and control* (univ. lect. dr. eng E. Rădăceanu—the "Stefan Gheorghiu" Academy-Bucharest).

10. *Elements of an integrated control system of technological processes in vegetable production* (prof. dr. B. Mănescu, dr. I. Davidovici, dr. Dan Stegăroiu- the Academy of Economic. Studies).

11. *Cybernetic model of optimizing the transport system of hot, solid products in the iron and steel units for reducing energy consumption* (univ. lect. dr. A. Patrasc, dr. eng. S. Bumbaru, eng. A. Ivănescu, eng. C. Bogdan—the Galați University, eng. E. Rittzinger—the Galați Iron and Steel Plant).

12. *Topical problems in the cybernetic modelling of socio-economic development* (M. Altăr—the Academy of Economy Studies).

13. *The technical-economic management of industrial production in the outlook of economic cybernetics* (Fl. Bică, dr. R. Lascu- the Craiova University).

14. *Cybernetic-Economic model of planning economic development at a territorial level by optimizing the efficiency indices* (eng. I. Wasluian, mathem. I. Balint — Territorial Centre of Electronic Computation-Tîrgu Mureș).

15. *Aspects of organizational entropy propagation in the production systems* (prof. dr. eng. M. Rafiroiu- the "Traian Vuia" Polytechnic Institute-Timișoara).

16. *On optimizing the production system management in entropy conditions* (prof. dr. eng. M. Rafiroiu, eng. T. Oană- the "Traian Vuia" Polytechnic Institute-Timișoara).

17. *A cybernetic model of the span of life of industrial products* (dr. eng. D. Teodorescu- the "Electromotor" Enterprise-Timișoara).

18. *Statistical-mathematical modelling in the field of international tourism* (prof. dr. Al. Sobaru- the "Ștefan Gheorghiu" Academy).

19. *Extraction conversion system, a general survey* (L. Serban-Computation Centre of the Industrial Group of Medicines, Cosmetics, Dye-stuffs and varnishes).

20. *Cybernetic modelling of foreign trade activity in the field of electric energy* (eng. ec. I. Ungureanu—the "Ștefan Gheorghiu" Academy).

21. *The administration of quality, a technical-economic system of selfadjustement of the products quality level in conditions of maximum efficiency* (eng. P. Adrian, ec. St. Zara- the "Electronica" Enterprise).

22. *The creation and exploitation of multiindexed files, an example of utilization in the personell-education activity* (Cornelia Pascu—Computation Centre of the Industrial Group of Medicines, Cosmetics, Dye-stuffs and Varnishes).

23. *Possibilities of integrating explorative programmes into previsional cybernetic models* (eng. V. Mihai- the Bucharest University).

24. *System of prospective models for the suggar economy* (eng. Ileana Ionescu-Sisești-Bucharest University).

25. *Integrated system of forecast and planning in constructions* (dr. eng. M. Siletchi-the "Stefan Gheorghiu" University).

Round-table debate: *Cybernetics of industrial processes*

The debates were chaired by eng. Mihail Florescu, corresponding member of the Academy of the Socialist Republic of Romania, minister secretary of state at the National Council of Science and Technology who having referred, in his opening speech, to the achievements already obtained in the cybernetization of industrial processes in our country pointed out that a serious gap continued to exist between these achievements and the accomplishments in the technologically advanced countries, orienting the debates towards the proposal of measures likely to lead to a rapid diminishing of this gap.

Participating in the round-table debates were 48 specialists. Nine proposals on speeding up the cybernetization process of production have resulted from the 14 exposées.

The following conclusions have resulted from the debates focusing on the measures to be taken for speeding up production cybernetization and for its growing efficiency.

1. The machine-building industry has covered a huge road in ensuring the infrastructure for production cybernetization. The achievements obtained so far must, however, be consolidated by developing new subbracnches of advanced technicality, ensuring technical progress in this top field, such as the production of widely integrated circuits and microprocesses on at least 8 bits.

2. Apart from modern computation and peripheral equipment, the production of conventional automation equipment must be consolidated, developed and modernized. For this, the need was emphasized of:

— speeding up the achievement, homologation and industrial-scale production of a Romanian management distributed system oriented on an 8 bit microprocessor. The reports to the National Conference of Cybernetics have shown the practical ways of achieving with 8 bit microprocessors the parallel processing on 16 bits necessary for such a system, putting forward practical solutions which have been solved.

— the homologation and industrial-scale production of regulators and interface equipment to ensure the docking of the closed loop process computers to the conventional automation apparatus;

— ensuring the domestic production of the measuring apparata of quality and flow analysis necessary for production cybernetization.

3. The Romanian machine-building industry has the necessary technicality for producing industrial robots. This problem should be courageously tackled by specialists through a close cooperation between researchers, designers, specialists in production and informaticians within multidisciplinary collectives. The proposal was put forward of studying the Synthetic Yarn Plant (and the equipment and spare part section there), as a pilot enterprise for the achievement, production and experimenting of the use of industrial robots.

