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East Europe Report

SCIENTIFIC AFFAIRS

No. 764

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BULGARIA

RESEARCH WORK IN FIELD OF NUCLEAR PHYSICS DESCRIBED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 3, 1982 pp 16-24

[Article by Prof Zhelyu Zhelev and Senior Scientific Associates Vasil Khristov and Nataliya Yaneva: "Nuclear Physics Research in the Field of Low Energy in the Bulgarian People's Republic"]

[Text] Currently research in low energy physics is conducted in the following Bulgarian centers: Institute for Nuclear Research and Nuclear Power Industry (IYAIYAE) of the BAN [Bulgarian Academy of Sciences], the Nuclear Physics Chair of Sofia University, and the Nuclear Physics Chair of Plovdiv University.

The basic systems for these studies are the following: the IRT-2000 research nuclear reactor, which has been in operation for the past 20 years; the ILU-4 ion implanter, and neutron generators. A number of instruments have been developed for nuclear physics and neutron-physics measurements, such as magnetic beta-spectrometers, a bicrystal neutron diffraction meter, semiconductor spectrometers for gamma rays and beta and alpha particles and splitting fragments, a Mossbauer spectrometer, a scintillation spectrometer for fast neutrons, a diffusion and streamer chamber in a magnetic field, the Romashka multi-section scintillation gamma ray detector, a gamma-gamma correlation spectrometer, and others. Detection electronic devices have been developed, including some within the KAMAK system. The automation of the gathering and processing of experimental data are taking place with the help of small I-1001 EIM-TRA computers, two IZOT 310 machines, two M6000 machines, one ES-1020 and various types of analyzers.

Our scientists are convinced that this experimental base is extremely insufficient. In recent years problems of its further development, updating and automation have been actively discussed. A reconstruction of the nuclear reactor, its increased capacity and updating of its experimental possibilities have been undertaken. The decision was made to undertake talks on the procurement of a U-250 heavy ion accelerator from the USSR. A base is being laid for the production of modules within the KAMAK system and microprocessor systems for the automation of the nuclear physics experimentation.

Highly skilled cadres are at work in the field of low energy nuclear physics in Bulgaria, trained mainly at the Joint Nuclear Research Institute in Dubna and in a number of top institutes in the USSR and other countries.

I. Experiments With the IRT-2000 Reactor

Research in the physics of splitting heavy nuclei is a traditional line which has been developed for many years both independently in Sofia as well as in cooperation with the Joint Nuclear Research Institute (OIYAI) in Dubna and the I. V. Kurchatov Atomic Energy Institute (IAE) in Moscow.

An experimental method was developed on the basis of the double impulse ionizing chamber with grids. The processing of the experimental data is accomplished with a small computer related to the chamber electronic system. Correlated mass and angular breakdowns of the fission fragments are obtained.

The correlation between the photographic breakdown sections into 232 Th, 235 U and 238 U from energy in the 6-9 Mev interval was studied on a specialized channel of the reactor, especially equipped for obtaining quasi-monoenergetic gamma rays through the use of threshold reactions, with an ionizing camera. The same correlation for 239 Pu was measured with glass for the first time in the world (Figure 1).

