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TRANSLATIONS ON EASTERN EUROPE

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[Speech by Ognyan Doynov, Politburo member and BCP Central Committee secretary, delivered at the 20-21 July 1978 BCP Central Committee Plenum: "For the Accelerated Development of Certain Strategic Directions of Scientific and Technical Progress in the Bulgarian People's Republic"]

[Excerpts] I. Use of Electronics in the National Economy--Strategic Task of National Significance

Comrades:

The contemporary scientific and technical revolution is being manifested exceptionally broadly. It has many facets. Yet, the one which largely determines its present aspect is electronics which, with every passing day, gathers speed and whose results are entering ever more extensively industry, management, and domestic life.

This is no accident. Electronics enables us to automate and optimally control the production process, apply new and highly productive technologies, make effective utilization of manpower and material resources, and upgrade production quality. It is the basis for the extensive application of automated control systems and creates conditions for making of substantial changes in the fields of culture, education, health care, and way of life.

A qualitative turning point was achieved in electronics with the mastering and application of microelectronics. In order to realize the revolutionary significance of microelectronics it would suffice to point out that, using it, complex electron systems possessing great computing and logic possibilities may be structured with its help on a crystal consisting of a few square millimeters, systems which, previously, required several thousand electronic elements.

Naturally, the main feature in this case is the qualitative aspect of the matter. The use of microelectronics represents a turn in information gathering, processing, and carrying, in the control of technological processes, and in the creation of new conditions and possibilities for improving the organization of the work, mastering the production of new goods, and so on.

Compared with classical electronics, the use of microelectronic items reduces by several hundred percent outlays for raw materials, materials, energy, and manpower. However, these advantages do not apply only to computer equipment producers. They effect mainly consumers. Despite the greater reliability and lower operational costs prices drop considerably while the time needed for the manufacturing and utilization of electronic systems is reduced greatly.

Microelectronics changes traditional instrument making. Many of the classical group control methods are abandoned and replaced by individual control of machine processes. In turn, flexibly interrelated, such machines offer possibilities for comprehensive automation of entire production systems, shops, and plants. The use of microelectronics allows man to develop to an ever greater extent as the "controller and regulator" of the production process, as Marx predicted.

The extent to which electronics is used in the national economy and of the development of the electronic industry is becoming one of the indicators of the economic power of a country, of its scientific and technical potential, and its ability and readiness to hold leading positions in human progress. Naturally, as confirmed by historical experience, in the study of such processes we can not ignore the nature of the social system, for, in the final account, it determines both the pace and the social consequences of the scientific and technical revolution.

Following the course of accelerated development of scientific and technical progress, our party assessed on time the significance of electronics and, particularly, of computer equipment. Over 10 years ago it clearly formulated the tasks and has been systematically following a line of accelerated development along this strategic direction. Within a short time new computer equipment plants and scientific research institutes were built. Highly skilled cadres were trained. Soviet and Bulgarian specialists developed the ES-1020 and ES-1022 calculators. The series production of some other basic technical facilities was organized such as magnetic tape and disc memory systems, magnetic disc packets, central process source, and others.

A high pace and unquestionable successes were achieved between 1971 and 1977 in the development of our electronic industry. Bulgaria specialized and developed as the major producer of computer equipment within the socialist comity. Electronic and electrical engineering goods account for a considerable share of the country's overall exports.

So far we have followed a line aimed mainly at acquiring experience, developing the material and technical base of the sector, and fast quantitative growth of output with a view to achieving our effective participation in the international division of labor. However, this line has exhausted its possibilities. Naturally, we shall continue to be concerned with the development of the material and technical base of electronics and the accumulation of production and scientific and technical experience, and with increasing the sector's output.

The big problem now is for this entire activity to be strategically directed toward insuring leading positions in the development of electronics. At the same time, we must engage in the extensive use of electronics in the national economy, wherever the achievements of electronics could be effectively applied and, on this basis, achieve high quality and effectiveness.

On the one hand, all this calls for amending the approach to resolving problems of electronics; on the other, it calls for surmounting relaxation and complacency based on achieved successes, manifested by a number of state and economic organs and organizations. We would be wrong to ignore this aspect of the matter.

What are we dissatisfied with?

We are dissatisfied with the pace at which the technical standard of produced goods is rising. The sector is not making full use of possibilities for renovating and increasing the variety of produced items, and for the prompt adaptation of the production process to the requirements of the domestic and international markets. The dynamic changes resulting from the scientific and technical revolution are manifested most rapidly in the field of electronics which is changing its appearance every three to four years. Yet, in some cases, we are slow to adapt to such requirements and do not always react promptly.

Let us take as an example magnetic disc memory systems. Within a short time we mastered the production of 7.25 megabyte systems and reached a good technical level. We took a second step and applied 29 megabyte discs. Presently the leading producers have gone even further. They have designed and mastered the production of new high density systems and are already producing integral disc modules. In this connection it is inadmissible to delay the development and mastering of the next generation of memory systems. Again and again it is a matter of organization, and of the respective state and economic organs and organizations which, carried away by individual current problems, have underestimated longer range targets.

There has been a delay in the development and application of modern technologies. The proportional development of the element base has not been secured. Consequently, a number of our promising high level developments were applied belatedly. A characteristic example is that of the Elka Electronic Calculator. We were among the first countries to develop such a calculator. However, the development of new models was delayed.

Despite the high volumes of output of a number of electronic goods, production capacities remain under utilized. Such cases exist, for example, in the production of processors, digital program controls of metal cutting machines, and others.

Difficulties are also created by the fact that our instrument makers are producing mainly the type of mechanical-hydraulic, and pneumatic systems of low compatibility with computers.

All this confirms the conclusions and critical remarks included in Comrade Todor Zhivkov's concluding speech at the National Party Conference. We must earmark effective measures and ensure the development of electronics in the desired direction. Obviously, this calls for the adoption of additional economic and organizational measures which would insure the implementation of the national program for the use of electronics in the national economy.

What must be done?

First. Attaining a higher scientific and technical level of the goods produced assumes decisive importance. Their technical and economic indicators must reach the highest worldwide scientific and practical achievements within a short time. The electronic industry, apply, and produce the type of goods reflecting the most progressive trends of the scientific and technical revolution.

Planning the requirements for electronic and electronic-oriented equipment must be seriously improved. The needs of the consumers for a broad range of technical facilities and program products consistent with their requirements must be met comprehensively and rapidly. In other words, the plan of the Ministry of Electronics and Electrical Engineering must be directly linked in time with plans for modernization, reconstruction, and new construction in the individual sectors. This is the main channel through which the new equipment, technology, and organization will enter the national economy.

Electronics must become a model for the systematic pursuit of our policy in renovating the output both through the development of basically new goods and the production of a rich gamut of modifications of multipurpose items. This way, in this field as well, the great idea of the multiplication approach will be implemented.

That is why it is of exceptional importance to master at the present stage the mass production of microelectronic goods with a high standardization level. The comprehensive development of an extensive gamut of integrated circuits must be insured. A series of standardized modules must be developed and, on this basis, we must organize the production of a variety of finished goods, systems, and completed systems for the automation of production, labor, and management. It is also mandatory to broaden and vary the production of microelectronic elements and goods with high technical and economic parameters. The efforts must be channeled toward mastering the latest technologies and trends. This will enable us to undertake in the near future the production of integrated circuits with a very high integration level and high speeds.

Possibilities exist for the solution of this problem within a short time. The material and technical base for the production of a certain range of modern microelectronic elements has been created. The task now is to ensure their mass practical utilization. Using our structural elements we shall be able to produce a number of high level computer items. The practical experience of the leading producers in the world proves that with the help of such elements they are developing the most modern electronic goods and systems. In order to shorten the time for mastering such elements we must make most effective use of the equipment at our disposal, the scientific and production potential we have developed, and the possibility to cooperate with foreign organizations.

Energetic measures must be taken to improve the cadre potential and the material and technical base of the Institute of Microelectronics, Institute of Computer Equipment, Institute of Instrument Making, Institute of Technical Cybernetics, and other scientific units directly involved in the development of microelectronic elements and technologies for their production and application. We must drastically upgrade skills and stabilize the development and production potential of the Scientific-Production Combine for Semi-Conductor Equipment in Sofia and Botevgrad. The reaching of full capacities with high production returns must be insured at a fast pace.

Second. Through the development of electronics the task is to ensure the use of electronics in material production and other fields of social life.

To this purpose electronic equipment and automation facilities must be developed and rapidly applied in production. This would enable us functionally to link the controlled projects with electronic and computer equipment. On the one hand, many of them are needed for the development of systems for complex chemical and physical analyses which, essentially, represent comprehensive technological laboratories. On the other hand, with their help we will control complex processes such as the production of steel and rolled metal, cement, biological preparations, and many others.

The variety of required automation instruments and facilities is substantial. It is neither possible nor expedient to undertake their development and production by ourselves. We must use the advantages offered by cooperation with CEMA-member countries and, on the basis of the adopted Uniform Automation Instruments and Means, organize extensive cooperation with the Soviet Union and the other fraternal socialist countries. Furthermore, we have created conditions for and should rapidly organize the production of some necessary equipment such as electronic regulators and transformers, apparatus for recording technological data, power electronics for performing mechanisms, systems for connection with computers, and so on.

The extensive use of electronics in material production would be impossible without the development and mastering of machinery with electronic systems and without expanding the use of electronic equipment including mini- and microcomputers used to control machines, machine units, technological processes, and entire production lines. The computers so far produced in our country are used mainly in data processing and far less in controlling production processes. The development of graduated systems for controlling individual machines, shops, and enterprises must be organized on the basis of microelectronics and available computers must be used more fully.

The dynamic and extensive development of computers raises very urgently the problem of program support. Today there is a shortage of programs throughout the world. This is one of the reasons for the limited use of computer possibilities. All this effects prices and the effectiveness of program products. The experience of the leading producers convincingly proves the great importance they ascribe to this activity. Some of them have turned the formulation of programs and the development of program products into their main activity, into an industry.