4. Industrial cybernetics can make an increased contribution to saving energy and natural resources involved in the industrial production process by a study and optimized control in the producer/consumer relationship. In this respect, several trends have been revealed, namely: the cybernetics of big production systems, of the town industrial platform systems, of integrated branch systems. The study of these systems in multiple variants will have to be made in substantiating all important investments;

5. The cybernetization of repairs is a less approached trend of research yet with major effects which must unfailingly be used following the reintroduction into the economic cycle of important material values and the increase of the extensive index of using the installations;

6. For speeding up the cybernetization of industry, firm action is necessary in order to impose a change in some outmoded conceptions in design by establishing new normative acts and by strengthening the formative actions through the participation of academic staff in improving the training of workers in the respective fields, in consolidating documentation and editorial activities in this respect;

7. For the development of cybernetic studies on fields of activity, the proposal was put forward of analysing the working out and financing — after approval by the National Council for Science and Technology — of a research programme to be drawn up based on the proposals of the specialized institutes.

Participating in the debates were dr. eng. A. Davidoviciu — the Central Institute for Management and Informatics; eng. M. Neguț — Computation Centre of the Chemical Industry; dr. eng. T. Grigoriu — the Institute for Technological Engineering and Design in the Chemical Industry; eng. E. Smuc — the Institute of Research and Design for Thermopower Equipment; eng.E. Ritzinger — the Galați Iron and Steel Works; eng.S. Regălie — the Institute for the Economy of Industry; prof. dr. eng. N. Preda — the Institute for the Economy of Industry- the Academy of Economic Studies; eng. ec. I. Ungureanu- a student of the "Stefan Gheorghiu" Academy; eng. P. Marinescu- the Central Institute for Management and Informatics; eng. M. T. Gruescu — Computation Centre of the Chemical Industry; chemist P. Rizescu-Management Centre for the Chemical Industry; eng. I. Vlăntoiu — Management Centre for the Chemical Industry.

The round-table debate: *Cybernetic aspects of management: the management-control-adjustment system*

Academician, Prof. Manea Mănescu, chairman of the section of economic and sociological sciences and chairman of the Cybernetics Commission of the Academy of the Socialist Republic of Romania chaired the debates in which about 70 specialists have participated. Exposées were presented by 12 specialists.

Considering the rich subject-matter which could not be entirely tackled and exhausted at this round-table debate, the organization of another round table debate on a more limited topic was proposed to be held in a few months, debates going to last for one or two days.

The discussions materialized in the following general conclusions:

1. The exposées mirrored, in the first place, the research work of the Romanian cyberneticians materialized in practical results which followed the guide-lines of the Party General Secretary, Nicolae Ceaușescu, as well as the provisions of the Guide-Programme of scientific research, technological development and introduction of technical progress in the 1981—1990 period, approved of by the Twelfth Party Congress on investigating and explaining on a scientific, materialistic, dialectical and historical basis the characteristics of the process of building the multilaterally developed socialist society in our country, the particularities of the present stage in building this society.

2. The theme of the debates embraced a large field of management in the cybernetic systems and focused mainly on the cybernetic-economic systems at a macro and microeconomic level.

3. Stress was laid on the correlation between management, more precisely the act of management and cybernetics, the planned management, the major social decision-making act being still more stimulated in socialism by the new values acquired through the contribution of modern methods of cybernetics and informatics largely promoted by our Party leadership.

4. An important trend in the application of the cybernetic concepts in our country and mainly of economic cybernetics, in the content of the management of social life is the implementation of cybernetic models which should serve in the plan substantiating activity. Noteworthy in this respect are the results obtained in elaborating the balancesheet of inter-branch connexions, the models on the economic growth rate and the accumulation-consumption correlation; models on the quantification of technical progress, the study of production factors and the working out of production functions for the national economy and for its main branches; models for optimizing investments at a branch level, models of forecasting the socio-economic development at a territorial level, etc.

5. By applying the cybernetic-economic models at a micro-economic level, positive results have been obtained in optimizing the distribution production targets on enterprises and within them, on sections, workshops and work places, in optimizing the type of production and assortments, in organizing the repair and overhauling of the equipment, in optimizing the level of stocks, etc.

6. Starting from the fundamental objectives of the growth of the national economy as a cybernetic system, the cybernetic-economic models can provide a wide range of practical solutions at an enterprise and branch level, for the whole of the national economy and at a territorial level.

7. The examination of the national economy as a cybernetic system made up of multiple components interconnected by direct and feedback connexions allows for a through investigation, for the widening of knowledge and for a scientific explanation of the very complex processes and phenomena which are taking place in the national economy.

8. In the conditions of socialism, the entire society is interested in a most favourable evolution of the economic processes taking place in the national economy system. That is why, the society is constantly following the system's evolution through its state, decision-making, input-coupling and output parameters and after analysing the information obtained, it decides upon the measures to be taken for influencing the behaviour of the system along the directions established through the socio-economic development plan.