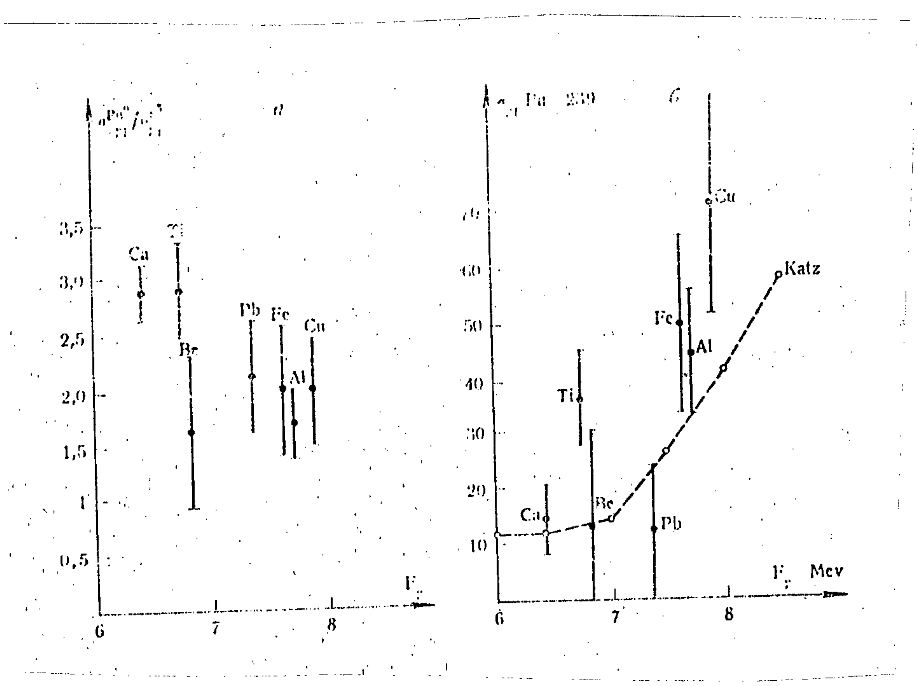

Fig. 1. a. Ratio among sections of photofission of 238 P and 235 U;
b. Correlation between the photofission section of 239 P and energy. The dotted line indicates the results of other authors obtained through the chopped radiation.

The ionizing method is also used in correlation measurements of mass and angular breakdowns of the fragments of the fission of 238 U of the neutron beam (energy 1.6 Mev) of the accelerator at the Fission Physics Laboratory of the I. V. Kurchatov IAE. Experimental data were obtained of 700,000 acts of fission, which are being processed.

Work on measuring and assessing neutron constants of the fissionable nuclei are the natural extension of such studies. This is necessary in the computation of fast neutron reactors, made within the framework of cooperation among CEMA-member countries. The Neutron Physics Laboratory of the OIYAI in Dubna, a joint group of scientists from the Physics-Energy Institute in Obninsk (USSR) and the IYAIYAE of the BAN is working on a program on measuring screened neutron sections of fissionable nuclei. On the basis of semiconductor silicium detectors with a large area, manufactured by the IYAIYAE and the small SM-3 computer equipment was created and experimentally tested for measuring the variations of total kinetic energy of the fission fragments of 235 U in the resonance area of neutron energy.

The IYAIYAE of the BAN, working jointly with the I. V. Kurchatov IAE (group headed by Dr Muriadyan) has developed equipment for absolute measurement of alpha values (the ratio between radiation detection and fission sections) for 235 U at the heat point of the neutron energy with the use of the Romashka multisectional scintillation gamma ray detector.

Also part of fission physics are the studies of independent production of iodine isotopes--132, 133 and 134--with the fission of 238U with above cadmium neutrons. A radiochemical method has been applied in extracting the iodine isotopes from the radiated uranium sample, after which gamma spectra are measured with a Germanium-lithium detector. The chains A = 134, A = 132 and A = 133 are considered. Independent extractions have been obtained of 132 I, 133 I, and 134 I in terms of the cumulative extraction of 135 I, which are consistent with theoretical predictions.

Experiments in the study of conversion pairs of argon and hydrogen are taking place with the IRT-2000 reactor. A diffusion Wilson camera with a magnetic field, used for recording electron-positron pairs of internal conversion into argon and hydrogen has been assembled at the heat column of the reactor at the nuclear problems laboratory of the OIYAI. Such reactions have not been studied so far due to the fact that the sections in argon and particularly in hydrogen are much smaller and that the creation of a track detector which can work within the intensive gamma ray of the reactor is quite difficult. A total of 120 cases of registration of selector pairs--positrons--were singled out among the 20,000 stereo frames which were obtained. Within the energy spectrum of the pairs we note a grouping of lines around 3 and 4 Mev.