In the case of our country this is a highly topical problem. We produce computer equipment a considerable percentage of which is sold on international markets. We have set ourselves major tasks related to the use of computers on the scale of the entire national economy. All this calls for a fuller and faster solution of the program support problem. Its high effectiveness depends on good organization, and the extensive knowledge of the possibilities of computers and controlled processes.

The task of program support must be implemented along two lines:

On the one hand programs for automated control systems must be created. Their development should include a broad range of specialists in economic management in order that the targets and tasks of control systems be precisely formulated and so that they may become the starting point for the elaboration of applied program support. The initial successful steps have already been taken in this respect.

On the other hand, programs must be developed for the automated control of production processes, machines, and equipment. This is the trend which shows most completely computer possibilities. Their formulation must be the work of collectives involving the participation of the best technologists and designers in the respective production lines so that the specific features of the technology and the equipment may be taken into consideration.

The problem of program support is most closely linked with the coordination of such activities on a national scale and the maximum utilization of foreign experience. In no case should a departmental approach, parallelism, duplication of the work, and the waste of funds and cadres be allowed.

The task is to improve the organization of the use of computer equipment. The electronic industry is unable to provide its own completely ready automation systems. The use of electronics in the national economy demands the active participation in such activities of the engineering units of economic organizations which will subsequently use automation systems.

The ever fuller saturation of the national economy with electronic and electronized machinery and equipment and their increased complexity give priority to the problem of their operational reliability. Idling caused by breakdowns of highly productive equipment are becoming ever more expensive. That is why the impeccable work of electronic and electronized equipment must be secured. Particular attention should be paid to the organization and capacity of the servicing industry. Gradually it must be organized on an industrial basis through concentration and specialization.

The extensive use of electronics in the national economy is particularly important in improving machine building output. The installation of electronic assemblies and measurement, control, and regulating systems will increase the technological possibilities of machines and equipment, making them more productive and effective. This is of exceptional importance in the case of items in whose production our country's machine building industry is specializing.

Third. The task of upgrading production economic effectiveness is of radical importance to the accelerated development of electronics and its use. The most important task now is to ensure within a short time a lowering of electronic production costs by utilizing the created modern material and technical base, mobilizing and properly directing the experience and knowledge of the large army of specialists, and rapidly applying latest technology. The first and decisive step in this respect must be taken in the production of electronic and microelectronic components. This is an entirely realistic and attainable target. The experience of the leading producers proves that with the same equipment and good technology and production and labor organization, they are achieving low production costs and high technical standards of output.

The prices of a number of electronic goods in the domestic market is a topical problem. The present price level is delaying the accelerated use of such goods. Obviously, we must discuss the possibility to amend them and make them consistent with the stipulation of the extensive use of electronics in the national economy. It would be hardly expedient to continue the practice of charging Bulgarian consumers higher prices for a number of electronic elements, assemblies, and systems compared with foreign customers.

The State Committee for Planning, Ministry of Finance, State Committee for Science and Technical Progress, and Ministry of Electronics and Electrical Engineering must formulate specific measures for providing economic incentive as electronics extensively enters industry and way of life.

Greater flexibility in reaching targets must be displayed in the course of enhancing electronic effectiveness further. The production process must rapidly take into consideration and adapt to changing scientific-technical and market trends. The decision of the party's Central Committee and the government to broaden the rights and responsibilities of the economic organizations offers a favorable prerequisite in this respect. It is on this basis that we must boldly pursue the line of production renovation. Should the production and export of individual electronic elements and assemblies be unprofitable we must convert to the production of more complete machines and systems built in them. Particular attention should be paid to program support and the creation of program products which, as we emphasized,is of exceptional importance in upgrading effectiveness, establishing our electronic output on the international market, and extensively applying it in our economic sectors.

Maintaining the high technical standard of electronic goods demands the use of imported assemblies and other elements along with components produced domestically. All opportunities should be sought to intensify our participation in the international division of labor and, on this basis, achieve an extensive exchange of elements for our domestic or jointly produced finished products. We must encourage producers of electronic and electronized goods who maintain high production standards, steadily renovating and broadening electronic exports and domestic marketing by procuring components from abroad.

Comrades:

The use of electronics in material production and daily life and of the tremendous multiplication possibilities of electronics is paralleled by the ever growing importance of quantum electronics as well. This trend is exceptionally promising and is of great importance to technical progress.

Lasers have great, one could say amazing, possibilities. They are extensively applied in information equipment, quality control apparatus, and as tools in metal welding, drilling, cutting, and heat processing. They make it possible to create new materials and a number of superpure substances needed in the field of microelectronics, pharmaceuticals, and others. The stability of the laser beam in terms of external influences makes it possible to use it as the most accurate standard for distance and time measurements. It has unique possibilities as a carrier of a tremendous volume of information and its rapid processing without external disturbances. This opens new possibilities in the development of communications technology, holography, computers, and microelectronics.

Worldwide experience shows that the choice of direction in this new area is a difficult one. Yet, we can not postpone the solution of this problem and wait for the horizon to become entirely visible, for we would miss the opportunity to develop rapidly this promising and effective type of output. Relying on Soviet science and technology, the advantages of socialist integration, and the best achievements throughout the world, in the next few years we must take decisive steps to organize the production of laser equipment.

Our efforts in the field of quantum electronics and the related scientific trends must be directed selectively to the development and utilization of a certain variety of semi-conductor lasers and integral laser beam receivers, filament light conduits, integrated optics, and elements and assemblies for optical data processing.

Whereas in the field of scientific research and production it would be proper to focus our efforts along several directions, our approach to the application of laser technology should be very broad and flexible. The task is to apply this technology in communications, navigation, meteorology, environmental protection, computers, control of production processes, automated control systems, industrial technologies, and so on.

Problems related to quantum electronics and the creation of a material base for the production of new materials, chemicals, and semi-finished goods must find their solution in the course of the implementation of the program adopted by the Politburo for the development of electronics and microelectronics, and the use of electronics in the national economy. Particular attention should be paid to ensuring supplies of optical lenses and glass filaments, special optical substances and industrial crystals, based on local raw materials, pure metals, and others. These are new tasks facing the scientific research and application units in the chemical, metalurgical, glassware, and ceramics industries, requiring new scientific and practical developments.

Everything stated so far confirms the tremendous possibilities offered to us by the development of electronics in upgrading the effectiveness of material output and improving the life of the working people. No less important, however, are the problems to be resolved with a view to providing scope for the development of this process and the great responsibility of party organs and organizations, cadres, and specialists in all economic sectors and sciences for the implementation of the target programs approved by the BCP Central Committee Politburo. This requires, yet once again, to draw the attention of the heads of ministries and central departments and all leading cadres to the need for the timely and qualitative implementation of assignments.

II. Robotics--An Important Means for Comprehensive Production Automation and Upgrading Social Labor Productivity

Comrades:

For a long time the people strived to create machines which would reproduce the motor functions and possibilities of man himself. It is only in the last decade, as a result of achievements in the field of cybernetics and electronics, microelectronics in particular, and progress in the fields of hydraulics, pneumatics, and precision machine building that this dream is turning into reality more and more. Essentially new machines--robots--were developed on the basis of such scientific and technical achievements, performing functions considered so far a human monopoly. Robots are qualitatively changing labor tools, the organization of the production process, and the interrelationship between man and productive capital. Therefore, whereas the 1960's and 1970's were marked by the rapid dissemination of computers, we could clearly state that the next decade will be largely influenced by robots and the mechanization and automation of a number of manual operations.

In the course of their development robots have covered several stages. The first generation had low maneuverability and rather limited movements. The second generation robots had a far more advanced electronic control system. They have been able to carry out a variety of actions with high mobility. Currently third generation robots which will possess a certain similarity of "intellect" in terms of recognizing and selectively choosing objects and performing operations are being tested. It is possible that in the near future robots will be developed which could logically "analyze" some of their actions and have a certain self-training capacity.

Modern robots can carry a broad range of loads and work over considerable periods of time without interruption and with a steady rhythm and high accuracy. They are successfully replacing human labor in casting, forging, welding, pressing, protective cover lining, painting, feeding metal cutting and plastic processing machines, and many others.

Today all developed countries are engaged in intensive scientific research, development, and application work in this field. The result has been the production and use of over 250 robot models. According to some forecasts, five years from now 10 percent of autonomous metal cutting machines operating in industrially developed countries will be equipped with systems for the automatic replacement of machined parts, and robots and manipulators will account for about 12 percent of their value. By 1985 their share will rise, respectively, to 20 and 25 percent. Thanks to microelectronics, by 1990 robot possibilities will be broadened considerably. To an ever greater extent man will be engaged in the solution of creative problems and make complex decisions regarding production management.

As we may see, it is today that the technology for the next 10 to 15 years is being created. The timely direction of our technical policy along this line assumes exceptional importance both from the viewpoint of the efficient utilization of the possibilities of the scientific-technical and production potential as well as the viewpoint of results. That is why the BCP Central Committee Politburo expressed its great gratitude to Comrade Todor Zhivkov for directing our industry toward the production and extensive utilization of robots.

Based on original Bulgarian designs, we are already producing, on a high technical level and with a high degree of standardization, bracket, portal, and standing manipulators. The established base in machine building and electronics, and the experience gained in the production of manipulators enable us, on the basis of the multiplication approach, to organize within a short time the production and utilization of robots of subsequent generations. This is a complex problem which can not be resolved along a single scientific direction or by a single industrial sector. That is why the Politburo program calls for the adoption of a comprehensive approach to its implementation.