9. The correlation of the management-cybernetics binomial pursues the analysis of the essential characteristics of the economic processes which, in a cybernetic acceptation, we consider as open, controlled and adjusted systems. The management and adjustment mechanism of any cybernetic-economic system must constantly ensure the optimal unfolding of its specific activity and the prevention of the perturbations which may occur. It is extremely complex due to the multitude of connexions and the interdependence relations within the system and due to the external factors.

In the socialist economy, every condition is ensured for achieving the system-management-control-adjustment correlation because the implementation of a unitary mechanism of management and control of the social life system, on a plan basis, is ensured. It has special advantages in point of the implementation of the optimal management, control and adjustment of the national economy as a whole. The planned economy is most efficiently achieving the feedback because it ensures rapid corrections—when it is necessary—over the whole economic system.

10. Extremely interesting preocupations have been revealed during the debates for the cybernetic survey of society as a whole, of the cybernetics of the modes of production in general and for a cybernetic examination of the economic-financial mechanism and of enterprise cybernetics in particular.

The cybernetic way of thinking, organizing and running the economic systems is an indisputable reality whose validity is fully confirmed by the applications of cybernetics in our country's socio-economic life.

The application of cybernetics in solving the problems of economic organization and management has become a component element of the scientific management of our socialist society.

Speeches were made at the debates by dr. M. Altăr-the Academy of Economic Studies; prof. dr. eng. Paul Constantinescu-the "Stefan Gheorghiu" Academy; prof. dr. C. Ionescu—the Academy of Economic Studies; eng. dr. M. Bulgaru—the Academy of Economic Studies; prof. dr. Al. Sobaru- the "Stefan Gheorghiu" Academy; S. R. Petrescu—the Central Institute for Mana-

gement and Informatics; anthropologist Cornelia Buja—the "Victor Babeş" Institute -Cluj-Napoca; dr. R. Stroe -the Academy of Economic Studies; prof. dr. eng. M. Rafiroiu- the "Traian Vuia" Institute, Timişoara.

The round table debate: *Cybernetics of economic administration.* The debates in which 26 specialists have participated were chaired by prof. dr. Eugeniu Niculescu-Mizil who presented the main characteristics which make the economic systems to behave as cybernetic systems (any economic system belongs to a bigger system which is the social system it belongs to). Thus, the national economy system is connected to the world economy system and, in its turn, it is made up of subsystems which are in connexion and feedback relations; large and diverse quantities of information are circulated within it; it is characterized by complexity and dynamism, by probable states and by finality.

The debates materializes in 8 papers from which the following general conclusions were drawn:

1. The society is a cybernetic system because the action of the basic mechanisms which are characteristic of such a system is manifested within it; it is adjustable and self-adjustable through the effect of the objective laws operating in society, in keeping with the essence of each social formation; the principle of connexion and feedback is achieved through the relations of interdependence and interaction between the elements which are making up society; the big quantity of information circulated in society reflects the standard of its organization; entropy (with its effects towards the disorganization of the systems) conditioned by information generates the probabilistic traits of society. The dynamism, the very high level of complexity and diversity, the continuous maifestation of the principle of "governing" (the mechanisms of management and control of the system), the practical applicability of the "model" category complete the cybernetic properties of society;

2. No cybernetic analysis of the social systems can be made globally. It must take into consideration the particularities of each of them, particularities which make the cybernetic categories act, in point of quantity and quality, differentiatedly from a type of social system to another;

3. The cybernetization of the socio-economic life resides in the fact that because of the complex character of the specific processes which are taking place in various economic and social sectors, it is still more difficult to solve problems without applying to cybernetic methods and techniques provided mainly by the systems theory, the information theory, the modelling theory, the deicision-making theory, as well as by computers and informatics;

4. Considering the set of direct connexions and feedback with the socio-economic and political environment it belongs to, as well as the dynamic character of the permanent change in its parameters, the general cybernetic system of the economy can be considered as the most complex social cybernetic system;

5. The present standard of development of the productive forces imposes the need of modelling the computer-controlled processes for optimizing them;

6. In the very topical question of efficient production programming, interactive models are necessary which should promptly answer the unavoidable changes (and updatings) of the production programmes. In achieving these models one must take into consideration the connection between the system and the production time with the system and the technological overhauling and repair time;

7. Robotics and the robotization of production processes require a structural revolution of labour force.

Participating in the debates were: eng. V. Bjola—Computation Centre of the Industrial Group for Rubber and Plastics-Bucharest; mathemat. R. Şerban—the Academy of Economic Studies; mathemat. I. Belcea—Computation Centre of the Chemical Industry-Bucharest; mathemat. S. Mustăţea-the Academy of Economic Studies; ec. Ana Dumitrache- the Central Institute for Management and Informatics; ec. Viorica Popescu-Management Centre for the Chemical Industry; eng. T. Halici—Management Centre for the Chemical Industry; ec. Aura Grecescu—Computation Centre of the Industrial Group for Medicines, Cosmetics, Dye-stuffs and Varnishes.