A streamer camera was developed for the further efficient study of the tapping of heat neutrons with the formation of conversion pairs in argon and hydrogen. This became the base of a streamer spectrometer for electron-positron pairs. The camera is controlled and has a short memory time, for which reason it can operate with a wide background. The working gas in the camera (argon or hydrogen) plays the role of a target, which facilitates the observance of the points or origin of the conversion pairs and the angular and energy measurements.

Figure 2 shows the exterior of the streamer spectrometer with the camera and the pulse feed system. The streamer camera works successfully with an argon charge with quite clear and properly localized traces.

Preparations for experiments on the study of gamma radiation obtained with a nonelastic dispersion of fast neutrons from the reactor spectrum and related effects, particularly the Doppler shifting of gamma-quantum energy, radiated from moving nuclei, were undertaken on the horizontal channel of the reactor in 1977.

A nonstandard experimental system was used to measure the lifetime of excited nuclei conditions based on Doppler's shifting. This represented a first combination of the advantages of two modifications--the simultaneous measurement with two targets (specific for charged particles) and a single target (applied in the reaction of nonelastic dispersion of fast reactor neutrons). Results were obtained for the nuclei 27 Al, 32 S, 58 Ni, 60 Ni, 45 Sc, 55 Mn, 59 Co, 40 Ca, and others. Further development of such work is planned in the mass area of $A \sim 90 \div 130$, in which there are reasons to expect original results.

Experiments with cold and ultracold neutrons are being conducted on the reactor. Neutron carriers for such experiments were designed and experimentally tested and a time flight spectrometer was developed. A mechanical method (neutron turbine) was developed for obtaining ultracold neutrons with velocities of under 10 meters per second.

Studies are being made of the interaction between cold neutrons and the substances. Experimental data have been obtained on full cross sections of interaction with Ag, Cu, In, Ni, Fe, Mo, Ar, N and dry air with neutrons with speeds within the 50-100 meters per second and 100-250 meters per second intervals (cold neutrons). A substantial deviation of the 1-V law was noted at speeds of under 120 meters per second.

The methods of neutron optics are extensively applied in studying the structure of crystals and determining the atomic order of amorphous substances. The DN-520 neutron diffractometer which was obtained from Poland in 1975 is being applied in diffraction studies of solids.

The neutronographic method was used in the study of crystal chemical and magnetic parameters of ferrites (Bulgarian production) with a view to clarifying some problems of the technology of synthesis. A study was made of the influence of oxide mixtures on electric and magnetic parameters of ferrites with a spinning structure: Ni-Zn ferrites with additions of ZrO_2, No_2O_5, Sb_2O_5; Mn-Zn ferrites with superstoichiometric content of Fe_2O; Mg-Mn ferrrites with small additions of Ho_2O_3, La_2O_3 and CeO. Data were obtained on the correlation between a number of macroscopic parameters with microscopic ones (changes of the grid constant, oxygen parameter, cation breakdown and value of the magnetic feature of the ion of the respective magnetic subgrid depending on the type and valence of the additive) under different circumstances of the synthesis of the models. The results of the orthoferrite $TmFe_{1-x}$ MnO_3 and the isostructure system with pure orthoferrite of $TmFeO_3$ provide new data on the physics of phase transitions.

The structure of alloys of rare earth elements, used in the development of strong permanent magnets was determined.

A method was developed for the basis of the dispersal of neutrons for the study of amorphous substances, increasingly applied in optics, electronics and laser technology. Studies of systems synthesized on the basis of Tellurium dioxide with different modifiers indicated that the close atomic order in a determined concentration of the modifier is similar to the structure of α-TeO_2 rather than α-TeO_2 contrary to prevailing opinion.

II. Nuclear Spectroscopy and Mossbauer Spectroscopy

Research in this area was significantly hindered by the lack of an accelerator. Despite this, our spectroscopists, who were well trained abroad, were able to organize efficient cooperation with physicists in Dubna, the GDR, Czechoslovakia and Romania. On the basis of such cooperation we are obtaining some long life radioactive sources from Dubna and our physicists are experimenting with accelerators in other countries. A high percentage of the developments in the physical interpretation of experimental results takes place in Sofia.