The first and decisive prerequisite is the accelerated development of the production base for fobotics, following a line of concentration, surmounting departmentalism, and preventing any waste of forces and funds. The newly created Scientific-Production Robotics Combine in Stara Zagora is becoming the center of domestic robotics. Its success will be largely determined by the fast and effective integration between the combine and the production units for hydraulics and electronics in Stara Zagora Okrug, thus developing an efficient territorial-production complex. Equally important is the proper clarification and concretizing of the assignments of the individual institutes and enterprises in developing and producing complementing assemblies and parts. The work must be so organized that along with the substantial increase in the output of manipulators, without waiting, undertake the production of subsequent generation robots within a short time. This calls for an overall solution of the problem of structural elements. Separately taken our electronics, hydraulics, pneumatics, and precision machine building could provide high quality items. However, this alone is insufficient. Difficulties arise when such heterogeneous scientific and technical directions must be combined within a single one, when we undertake the solution of problems in their border areas. This requires new technical solutions and technologies, further elaboration of mathematical problems, and so on. That is why the efforts of our scientific potential must be focused in such directions, making maximum use of foreign achievements as well.

Naturally, the matter can not be reduced merely to robot manufacturing. The problem of their mass application in material production remains. The way to their extensive use has not been cleared as yet. The necessary economic prerequisites for this have not been created and the psychological barriers related to their use have not been surmounted. The problems of the socialist organization under the conditions of the mass use of robots in industry have not been elaborated. Within a short time we must provide a fuller clarification of the areas in which robots could be applied. It would be also expedient to assign several enterprises to engage in the accelerated use of robots. Such enterprises should provide standards for the use of robotics in the individual sectors of the national economy.

The use of robotics requires new relations between producers and consumers. The more complex the robots become the greater the need to supply them with specific technical systems for the proper production facility, the availability of programs for their control, and so on. This requires major changes in the technological process, the organization of output, and so on. Another specific feature is that the new robot models are developed as a result of the steady interaction among consumers and producers. Consumers develop ideas for new applications. They formulate new requirements and call for the automation of various processes, directing the designers to the creation of new robots. The solution of such problems calls for the participation of a broad range of specialists with rich general and specialized training along all links of the "design-production-consumption-service" chain.

The operational reliability of robots directly effects the economic effectiveness of the respective production process. That is why a suitable organization for their maintenance and servicing must be developed. Servicing is also a source of systematic information on the behavior of the robots in the production process.

In order to ensure the implementation of the program for the development of robotics, the Politburo made it incumbent upon the State Committee for Science and Technical Progress, Ministry of Machine Building, and Ministry of Electronics and Electrical Engineering to synchronize the activities of all organs and organizations. The overall development and production activities must be closely integrated with the Soviet Union and the other fraternal socialist countries.

Comrades:

Robotics is a new strategic direction still in its initial stage. The use of robots requires the solution of a number of various problems. Currently we are gathering speed and creating the necessary prerequisites to provide scope for this process. The successful implementation of the Politburo program will enable us to speed up the process of production mechanization and automation, undertake its comprehensive automation, and gradually to convert a number of interrupted into continuous processes.

Possibilities are being provided for reaching a new solution to a number of important social problems. This includes, above all, improvements in working conditions, freeing man from a number of difficult physical and monotonous operations, withdrawing him from production processes adversely effecting his organism, and raising the production shift coefficient. Substantial changes will take place in quality control. To an ever greater extent it will be based on predetermined programs and machine possibilities.

The accelerated development of robot manufacturing will enable us to optimize the structure of machine building output, broaden the range of exported commodities, including that of automated lines and complete projects, and to upgrade economic effectiveness.

We see, therefore, that robotics is of exceptional economic and social importance. That is why, within a short time we must create all the necessary organizational-technical and economic prerequisites and make maximum use of domestic and foreign experience.

III. Chemical and Biological Achievements--Powerful Factors for Upgrading Social Production Effectiveness

Comrades:

It has become clear that electronics and the use of electronics provide new ways and means for optimizing the control of production processes, their automation, and the upgrading of their reliability. Robotics makes it possible for machines to assume and carry out a number of human functions, freeing man from heavy physical processes. In other words, electronics and robotics advance and qualitatively change labor tools and the ways and means of their control. Chemistry and biology provide new processes, technologies, and new materials. They enable us to relate in a new way labor, machines, and equipment with labor objects. That is why electronics, robotics, chemistry, and biology are interdependent strategic directions followed by the contemporary scientific and technical revolution. Today chemical processes and products are being extensively used in all economic sectors and daily life. The latest biological achievements are being used ever more extensively. Under the conditions of the scientific and technical revolution chemistry and biology make it possible to intensify production processes, speed up their development, lower production costs, and upgrade quality. The use of chemicals and biological methods and products in agriculture is of particular importance. Further improvements in the prosperity of the working people are inseparably linked with the all-round utilization of chemical and biological achievements and their extensive use in the national economy.

Catalytic agents which increase manifold the speed of chemical reactions and, even more important, direct chemical processes toward the development of products with predetermined characteristics, play a revolutionary role in chemistry and biology. In the past 20 years catalytic processes have been developing at an exceptionally fast pace. Today about 70 percent of all chemicals are produced catalytically. Catalytic processes are the basis of major production processes such as the synthesis of ammonium, methanol, most of the petroleum refining and petrochemical processes, and the production of sulfuric acid, polymers, synthetic fibers and rubber, detergents, pharmaceuticals, household chemicals, and many others. They have made it possible to make more effective use of raw materials and to upgrade the quality of finished products.

The role of biological catalysts--enzymes--is growing as well. They are used extensively in the processing of animal and vegetal raw materials, in the chemical and pharmaceutical industries, and in medicine. They enable us to make use of a number of agricultural and food industry byproducts in order to meet mankind's protein requirements.

Studies have indicated that in recent years all advanced countries have invested considerable funds in improving catalysts and enzymes and in their use. This is explained by the fact that they make it possible to miniaturize chemical processes and to ensure the development under favorable conditions and proper parameters, considerably reduce dimensions and costs of equipment, and upgrade production effectiveness.

All this proves the tremendous opportunities offered by chemistry and biology in lowering material and labor outlays and rationalizing production processes.

That is why both now and in the future the development of these directions is the main way leading to the solution of a number of vitally important problems.

The first is a protein problem whose topical nature is determined by the ever growing shortage of protein needed for the feeding of mankind. In addition to the classical method of increasing crop yields and the extensive and intensive development of animal husbandry, the latest chemical and biological achievements open new real possibilities for its solution through microbial protein synthesis.

The second problem is that of increasing agricultural output. Chemical fertilizers and plant protection means will retain their exceptional importance in increasing fertility. Stabilizers and special additives are being developed to increase the level of utilization of fertilizers by the plants. The use of bioregulators and chemical stimulants which accelerate plant growth and destroy weeds and pests is growing steadily. A large variety of valuable products based on available raw materials, successfully used as food industry substitutes, are produced through biochemistry and the use of enzymes.

The third problem is maintaining the biological balance in nature and the protection of the environment from the harmful consequences of human activities. This is a substantial factor in improving living conditions. The chemical and biological sciences offer new and effective methods for the efficient utilization and enrichment of natural vegetal and animal resources, upgrading productivity, ensuring the proper exploitation of forests, natural pastures, and game and fish stocks, and the protection of rivers, lakes, and dams.

The fourth problem is the use of modern biology achievements for the purpose of improving vegetal and animal species. Major achievements are expected in this area in the immediate future as a result of successes achieved in basic molecular biology and genetics research. The discovery and mastering of molecular heredity mechanisms and means for their control will lead to the development of microorganisms, plants, and animals, possessing a far greater biological productivity. Of late intensive work is being done in the field of gene engineering. In the next few years the photosynthesis of a number of crops such as soybeans, wheat, tobacco, cotton, potatoes, and others, is expected to change genetically.

Fifthly, chemistry and biology are developing new, highly effective, and varied raw materials and materials, power sources, and technologies. Synthetically developed raw and other materials, with new properties and consumer qualities are being used to an ever greater extent in industry. Wasteless technologies are being extensively introduced. Organic waste and substitutes are being used to an ever greater extent in the manufacturing of valuable and save products.

The comprehensive use of coal replacing petroleum as a raw material in a number of basic chemical processes is the contemporary trend in chemistry. Extensive studies are being made for the development of highly effective technologies for coal hydrogenation and gassification.

Catalytic systems for the production of hydrogen from water are being intensively developed. Another promising method is the production of hydrogen through the utilization of microorganisms as biocatalysts.

Today chemistry and biology follow a number of directions leading to the discovery and application of new raw and other materials, new and varied power sources, increased agricultural productivity, and food production. It would be impossible to discuss them here profoundly and extensively. What is important is that chemistry and biology offer truly tremendous possibilities for the lasting and effective solution of a number of vital problems facing mankind.

Conditions exist in the Bulgarian People's Republic to ensure the further accelerated development of contemporary trends in chemistry and biology and accomplish the chemization of the national economy.

The results so far achieved offer a major prerequisite to this effect. In the Seventh Five-Year Plan a considerable share of the growth of output on a national scale will be the result of the use of chemical products--50 percent in agriculture, as much as 80 percent in light industry, and so on.

The party assessed at the proper time the new directions followed in chemistry and biology. Thanks to the measures taken and the concern devoted on Comrade Todor Zhivkov's initiative, major results were achieved in the development of chemical and biological catalysis and its application in a number of industrial technologies such as the production of synthetic protein, fungal mycelium, and others. Several highly rated new catalysts were developed and tested at home and abroad.

Close cooperation with the Soviet Union and other socialist countries in the chemical and biological sciences is being established.

The legitimate pride we feel from the results achieved do not lower our concern caused by some adverse trends in the development of the chemical industry. Assessed on the basis of the requirement of comprehensive chemization of the national economy and daily life, a number of items do not meet the country's requirements in terms of quality, quantity, and variety. The development of small tonnage chemistry and, particularly, the production of goods important to the national economy such as special polymers and copolymers, industrial rubber goods, paint components, selectively acting harmless herbicides and insecticides, and others, is lagging.

Currently our industry is applying a number of catalytic processes and using considerable amounts of catalysts. Despite the clear policy in this field and modern developments, the production of catalysts is falling behind requirements. Within a short time we must build the experimental-industrial shops for their production, planned as additions to the combines in Vratsa and Burgas. In the next five-year plan the full satisfaction of our requirements must be achieved.