A series of studies of magnetic β-spectrometer dealt with the nuclei of 147, 149 Sm, and 153 Eu, which are close to the border of the transition from spherical to strongly deformed (N = 89). We know that studies of the nuclear structure in this area have been in the center of attention. For example, measurements were made in the breakdown of 153 Gd of the spectra of electrons in internal conversion and gamma rays in the deformed nucleus of 153 Eu (N = 90).

It is of interest that in addition to ordinary multipolarity, data were obtained on the value of the electric quadripolar aspect of the excited condition of 103 Kev and parameters which express the effect of the penetration in internal conversion in the transitions 97 (E1), 103 (ml) and 173 Keb (M1). It turned out that the penetration parameter λ_1, related to the electric charges in the nucleus and the parameter λ_2, related to the spinning transition currents have low values (Figure 3).

Substantial information was acquired on the gamma-transitions of weakly deformed nuclei in the lanthanum-barium area. The data prove the complex nature of the status of the nuclei. Only a few of them prove to consist of a single particle. There are grounds to believe that the characteristics of these transitional nuclei could be understood within the framework of a model with a particle attached to an anharmonic central part.

A traditional direction followed in our work is the measuring, classification and interpretation of probabilities of electromagnetic transitions. We know that such probabilities are quite sensitive and are perhaps the most sensitive values related to the wave functions of nuclear conditions. For this reason they are the best tests for nuclear models. Measurements with nanosecond isomers take place in a state of radioactive breakdown in cooperation with the Nuclear Spectroscopy Department of the OIYAI Nuclear Problems Laboratory and in cooperation with the Central Institute for Nuclear Research in Rosendorff (GDR) and the University of New Jersey (United States) of a bundle of alpha particles and heavy ions.

Several years ago, other authors discoverd a number of IR (irastovi) isomers in 176 Hf. Together with a German group, our associates used a Ge (Zi) detector to measure the record-setting short lifetime of a high spin multiparticle status of 15 + $T_{0.5}$ = $0.20^{+13}_{0.07}$. Such an isomer was found in the 178Hf nucleus as well.