Strengthening the engineering units of the economic organizations with a view to ensuring the accelerated development of engineering-chemical servicing of industry and chemical machine building, it is a major prerequisite for the development of catalytic chemistry. The extensive use of methods for modeling systems and parameters of chemical-technological systems will provide good conditions for the optimizing and comprehensive automation of processes.

In machine building, electronics, and electrical engineering chemization calls for broadening the variety of chemical products such as rubber goods, fuels, lubricants, anti-corrosives, galvanizing additives, polymers and dyes, metal ceramic goods, ferrites, pure metals, and others.

In the light and consumer industries chemization calls for enriching the raw material base of the textile industry with high quality synthetic and artificial fibers, improving the quality and structure of dyes and bleaching materials produced in the country, and expand the production of washing, cleaning, and auxiliary materials for industry and daily life.

Chemization in construction calls for increasing the production of polymer and ceramic materials, the development of new outdoor paints, insulation materials, concrete additives, and so on.

Agricultural chemization requires the increased production of new chemical fertilizers with a higher coefficient of utilization of active substances, selectively acting pesticides and microbial preparations maximally degradable within a single vegetation period, herbicides and stimulators, protein-vitamin concentrates, amino acids, enzyme preparations, and biologically active substances.

The further development of the biological sciences and the timely practical use of their results will provide conditions for the use of modern biological methods in the national economy. In this connection priority should be given to problems of the greatest importance to our country and, particularly, to studies in the fields of plant and animal physiology, biochemistry, genetics, and selection. New methods must be developed to obtain high yielding disease resistant cultivated plants possessing valuable taste qualities, and more productive vegetal and animal species and strains. Cross breeding must be applied ever more extensively in animal husbandry and breeding must be intensified.

Pharmacology must steadily develop new, effective, and low toxic preparations for disease treatment and prevention. The use of substances of chemical and vegetal origin which increase the ability to work and human endurance, attention, and memory must be increased in medical practice.

The importance of physiologically controlling human ability to work and react increases under contemporary production conditions. With every passing day physiology is becoming ever closely linked with the scientific organization of labor. That is why we must increase physiological research with a view to the better adaptation of the parameters of technical means to human possibilities.

Even such a short analysis unequivocally proves that chemistry and biology are the foundations of the rationalization of all national economic sectors, directly effecting their effectiveness and contributing to the multiplication of results along the entire social production chain.

5003
CSO: 2202

ACHIEVEMENTS IN MOLECULAR BIOLOGY, GENETICS OUTLINED

Sofia ZEMEDELSKO ZNAME in Bulgarian 5 Aug 78 p 5

[Article by Senior Scientific Associate First Grade Bogdan Bochev, deputy director of the Bulgarian Academy of Sciences Integrated Biology Center: "Power Progress Booster"]

[Excerpt] We, the workers on the biological front, welcome the decisions of the BCP Central Committee Plenum with particular joy and satisfaction also because, for the first time, biology has been entirely properly included in the basic strategic directions for the accelerated development of scientific and technical progress in the country. This is no accident. Under the conditions of building a developed socialist society and the contemporary scientific and technical revolution, the biological sciences will assume an ever greater importance in the development of production forces and the solution of basic social problems such as feeding the population, protecting human health, extending man's creative activity, enriching and upgrading the productivity of biological resources, and insuring the protection of the environment as an important prerequisite for human existence and the development of society, and so on. It is no accident that all worldwide forecasts depict a tempestuous development of biology starting with the very end of the present century, as well as its particularly important role in the development of the entire scientific front. In this respect molecular biology and genetics are allocated the main role.

In our country basic biology problems are developed by the Bulgarian Academy of Sciences Integrated Biology Center which consists of 16 scientific units employing over 650 scientific workers and about 1500 auxiliary personnel, working on 25 comprehensive-target problems. Consequently, the Integrated Biology Center bears the main responsibility for the implementation of biology assignments formulated at the plenum. As workers on the biology front, we are clearly aware of this responsibility and will dedicate all our efforts to decisively improving our activities and directing more firmly the efforts of the scientific cadre potential and the material facilities toward the accelerated qualitative solution of the strategic tasks assigned to us.

A study of our past scientific research activities has indicated that these strategic biology problems are included in our comprehensive coordination programs. Studies on a number of such problems are conducted in accordance with world standards and considerable achievements have been scored.

Thus, for example, enzymes and biological catalyzers possessing tremendous biological power and possibilities have been studied at the Institute of Molecular Biology. Considerable successes have been achieved in the study of the structures and functions of proteins, chromatin, and nucleic acids to clarify the molecular level of the basic mechanisms of their biosynthesis and their role in transmitting hereditary information. An anti-tumor preparation has been developed and is undergoing tests. Studies have been undertaken related to so-called "gene engineering," a particularly promising area of molecular biology through which, from enemies of man, bacteria may be transformed into his helpers and used to synthesize protein, ferments, hormones, antibiotics, vitamins, and others. On the basis of new contemporary methods for heterosis, experimental mutagenesis, interspecies and interstrain hybridization, polyploidia, immunogenetics, and others, the Genetics Institute has developed a large number of valuable types of different farm crops some of which have been extensively applied in production. The Plant Physiology Institute has developed and tested a large number of very effective bioregulators and stimulators which are being tested and applied. Particularly valuable results have been obtained by the Microbiology Institute based on developed methods for the cultivation of various micro-organisms (yeasts, bacteria, fungi) in a suitable environment for protein synthesis aimed at producing biologically active substances of microbial origin. Methods have been developed for the making of vital amino acids such as lysine, methionine, tryptophan, various antibiotics, and others. Major successes have been recorded in the field of immunology of multiplication and intensification of the breeding process in animals, sheep in particular. The use of this method enables us to obtain additionally about 60,000 to 65,000 lambs and about 1.2 million kilograms of meat annually. Considerable successes have been achieved by other Bulgarian scientific units as well in enriching vegetal and animal resources, waging a biological struggle against harmful insects, related to problems of parasitology and helminthology, the study and use of biologically active substances of vegetal origin, preservation of human health and increasing and extending man's capacity to work, upgrading the productivity of forest ecosystems, and others.

Regardless of our successes, however, we could boldly state that these achievements are far below the possibilities of the collective of the Integrated Biology Center. The plenum decisions make it incumbent upon us to review critically, yet once again, our problems and topics and make decisive improvements in their concentration, comprehensiveness, and purposefulness in order to resolve the indicated strategic scientific problems. Unquestionably, we shall have to pay greater attention to the accelerated practical utilization of our scientific achievements in order to increase their results and decisively eliminate bureaucratic and organizational weaknesses in this respect. Comprehensiveness in the solution of complex biological problems must be intensified in particular.

We are extremely aware of the great complexity and difficulty of the biological problems we are resolving and which face us. For this reason, in the course of our further scientific activities, we shall increase even further our scientific and technical cooperation with related institutes in the USSR and the other socialist countries and improve our integration with the scientific units in the country.

The collective of the Integrated Biology Center is confident that the decisions of the BCP Central Committee plenum will provide a powerful impetus in the development of technical progress in our country, including the more intensive development of biological sciences. It will dedicate all its efforts to the prompt and qualitative implementation of the tasks facing biology.

5003
CSO: 2202

LASER DEVELOPMENT IN BULGARIA OUTLINED

Sofia POGLED in Bulgarian 17 Jul 78 pp 1, 3

[Article by Velichko Semerdzhiev and Chavdar Georgiev: "The Laser the Ray of the Future"]

> [Text] The laser is a generator of electromagnetic waves that are characterized by a high degree of coherence, monochromaticity, high directivity during propagation, great power etc. It comes from the English, "Light Amplification by Stimulated Emission of Radiation."

The world's first laser was designed at the end of 1960.

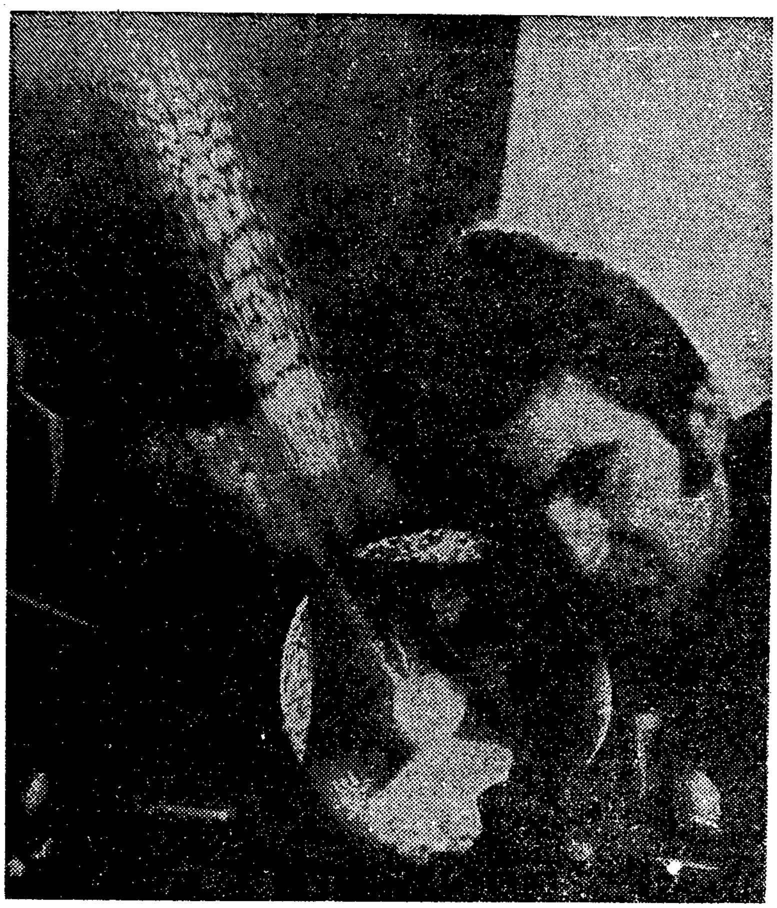
Ten years later two tenth-year students and one eleventh-year student of the okrug young engineers' station in Burgas, with the help of staff members of the Quantum Electronics Laboratory, are generating the first laser (solid-state).