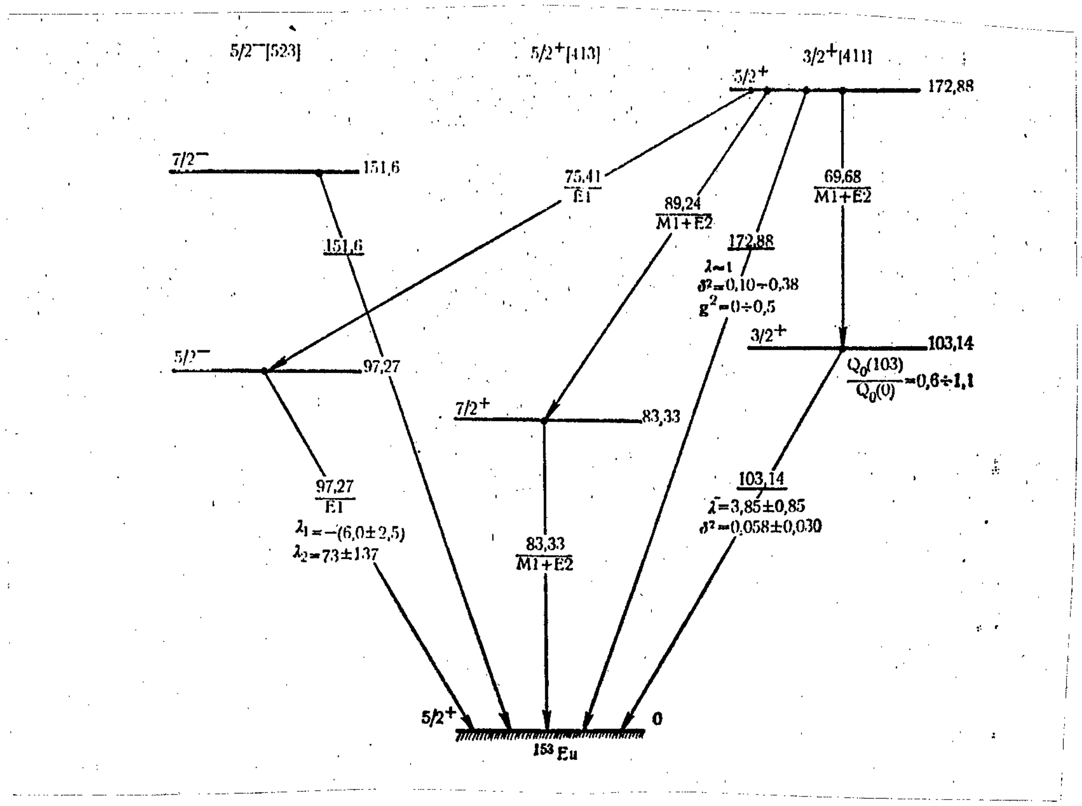

Figure 3. Results of Measurements of $\beta - \gamma$ -Spectra of 153 Eu.

Following are several examples of the work on systematizing probabilities of electromagnetic transitions. A weakening of spinning polarization of the core of the Arima-type is expected in the vicinity of the close strata and a decline in the probability of M1 transitions, which are forbidden on the basis of the quantum figure 1. For the first time systematics have been made of the 1-forbidden transitions for all mass areas. In the case of nuclei in the N = 20 area the probabilities M1 have been strongly manifested. Transitions in mirror nuclei (25 A1-25 Mg) have been similar in size. This may be explained by the isovectorial dominant in the magnetic dipole operator. It is interesting to note that work on 1-banned M1 transitions were carried out by Bulgarian, Soviet and American physicists.

Another example is that of collective transitions E2 in the basic stripes of the deformed nuclei. We know that the strength of the tie between the "back-bending phenomenon of the inertial aspect and the changes in the moment of E2 transition is strong is still being debated, and the problem remains unresolved in its microscopic variant. Our physicists suggest a consideration of the power function S E x B (E2), which has proved to be quite sensitive in terms of the spinning frequency. This may offer additional proof to the effect that the hydrodynamic model is valid in such nuclei to a spin equaling 8.

The IYAIYAE is engaged in studies based on the method of gamma-gamma-angular correlations. Measurements are being made of the electromagnetic aspects of excited nuclear levels, the multipolarity of gamma transitions and electric and magnetic fields influencing radiating nuclei. To this effect a fully automated correlation spectrometer (Figure 4) was developed.

Measurements of differential time-related angular correlations were undertaken in recent years. The breakdown capability of the spectrometer, obtained with a source of 22 Na, with windows for differential discriminators, consistent with the maximum values of 181 Hf with energies of 133 and 482 Kev and plastic NaJ (Tl)-detectors reaches 1.3-1.7 nanosecunds FWHM. This spectrometer was used to determine the disturbance factor $G_2(T)$ on the level of 482 Kev for 181 Hf in Hf_2Pb_3, Hf_2Pd_2 and HfB_2. The frequency of the quadripolar interaction was $\omega_1 = (517 \pm 10)$ MHz; $\omega_2 = (800 \pm 4)$ MHz.

With a view to the detailed study of the electron-positron interaction and its application to the study of the electron structure of matter experimental studies of the annihilation of positrons are conducted by determining the lifetime of the positrons, the doppler expansion of the annihilating gamma line and the angular correlation of annihilation gamma-quanta.

Measurements were made of the angular dependence of the diffusion widening of the Mossbauer line in a copper monocrystal. The Mossbauer source of a monocrystal copper plate with an admixture of 57 Co with T = 1,030°C was studied. The widths of the Mossbauer lines photographed from different angles between the wave sector of the recorded gamma quantum and axis (100) of the copper monocrystal are different. The diffusion expansion of the Mossbauer line depends on the recording angle. The vacancy diffusion mechanism with jumps in the first coordinate sphere is confirmed in a first approximation. This is the first experiment providing such data.