We report this because even today many people are amazed at lasers. A number of publications overwhelm us with its colossal qualities and properties -- the laser can be used everywhere. Its participation in technological processes leads to a sharp rise in labor productivity; the reliability of output is increased and its qualities are improved.

Many branches of science are experiencing an acute need for the laser ray. With its aid, many assumptions and hypotheses receive a realistic and quite exact answer. The laser is successfully in use in medicine, meteorology, biology, in cancer and earthquake control and in dozens and dozens of other fields. We couldn't enumerate them all; it's impossible. And yet among quite a few people, distrust continues to persist at almost the same level. They cannot accept the laser and regard it still as utopian, while in many countries even the nipples of babies' bottles are perforated with a laser ray.

The capital city "Elektra" plant has been making microholes with a laser for two years now. Engineer Atanas Velikov, deputy director for production, tells us:

"It used to be a headache to drill two parallel holes of the order of microns. We tried drills, but they broke. Then we looked for another technique and found it by using the laser ray. It does a splendid job for us and now everything is going smoothly and precisely."



Postgraduate specialist Ognyan Dinev working with a liquid fuel laser in the Tunable Laser and Intrinsic Resonance Spectroscopy Laboratory of the Optics and Spectroscopy Chair of the Physicomathematical Faculty of Sofia University. -- Photo by Deyana Stamatova.

As a matter of fact, the parts needed by "Elektra" are processed at the Quantum Electronics Laboratory, which on 1 July 1978 became an independent chair of Sofia University's Physics Institute.

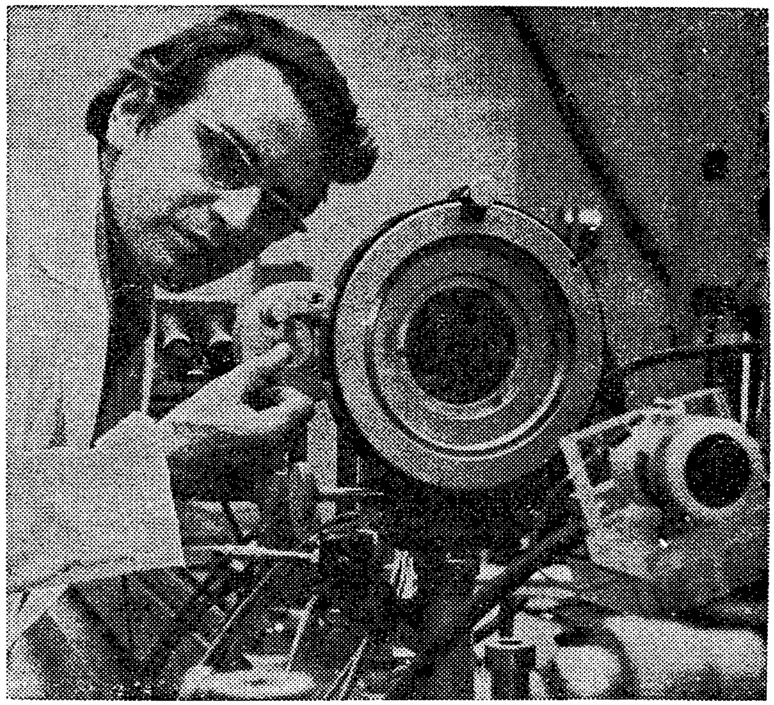
The laboratory was created in 1966 and is now the only place in Bulgaria where specialists in quantum electronics and laser technology (QELT) are trained, being a leader in research on the interaction of laser radiation with matter. The results of the chair's scientific research activity are reflected in a large number of articles, most of which have been published in a number of the most famous Soviet and foreign publications. Four patents have been recognized, and some of the experimental and theoretical work has been conducted for the first time in the world. The chair has developed or is preparing many manufacturing processes for the needs of our domestic industry. In order to introduce these, laser devices are being designed.

We asked Docent Konstantin Stamenov, head of the Quantum Electronics Chair, a few of the questions that face the chair and are important for its future development

[Stamenov] "Perhaps we ought to begin with our collaboration with Soviet scientists and higher educational institutions since we owe a great deal to their assistance. It began in 1966 when I was taking specialized training at Moscow State University in the newly formed, splendid collective of Professor R. V. Khokhlov, one of the greatest names in the sphere of quantum electronics and laser technology. The time I spent there helped me a great deal in setting up our laboratory. Since 1967 we have regularly sent postgraduate students to the USSR, and since 1970 we have had planned collaboration with MSU, taking the form of parallel research, the exchange of staff members etc. Many of the expensive and scarce laser elements are also made available to us by Soviet colleagues. Since the beginning of last year we have had a very good creative and scientific exchange with the Leningrad Institute of Precision Mechanics and Optics (LIPMO), and we are already engaged in joint study projects on specific problems. We are also receiving assistance in educational work."

[Question] "Our national economy needs specialists with a rich store of knowledge and skills. Are you satisfied with the level of instruction at the institute?"

[Stamenov] "The training of personnel in quantum electronics and laser technology began 11 years ago with the presentation of lectures in this field, and later also on the interaction of laser radiation with matter. A laboratory practicum in quantum electronics and group exercises are also provided, but this is still extremely inadequate. We need full and systematic training in the QELT field, but for that a separate category of "Laser Technology" has to be established under the "Engineering Physics" specialty. Our chair will continue in the future to train QELT specialists, postgraduate students and specialist trainees, and scientific research and applied activity will be increased."



Chief assistant, Candidate of Physicomathematical Sciences Lyubomir Pavlov of the Quantum Electronics Chair at the Sofia University Physics Institute tuning a laboratory laser device. -- Photo by Dimitur Kamberov.

[Question] "Speaking of applied activity, are there any problems in introducing laser technology into different sectors of industry?"

[Stamenov] "Bulgaria is now the equal of the rest of the socialist countries in scientific and technical development, but still lags behind in laser technology application. One of the basic difficulties is that laser technology is not sufficiently well known or popularized to be in demand by the enterprises. They prefer working according to 'established methods.' Very often we have to try to convince them that the future is with the laser, that it provides exceptional operational precision and reduces permissible rejects to a minimum. The specialists from our chair will have to stick to it if we are to have a hope that the proposed technology will be used in production. You understand yourself that it is difficult for us to go from enterprise to enterprise and ask: 'Beg pardon, but do you need us?' even though we do it. What is imperative is a change in the way of thinking and in the organization of laser technology application. The future demands this, and we have no right to lag behind because the results obtained thus far give us reason to believe that we can rank among the first countries in the world in laser utilization."

The creator of the first laser, Maiman, once declared, "When the question of the control of laser beams is solved and acceptable efficiency is provided, their use will be limited only by the imagination and inventiveness of the engineers."

There is no need to convince ourselves of the great advantages which the laser offers us in every field of science, technology and industry. This is indicated by many facts, most of which have long been known.

A place has been allotted for the development of QELT in the National Electronization Program. It involves the general growth of electronics, optics and other branches of science. A number of questions which are to be solved are targeted. On the other hand, the activity of the "customers" is still not up to the necessary level.

In quite a few enterprises where laser technologies would successfully solve many complex operations we observe inertia in their thinking and the marking of time with old methods and technologies.

The laser ray is the ray of the future, the ray that will solve problems in the most diverse spheres of science and technology, solve the secrets of nature, help man master a number of processes and, as they say in such cases, bring science fiction down to earth and make it reality. But this calls for interest and activity mostly on the part of the industrial enterprises, because the staff members of the Quantum Electronics Chair are always ready to help everyone.

6474
CSO: 2202

SUCCESSES, FUTURE TASKS IN COMPUTER DEVELOPMENT OUTLINED

Sofia IKONOMICHESKI ZHIVOT in Bulgarian 19 Jul 78 pp 1, 10

[Article by Engineer Zhivko Zhelyazov, director, Institute of Computer Equipment: "Both Successes and Problems to be Resolved"]

[Text] Computers represent a strategic direction followed by our economy. As a result of the decisions of the BCP Central Committee and the fraternal aid of the Soviet Union, our country has become one of the big producers of computer equipment. Its development is based on the all-round and intensifying international cooperation in scientific research and development among countries cooperating within the Intergovernmental Commission for Computer Equipment.

International cooperation does not save time only. The develoment of an essentially new form of cooperation is even more important. Great successes have been achieved in the eight years since the creation of our electronic industry. The Integrated Computers System (ES EIM) was created and 160 systems devices were developed.

Extensive Offensive of the Strategic Subsector

Three years ago the new minicomputer system (SM EIM) was created. Our country is one of the major partners in the elaboration and manufacturing of this system.

All activities related to computer equipment production are focused in the IZOT DSO [State Economic Trust], while the Institute of Computer Equipment is in charge of basic development.

According to our rating procedure about 67 percent of the production of computer and management equipment meet or are above the average world standards.

The technical level of output is determined by the nearly virtual renovation of a variety of goods every four years.

Production concentration, based on internal specialization, is directly reflected in the effectiveness, quality, and technical standard of technologies and goods.

Bulgaria has specialized in the production external magnetic memory systems, ES and SM series processors and systems, systems and means for remote control processing, operative memory systems, magnetic disc packets, and others.

Our institute and plants are proud of the ES 1022B system and its development in to the ES 1035 system, the ESTEL 2 system, disc and tape memory systems, disc packets and the ES 3003 data preparation system, the ELKA 240 electronic calculator, and the IZOT-9110 U management system.

The launching of a broad offensive along the front of microcomputer systems is on the agenda. The basic method in their development is the application of the module principle of systems development which leads to considerable multiplication results. Suffice it to mention that on the basis of five modules and through programming and microprogramming alone 11 problem-oriented systems are being developed. The successes of our specialists have been confirmed by the growing interest in the output of the IZOT DSO and the positive rating of all our goods subjected to international tests mandatory for ES and SM EIM. That is the reason for the high effectiveness of the institute's work. In the past two years returns per leva expenditures for applied science activities have equalled 8.27 leva.

The close interaction between the plants and the institute is an important factor in the successes achieved by our sector. This tie is achieved through comprehensive programs, joint planning with plants, and participation of plant specialists in developments and of institute specialists in the manufacturing of test series.

The experience we have gained in the course of our joint work with the plants indicates that application time is being reduced if plant specialists actively participate in the work at the initial stages when certain designs and technological requirements are defined in advance, combined with activities inherent in latter stages.

Use of Targe Programs

Substantiated planning and the need for the plant to face development and for the institute, application is a basic requirement for faster utilization. Formalism and a bureaucratic attitude in terms of the process are incompatible on either side and its separation into "development" and "application" is faulty.

The five-year plan slogan of high effectiveness and quality sharply raised the question of production returns, particularly in the technological plans.

The management of the Ministry of Electronics and Electrical Engineering, the IZOT DSO, the Institute of Computer Equipment and the Magnetic Discs Plant in Pazardzhik undertook to resolve the problem of drastically upgrading the quality and effectiveness of magnetic disc packets.

This problem of exceptional economic and political importance could be resolved only through the adoption of a comprehensive approach covering technological, economic, and organizational-technical measures. A comprehensive target program, elaborated and managed personally by the minister of electronics and electrical engineering, was born as a result of the creative search for a solution to the problem of increasing returns. It covers the period through 1980. According to the program the emphasis in terms of returns was scheduled for 1977. This was the decisive period and the testing stone improving the expediency and effectiveness of the program.

Achieving total integration between the Institute of Computer Equipment and the Magnetic Discs Plant, the managements of the two organizations created the organizational prerequisites for the fulfillment of the returns program.

The results of one year of work within the framework of the comprehensive target program are the following: An 80 percent increase in social labor productivity; doubled volume of output, doubled profits, and a sharp increase in quality. The need for an effective comprehensive approach to the solution of production problems was confirmed through practical experience.

Problems Triggered by Accelerated Development

Naturally, such a dynamic sector would have problems to be resolved.

Our international successes in the production and export of computer equipment clashed with our limited development potential. For example, the output per development worker in our country is far greater compared with the other CEMA-member countries. This entails the danger of loss of positions in the near future. We are short of developers of technical and, particularly, program facilities. A solution to this problem could be found only through the establishment of branches in the country, above all dealing with peripheral equipment and remote control devices. The transfer of a number of problems related to the modification of the items and of technological equipment would enable the institute to speed up the pace of development.

Despite the great successes achieved we can not state that no problems exist related to the quality of the goods. In this respect a solution may be found only through the development of modern tuning, intermediary control, and final testing systems with the help of computers. Our accomplishments so far have been insufficient. Our specialists know how to and can cope with this problem. Relying on imports from leading companies is neither possible nor economically substantiated. They are virtually unwilling to sell their secrets. Even though adequately equipped, our plants must be saturated with "intelligent" technological and control facilities.

Another major problem is that of labor productivity and, hence, of production costs. Frequently tens of workers in our plants are concentrated on performing identical and routine operations. Let us mention mass operations such as the coiling of so-called shelves and wiring. The IZOT DSO and the other trusts within our ministry employ hundreds of workers even though this is taking place in a period of conversion to robots. Naturally, we have great possibilities for upgrading labor productivity. This is a debt which Bulgarian technological thought owes production workers.

Are Reserves Used?

Engineers in the plants are used inefficiently and outside their fields. They are the main reserve in the battle for plan fulfillment. Yet, is it proper to use them so extensively to resolve tactical problems rather than strategic, i.e., in resolving problems related to quality, automation, and new items? Our plant colleagues have long proved that they are as good as the institute's specialists. However, they are not offered opportunities consistent with their skills and knowledge to engage in truly creative work.

We frequently speak of shortening the "research-application" cycle. In our country it lasts from two to three years. However, as long as the problem of supplies for development activities and the manufacturing of test series remains unresolved, it could be hardly reduced, the more so since with every passing year developments are becoming ever more complex and labor intensive. Naturally, the automation facilities used make it possible not to worsen this cycle. However, possibilities exist even though small.

Yet, greater possibilities would exist by adopting a new approach and speaking of a "idea-research-application" cycle. In our country many ideas are kept in the pre-planning stage for two or three years and only then do we undertake their implementation. Again, the limitations are due to the inadequate development potential. The economic results of the fast implementation of a fruitful idea would be high. For example, the idea of developing a ES 9003 data preparation system took shape over five years ago and was developed in a single year. It will find a practical application in less than one year. The loss of two to three years at the "idea" stage is obvious. Similar examples may be found in any scientific research institute.

Our activities in the field of scientific research based on a coordinated international plan are insufficient. Effective cooperation with higher educational institutions and the Bulgarian Academy of Sciences would benefit our country. Unfortunately, both in this area and in the field of direct development our relations are largely symbolic. The coordination of our plans still remains beneath all criticism with following results: The application organizations have many assignments not included in the plan for reasons of resource availability. Meanwhile, our colleagues in the Bulgarian Academy of Sciences and higher educational institutions are resolving problems whose multiplication effect remains very modest. Naturally, the fault here is reciprocal and the State Committee for Science and Technical Progress has a great deal of work to do.

Possibilities exist for resolving problems related to a practical development potential. However, we must increase the facilities of the institutes. An acceptable solution must be sought.

Our knowledge and efforts are needed to the country. We shall provide them with the awareness of fulfilling our duty to the party and the people.

5003
CSO: 2202

NEW SCIENTIFIC ELECTRONIC MEASURING DEVICE DESCRIBED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 2, 1978, pp 82-83

[Descriptions of new equipment]

[Text] Radiophysical Apparatus for Scientific Research at Superhigh Frequencies

The Bulgarian Academy of Sciences Institute of Electronics has developed a waveguide for an 8-12 gigahertz range for scientific research and the building, maintenance, and repair of official superfrequency installations. The apparatus was successfully demonstrated in several exhibits domestically and abroad.

An orginal design of a waveguide dialectric phase regulator was developed for tuning and precision studies in the centimeter wavelength phase, suitable for smooth changes in the phase within the 240° range with a typical five decible crosstalk attenuation and bilateral coordination with a standing wave coefficient lower than 1.1. The instrument is protected by an authorship invention certificate.

A new resonant frequency meter design has been developed for frequency control and measurement, covering the 8-12 gigahertz range. The cylindrical resonator of the instrument is tuned with the help of a micrometrically moved tin connected to a spiral gauge directly graduated in gigahertz for frequency readings. The scale, approximately two meters in length, ensures the high division capacity of the instrument within the entire frequency range.

A new magnetically controlled waveguide combination using semi-conductor elements has been developed. Based on Hall's galvanomagnetic effect of the semi-conductor, the system operates as a controlled deviation of superhigh frequency energy and may be potentially used in the superhigh frequency diagnosis of the physical properties of semi-conductor substances.

A magnetically controlled ferrite key with two stable conditions has been developed for directing, deflecting, reflecting, or letting through superhigh frequency energy. A tetrohedrite waveguide compound with a coaxially located ferrite cylinder, magnetized along the axle, has been used in the instrument. The ferrite key has a 0.5 decibel crosstalk attenuation and ensures an insulation in excess of 45 decibels.

Electronic equipment for measuring, transforming, and controlling superhigh frequency signals has been developed, ensuring greater measurement effectiveness in scientific research. The automatic reflector is used for direct measurements of the reflection coefficient and of superhigh frequency systems within the 0.01-1 range. The instrument has two signals proportional to the amplitudes of the incident and reflected wave, processed through originally designed electron analogue circuits using the Hall effect for dividing and extracting square root. Another electronic instrument is the superhigh frequency multimeter for the direct measurement of the abatement coefficient of up to 40 decibels, the standing waves coefficient for up to 100 (with a possibility for an extended scale from 1 to 1.25) and a reflection coefficient of up to 1. Four authorship invention certificates granted the institute's associates have been used in the development of both electronic instruments.

Parametric Superhigh Frequency (SVCh) Amplifier

The Institute of Electronics has developed a low-noise parametric amplifier distinguished by its low noise level, broad dynamic scope, small dimensions, and high reliability. The installation of a parametric amplifier in a radar receiving system substantially improves its indicators and increases the detection range by 20-50 percent. Parametric input amplifiers are also used in long-range space communications systems.

The pump oscillator is solid (with a Gunn diode or multiplier). This greatly increases the overall reliability of the entire system--parametric amplifier, pump oscillator, and feeding block. Trouble-free running ranges from 10,000 to 30,000 hours.

The following indicators have been reached within the SVCh centimeter range:

Amplification coefficient, 15-20 decibels;

Noise coefficient, two-three decibels;

Frequency band, one-two percent; if necessary it may be broadened to five percent.

The temperature stabilization of the system has been achieved, thus substantially improving its indicators for stable work within the 5-50° C temperature range. Laboratory and practical tests have indicated the high effectiveness of the device.

5003
CSO: 2202

MKF-6 MULTISPECTRAL SATELLITE CAMERA DESCRIBED

Leipzig LEIPZIGER VOLKSZEITUNG in German 22/23 Jul 78 p 10

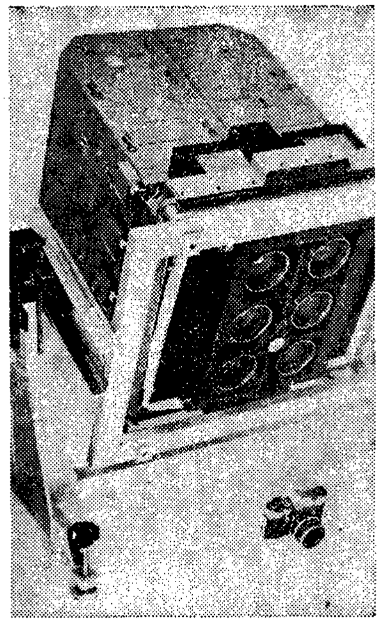
[Article by Hans Ronneburger: "MKF-6 in the Service of Earth Exploration"]

[Text] The MKF-6 multispectral camera constructed by VEB Carl Zeiss Jena has already been in use for more than 300 days on board the Salyut 6 scientific orbiting station. It has proved itself extremely well in continuous operation, according to the 10 cosmonauts who have worked with it up to now on board Salyut 6. In contrast to the MKF-6 used on Soyuz 22 in September 1976, the modified model for long-duration flights contains two copies of some electronic and mechanical parts, so that it is possible to switch to a back-up unit if necessary.