Dysprosium orthoferrite with a partial substitution of trivalent iron ions and ions of bivalent cobalt was studied with the help of the Mossbauer effect. At 42 degrees K the so-called Morin transfer took place in the dysprosium orthoferrite. When iron ions are partially replaced by other ions a variety of properties of dysprosium orthoferrites may be obtained. With bivalent cobalt as a 0.25 percent substitute the Morin transfer shifts toward higher temperatures of up to 100 degrees K and a new reorientation appears which is never found in pure dysprosium. The Mossbauer spectra of this material reveal that in the 250-155 degrees K range a smooth rotation of the iron spins takes place from the X to the Z axle on the XZ plane. At the end of this reorientation the spins are in a position of 20 degrees of the Z axis. Below 155.5 degrees K a new reorientation begins. The spins of Fe^{3+}, which do not reach reach the Z axis leap along the Y axis in a purely antiferromagnetic order. In this case we also note the Morin transition of a spatial type.

III. Applied Research

Extensive activities are taking place in our country on the application of the results of scientific research in low energy physics in the national economy. Let us cite a few examples of basic lines of applied research.

In cooperation with the USSR Academy of Sciences Institute of Nuclear Research studies are underway on the development and application of the pulse neutron method developed by V. M. Kazarnovskiy and K. Ilieva, using the results of the theory of the nonstationary diffusion in environments containing large cavities. Pulse experiments conducted with a neutron generator made it possible to determine with an accuracy of up to 1 percent the albedo of heat neutrons in water and ethyl alcohol delaying agents.

Under contract with the International Atomic Energy Agency in Vienna, a number of nondestructive methods for controlling nuclear materials were developed, including a neutron-coincidental method for determining the presence of plutonium in nuclear industry products for purposes of inspection control.

A method for determining the depth of exhaustion of nuclear fuel was developed for VVER-440 reactors. A gamma scanning method was developed and applied. The possibility of applying the X-ray fluorescent analysis in determining the accumulation of plutonium in exhausted fuel was indicated. A detector with a high differentiating capability is used. Precise correlations were established among the products of fission, combustion of the basic fuel and accumulation of plutonium. The studies were conducted with the help of minitablets which are placed in the dry canal of the cassettes with the basic fuel, radiated and analyzed. A method for determining the hermetic sealing of the cassettes is being developed as well.

A series of gamma radiation instruments for scientific research or industrial purposes has been developed. Gamma radiation using powerful sources is being applied in the development of genetically new strains, stimulation of seeds (National Agroindustrial Union), canning fruits, vegetables, meat products, ground meat and protein item canning, biological protection, and others.

The IYAIYAE is working of neuron-activation analysis. The IRT-2000 reactor is used for radiation. The study of short-life isotopes is conducted with a pneumatic tube developed in one of the vertical channels of the reactor. Methods have been developed for identifying more than 30 elements in geological and other projects. Work is underway to determine the microelement composition of organs and tissues of healthy and sick people and experimental animals for diagnostic and treatment purposes. Determining industrial pollution in water and its influence on living organisms inhabiting it is also being studied.

Studies of angular and energy breakdowns of single and multiple dispersed beta radiation of materials with different Z are being conducted by the nuclear physics chair of Plovdiv University. These studies led to the creation of a family of beta reflectors thickness-measuring devices and instruments for the study of bicomponent systems used in the laboratories of a number of plants.

Work related to the development of methods for measuring low activities and the mastery and development of methods for carbon dating are taking place within the programs for the application of radioisotope methods in industry. A new method has been created to compensate for the residual background in low-phonic detector systems. A model was developed to determine the geometric factor in low-phonic detector systems. Industrial equipment for measuring NFA-3 low beta-activity was applied.

Interesting applied studies are being made with the IRT-2000 reactor in Sofia in the field of radiation dosimetry, radiochemistry, radiation chemistry and production of isotopes.

More than 24 different types of isotopes with an overall activity in excess of 40,000 millicurie per year are obtained with the help of this reactor.