The camera is completely in the service of earth exploration from space, which plays an especially large part in the program of the greatest Soviet space flight effort to be made in a long time. At the recent COSPAR meeting in Innsbruck, experts from all over the world were able to see for themselves the quality of the photos "shot" with the MKF-6 from earth orbit. "The pictures of calving icebergs, steppe and brush fires, oil beds, mountains, and sea canyons were very sharp and of great esthetic value," wrote DPA [German Press Agency].

Multispectral photography is at present the most modern and efficient method of remote earth exploration. This method makes use of the fact that various objects on the earth, because of their physical properties, reflect or absorb incident light differently. Thus the individual materials stand out in different colors.

The MKF-6 photographs an object sumultaneously in six spectral channels -- two in the infrared region, and four in the visible region. Since visual interpretation of the pictures obtained in this way is extremely difficult, the individual frames are recombined in a purely optical fashion into a single picture, using a color mixing projector also developed by VEB Carl Zeiss Jena. The strongest possible contrast between different objects is then obtained through appropriate filters -- so that, for examples, woods appear red and crop lands green, or water surfaces yellow. This is called false color photography.



The MKF-6, constructed by VEB Carl Zeiss Jena and used on the Salyut 6 scientific orbiting station. This camera underwent its baptism of fire in the Soyuz 22 spacecraft. Since then, its mechanical parts and electronics have been improved.

During the first use of the MKF-6 on board Soyuz 22, previously selected areas of the USSR and the GDR, covering an area of 50 million square kilometers, were photographed. In five minutes, the camera delivered as much information as an aerial photography plane could produce in two years of continuous use.

A space photograph covers large areas and thus has the information content of 1500 to 3000 aerial photographs. Possible distortions due to the motion of the spacecraft are prevented by a special control system for the camera.

By means of the MKF-6 on Soyuz 22, 60 problems were solved in the fields of geology and geography, vulcanology, agriculture, forestry, fisheries, harbor management, water conservation, and environmental protection. Specialists were able to extend their maps of the Pamir-Altai with 79 previously unknown glaciers. Among the objects photographed were the volcano belt between the Okhotski Sea and the Chukchi Peninsula, the BAM, and the giant forests of Siberia and the Far East.

8429
CSO: 2302

EAST GERMANY

BRIEFS

DEVELOPMENT OF NEW COMPUTER--The development work on the "ES-1055" electronic data processing unit, the main product of the Robotron Combine State Enterprise for the coming years, has been nearly completed. The tasks for moving into production are progressing according to plan. The prototype of this system's core unit, the "Robotron ES-2655" central processing unit, has proved itself in tests by this major producer of electronic computing and office machines. The "ES-1055" unit is part of Series 2 of the family of universal equipment in CEMA's long proven uniform electronic data processing system. As a unit in the medium performance class, it attains a maximum speed of 450,000 operations per second. In the future it will perform tasks from planning to accounting in science, industrial production, health services, transportation, finance and other sectors. As a result of close socialist economic integration, the "ES-1055" can be used with punch cards and magnetic tape as well as storage and character devices and printers from the Soviet Union, Poland, the CSSR and Bulgaria. [Text] [East Berlin NATIONAL-ZEITUNG in German 4 Aug 78 p 1]

CSO: 2302

NATIONAL ATOMIC ENERGY COMMISSION REDEFINED

Budapest MAGYAR KOZLONY in Hungarian No 41, 4 Jul 78 pp 429-430.

[Resolution 1023/1978 (VII 4) issued by the Council of Ministers]

[Text] The Council of Ministers determines the mission, jurisdiction, organization, and activity of the National Atomic Energy Commission (OAB) as follows:

1. The OAB shall advise the Council of Ministers on questions involving the peaceful use of atomic energy. It shall also be the coordinator, executor, and controlling organ of official tasks.

2. In its consulting and advisory role the OAB shall:

--observe the general trends of domestic and foreign progress in the use of atomic energy. Based on these, it shall prepare informational materials, studies, and proposals for the decisions of the Council of Ministers and other organs;

--evaluate the proposals of the ministries and other organs on the national level on peaceful uses of atomic energy;

--help in the execution of economic tasks concerning peaceful uses of atomic energy. It shall also help in the preparation of development programs that touch on several branches [of the economy] and support scientific research and development activities associated with these programs;

--initiate the creation and development of an industrial background [infrastructure] necessary for the peaceful uses of atomic energy. This includes the issuance of rules and regulations.

3. In its coordinating role the OAB shall coordinate:

--the creation, start-up, operation, alteration, and shutdown of facilities connected with the peaceful use of atomic energy;

--the manufacture and import of such facilities;

--the production, use, storage, and transport of fissionable and radioactive materials;

--radiation protection and nuclear security;

--all those activities that are under the jurisdiction of ministries and national organizations in this area.

4. In its executive role the OAB shall:

--determine the tasks arising from Act 12/1970 concerning the spread of nuclear weapons and from Act 9/1972 that codifies the agreement between the Hungarian People's Republic and the International Atomic Energy Agency covering the safeguards against the spreading of nuclear weapons;

--prepare a system for the registration and control of nuclear and radioactive materials for the country;

--determine conditions for the installation, start-up, and operation of nuclear critical systems, research and educational atomic reactors, particle accelerators, and other experimental facilities and storage facilities.

To carry out the executive and controlling tasks, the president of the OAB, with the consent of the ministers and the executives of other national organs, shall appoint and use appropriate research institutes and other entities.

5. In its controlling role the OAB shall follow:

--the use of peaceful applications in the economy;

--the execution of rules concerning atomic energy.

The OAB--in the course of its controlling function--can examine, or ask information from, organs concerned with the peaceful uses of atomic energy.

Based on the findings during its controlling function, the OAB shall initiate actions and call on the leaders of ministries, national organizations, and other organs to modify the rules as necessary and report on its experiences to the Council of Ministers as needed.

6. The OAB shall be in contact with the international and regional organs that are concerned with the peaceful uses of atomic energy. In its area of jurisdiction it shall build and maintain bi- and multilateral international contacts. It shall coordinate the domestic work arising from the international obligations.

7. The OAB, in the course of its duties, shall closely cooperate with the ministries and national organizations concerned with peaceful uses of atomic

energy. In foreign policy it shall act with the consensus of the Ministry of Foreign Affairs.

8. The OAB shall consist of a president appointed by the Council of Ministers, vice presidents, experts appointed by the ministers of Interior, Health, Defense, Metallurgy and Machine Industry, Foreign Affairs, Heavy Industry, the presidents of the National Technical Development Committee and the National Environmental Protection and Nature Protection Office, and the secretary-general of the Hungarian Academy of Sciences, and experts appointed by the president of the OAB.

9. The professional consulting organ of the OAB is the Technical Scientific Council. Its president and members are appointed by the president of the OAB.

10. The business of the OAB is carried out by an office directed by the president of the OAB. Its manager is the secretary of the OAB. The office operates as independent budget item in the National Technical Development Committee budget.

11. The by-laws of the OAB shall be determined by itself. The by-laws of the Technical Scientific Committee and the organization and operating rules of the office shall be determined by the president of the OAB.

12. This decision is effective July 1, 1978. Simultaneously, paragraph 1 of Rule 10/1964 (V. 7), Council of Ministers, (Radioactive Materials and Preparations) which determined the tasks of the OAB, and Rule 2015/1968 (VI. 4), Council of Ministers, concerning the tasks, jurisdiction, organization of OAB, are obsolete.

Gyorgy Aczel, [signature]
Vice President of the Council of Ministers

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HUNGARY

HEAD OF PATENT OFFICE DEPLORES WASTE OF CREATIVITY, INVENTIONS

Budapest ELET ES IRODALOM in Hungarian 8 Jul 78 p 5

/Interview with the Chairman of the National Patent Office, Emil Tasnadi: "Are We So Wealthy"/

/Text/ In the past two or three years more and more newspaper articles, radio and television reports and interviews have dealt with the fate of innovations and inventions and with the years and decades long senseless tribulation of many inventors of patents of national and even world-wide significance. In last week's issue of ELET ES IRODALOM, for example, Andras Mezei embarked on a debate stimulating article. We are discussing this same theme with one of the most appropriate experts, the Chairman of the National Patent Office, Emil Tasnadi.

/Question/ In your opinion, is the increasingly urgent voice of those seeking to publish information and urge action on this theme justified?

/Answer/ I have been chairman of the OTH /National Patent Office/ for 20 years. I have 2½ years to retirement, and it is my intention to step down at the age of 60. In the time remaining to me I shall attempt to put my expertise here gained to good use. I would like to conclude my employment with a clear conscience. On my desk right now is the outline of the report I am preparing, in which I am endeavoring to convincingly lay down the experiences, and in many respects, the serious problems of the Hungarian innovation and invention movement.

/Question/ Is it necessary to rehash in yet another report the 3 decades long, results and disquieting characteristics of the movement which is so extremely important to the people's economy, and which represents hundreds of thousands of splendidly prepared specialist?

/Answer/ Our country's economic situation and the possibilities and tempo of its further development are determined primarily by concrete conditions and necessities. Today foreign trade provides 45 to 50 percent of our national income. In addition, an imposing portion of our foreign trade is realized in capitalist countries among the harsh conditions and merciless laws of the capitalist market, where the scientific-technical revolution often produces frightening surprises. Thus, if we wish to remain in this market and indeed to further strengthen our present position, then we must plan and manufacture in a modern way; namely our products must be modern. This then is one of our most important concrete needs and a condition of today's world market. To meet these demands we need more and more technical innovations, scientific and technical solutions--namely, the innovationg man, the thinking participant in production work, and even more, the one who is able to contribute to the modernization of Hungarian industrial products through discoveries of national and world-wide significance. This type of man should be appreciated many times over in our era. A second possibility for making our products competitive is the continuous purchasing of licenses for foreign discoveries...

/Question/ I beg your pardon, but is it necessary for you to relate this, or rather write this down anew? Are these not commonly known facts, basic knowledge acquirable by regular reading of daily newspapers, and are the conclusions and actions derivable from these not obvious?

/Answer/ They should be! While it is true that many know more or less enough about the objective necessities, but even these know less about the subjective conditions, about the human side of this problem area. Let me mention here just one, although not insignificant detail. In Hungary today, in scientific research institutes, 81,000 men are working with an expenditure of 14 billion forints. But if we examine the intellectual presence of the 35,000 who are actually involved in national economic production planning, we can perceive a very disappointing picture. It is astonishing with how much of a clash the objective national necessities and subjective interests collide.

/Question/ What is the cause of this?

/Answer/ The formation of an economic atmosphere in which it is not absolutely necessary for the scientific researcher to produce modern endeavors, technologies. Truly creatively characterized cooperation is not required because the innovator, the man desiring to change the routine could disturb the tranquility of the comfortable chiefs of many work places.

/Question/ How could this astonishing waste of our intellectual resources become a practice?

/Answer/ There are still today unselfish, dedicated people who love their work, but their type is exceptional and rare. There are more of those in whom it would be worthwhile to research the direction and reason for the general and economic atmosphere's turning their heads.

/Question/ In the September 26, 1976 issue of "Magyar Nemzet" in an analysis of a work by Dr Ferenc Korma entitles "Broad Life Through the Socialist Method", Erzsebet Toth wrote: "...The 11th MSZMP Congress raised to the rank of a resolution a standard of living program which strengthens the socialist fundamentals of life style. What results can we expect from the formation of the socialist model? The increase in the population's contentment, culture and sensible discipline, and thus the increase in human and social security. The liberation of energies which will multiply the country's greatest treasure--industriousness and creativity. We do have a need for this since Hungarian national products appearing on the foreign market have lost more than a quarter of their value in a year and a half. We cannot wait or procrastinate..." Should we not be concerned that this tendency has since become stronger?

/Answer/ In my opinion a country's technical development is characterized by certain numbers: annually how many discoveries suitable for patenting are created and how many foreign patent licenses are purchased. These indicate with sufficient reliability how far a certain nation has gotten in relation to the world level. In the international statistics of these indicators, Hungary stands at the rear of the moderately developed nations group. In the first group of nations, those registering more than 50,000 patents, are the United States, the Soviet Union, Japan, the FRG, Great Britain. In the next group, for example, are listed: France, Finland, Romania, Yugoslavia, Argentina, India, Czechoslovakia. Among the middle performance nations are: Belgium, Ireland, Luxembourg, Iran, Hungary, Portugal. In the last category I will mention Algeria, Uruguay, Cuba. If we compare the relative number of patents to population, then the picture for us is even more disheartening. Also disappointing is the fact that in the international sphere we are among those who acquire the least number of licenses. For example, Czechoslovakia purchases 10 times more licenses than we do.

/Question/ The absolute and relative data regarding the annually recorded patents in our homeland are truly disheartening. But does it follow from this that we have insufficient intellectual strength to be capable of much more? Surely it is also well known that many of the accepted patents are not utilized, nor recognized sufficiently expeditously by industry and foreign trade.

/Answer/ Of the annually recorded patents approximately 70 percent reach fruition. But I repeat that this is very slight. To demonstrate this, the following data regarding recorded patents is cited:

	1950	1976
Hungary	1853	2647
Romania	58	4650
Poland	1308	8805
Soviet Union	32,500	132,855

Thus we can state that we have greatly fallen behind in the dynamism of technical discoveries. How do we stand with the famous Hungarian intellectual capacity? I have already mentioned that 35,000 scientific researchers are operating in our homeland. That is what they are called. But very many of these have as their highest endeavor only the acquisition of the scientific label: the degree of candidate or doctor. We must admit that in international statistics on scientific degrees Hungary can be found in the leading group.

/Question/ What kind of intellectual accomplishment is behind these degrees?

/Answer/ Candidate and doctoral dissertations and a multitude of publications. But new ideas useful in technical life and applicable to production are very few.

/Question/ Did not the unfavorable conditions which developed around inventions and technical innovations lead to this indolence? The editorial in the March 17, 1977 issue of "Nepszabadsag" revealed Patent Office data according to which 6 out of every 1,000 of our scientific researchers have patented discoveries. Six out of every 1,000. Could it be that a researcher is satisfied, let us say, with the monthly 500 forints for a candidate degree, or the 1,000 forints for the doctorate?

/Answer/ Which, of course, the recipient of the title receives until his retirement, even if he never discovers anything new! Many are lured by the number of publications, even when most of the time, as follows from the facts mentioned earlier, these contain no scientific-technical innovation. But as long as in the acquisition of a scientific degree the number of published articles counts more than a genuinely useful new idea, the minds and interests of many researchers will turn toward publication. These factors have contributed to the indolence.... Let us compare the situation of our researchers with that of their colleagues working in capitalist countries. In a capitalist factory, in the research institute of a capitalist entrepreneur, something useful in the field of science or in industry must be produced first, then follows the scientific rank, title, prestige and higher pay. With us, the situation is the reverse, and it fails to stimulate.

/Question/ Are we so wealthy that we can permit ourselves this?

/Answer/ It appears so.

/Question/ What we have so far been discussing we have been aware of for 10 or 15 years. How is it possible that we have not progressed further in the solution, in the pressing of extremely urgent changes?

/Answer/ In our economic life we distinguish two schools of thought According to one, our economic situation is good, even excellent, but there are too many of those who cannot live with the possibilities. According to the second opinion, I include my own here, almost every sector of our economic life, every stimulating system is well intentioned, properly directioned, but it happens that many of its effects are negative.

/Question/ Do you not occasionally get the feeling when examining an unbelievable case that perhaps work discipline and organizational ability, as well as common sense have been suspended at many work places?

/Answer/ What I often felt could be so described.

/Question/ The June 19, 1977 issue of "Eszak Magyarorszag" published a conversation with you. Permit me to quote from this the following words: "In many places it truly seems that innovations are handled at most as unnecessary fussing. I believe that in the background, human vanity and jealousy lurk, the vanity and jealousy of those who for some reason could not, or were not able to create the new. Of course no one admits this, but the jealousy is still operating, and naturally a good sounding explanation is always at hand. If I were talking about discoveries as well as innovations, I could cite many exasperating, shocking examples.... To my knowledge, not a single inspector has found fault with the failure to install some significant innovation, or with installation so circuitous as to have resulted in many millions of forints loss.... The result of the process is that the value of intellectual products is devalued, and that no one takes proper care of these valuables. A half kilo of nails must be accounted for, but not the fate of an innovation promising a profit of a million...."

/Answer/ Unfortunately, this is still true today.

/Question/ In that interview you discussed innovations worth only millions. Let me mention here the polygon lathe patented by Karoly Gellert in 1968. The professors at the Heavy Industry Technical University have calculated that if only a portion of the annually produced lathes in Hungary were manufactured as polygon lathes, it would bring an annual profit of a billion forints to the people's economy. But in ten years this patent of worldwide importance could not become the sensational item of Hungarian export, could not become a great business item. Are not the jealousy, vanity, indifference and even obstruction unforgivable and intolerable? Even the contract which the SZIM /Machine Tool Industry Works/ made with the inventor last summer can hardly be taken seriously.... But I could mention as other examples the history of quite a few outstanding patents which turned into horror tales. Should we not scream for common sense when we list these?

/Answer/ We must urgently investigate where the problem lies. /Is it/ in the people who should be creative at their places of employment. In the leadership, who should manage their intellectual resources sensibly and courageously? Or perhaps /is it/ in the economic or human circumstances? Is there a problem with our subjective or objective faculties? The two blades of the scissors are too wide open. They are not sufficiently moveable, perhaps because the rust of indifference and irresponsibility have begun to eat them away.

/Question/ The fate of many of our inventions and the indolence of our technical life and scientific research institutes appear to be rather disheartening. Perhaps they do not feel the stimulus of constantly accelerating time as if they were not aware that in the capitalist countries in many branches of industry such as in electronics for example, the /state-of-the-art/ life expectancy of individual inventions has been reduced to 2-4 years, because newer solutions are forcing them out so much so that many inventions today are not even protected by patent rights because of rapid obsolescence. But similarly tough competition is taking place in other branches. How can we come forward on the world market with exciting new scientific, technical innovations which attract new customers if the transition time of our discoveries is so long that most become obsolete in the meantime, or are outstripped by foreign researchers?

/Answer/ There are two possibilities. Either we take the blame for our errors and neglects, and examining our situation, in many cases for opposition arising from personal interests, vanity and jealousy, act more resolutely and quickly, or we shall receive such blows on the nose in the world market as to wake us up to the necessary steps: the utilization of more modern methods.

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HUNGARY

BRIEFS

NEW TRITICALE HYBRIDS--The latest triticale hybrids are being cut and evaluated ear by ear. Findings to date reveal that the new types of triticale have withstood inclement weather: between 100 and 110 kernels came to fruition in the span-long ears. This would be indicative of yields of 90-110 quintals per hectare. This year the grain research institutes of all CEMA countries have established special test plots for triticale the seed stock of which came from Hungary. Within CEMA, Hungary is in charge of the coordination of the improvement of triticale. [Budapest MAGYAR MEZOGAZDASAG in Hungarian No 30, 26 Jul 78 p 3]

SUSTAINED RELEASE FERTILIZER--The sustained release chemical fertilizer recently developed by the Pet Nitrogen Works nourishes the soil for half a year. Experiments show that the active ingredient in the granulate is released evenly throughout the entire growing period. [Budapest MAGYAR MEZOGAZDASAG in Hungarian No 30, 26 Jul 78 p 3]

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END