For a number of years the atomic physics chair of Sofia University has studied the Mossbauer effect and its applications. A new method was suggested for the study of fine surface layers known as depth selective Mossbauer spectroscopy, based on the combined utilization of the beta-spectrometer and the Mossbauer analyzer. The Mossbauer electron spectra with different energies yield information on the structure of the phonon spectrum of the "substrata" located at different depths--1,000 A in tin with 100-200 A step. Subsequently, the method was developed at the university in Stockholm and is currently being developed and applied in the USSR, the FRG, Japan, France and the United States. It is being extensively used in the study of chemical and physical phenomena in thin strata, corrosion, and others.

For the first time a resonance scintillating detector and a resonance ionizing camera have been developed and are finding scientific and practical application.

Other methods for analysis using the Mossbauer effect have been developed as well. Studies have been made of a number of chemical compounds and of the behavior of combinations of iron with tin, which accelerate the process of sulfur-free vulcanizing of some varieties of rubber.

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BULGARIA

DESCRIPTION OF GROUND STATION EQUIPMENT FOR SATELLITE MEASURING

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 3, 1982 pp 25-29

[Article by Prof Dimitur Mishev, Scientific Associate Engineer Garo Mardirosyan and Engineer Dzanka Indzheva: "Mobile Ground Station for Synchronous Satellite Measurements"]

[Text] The sum total of tasks, methods and technical facilities for telemetric study of the earth from outer space represents a complex multi-step system based on suborbital (mainly ground) systems and complexes for data gathering and processing. The results obtained from ground measurements not only supplement and make possible the effective processing of data provided by artificial earth satellites, manned space ships and orbital scientific research laboratories but are also exceptionally valuable data needed in resolving a number of entirely separate scientific -theoretical, scientific-applied and national economic problems in the areas of geophysics, geology, geography, meteorology, hydrology, the study of natural resources, environmental studies and protection, agriculture, and so on. Ground measurements become particularly important when they are synchronized or, rather quasisynchronized with experiments and studies conducted with the help of airplanes and in outer space. Considering the relatively large territories on which they take place and their specific nature, it is expedient to conduct ground measurements with the help of mobile laboratories and complexes.

Considering the nature of their work, such mobile laboratories must meet a number of specific requirements, the main ones of which are the following:

High mobile and increased cross country qualities, which make possible their movement along rugged and steep terrains, along roads and roadless areas;

Possibility of establishing and beginning normal operations within minimal amounts of time;

Availability of highly reliable, small-sized equipment with low power consumption, capable of withstanding mechanical loads;

Possibility of fast primary data processing on the spot;

Efficient and flexible structure--possibility of quick and easy reorganization of studies in various geonomic areas;

Compatibility and possibility of participation as an element of complex research systems.

The main prerequisites governing the creation of a mobile scientific research laboratory are the following:

Availability of motor vehicles, trailers and buses with increased cross country capacity and of suitable dimensions;

Availability of modern electronic equipment--small-sized, highly reliable, economical in terms of power supply and highly resistant to mechanical loading;

Availability of modern facilities for long-distance data transmission, recording and processing.

In connection with the implementation of the "Intercosmos" program and the "Bulgaria-1300" space project, the Central Laboratory for Space Research of the Bulgarian Academy of Sciences designed and developed a prototype of a mobile ground station for synchronous satellite measurements (PNSSSI). It is one of the possible variants of a developed general purpose mobile laboratory for synchronous and comprehensive space and geonomic studies.

As a compromise, the body of the Chavdar-5S bus with 4-wheel traction and 230 millimeter clearance was taken as a basis for the development of the PNSSSI. It is powered by a D-3900 four-stroke diesel engine developing a maximal power of 85 hp.

The structure has been reinforced and computed in such a way as to withstand a static load of about 400 kg. Flanges, brackets and other propping elements have been mounted on it, as a result of which antennas, apparatus, tripods and other systems may be installed at different heights and in different positions. The main equipment on the roof is a 4,000 millimeter long arm, which is a light duraluminum structure, The arm is carried on the roof in a horizontal position and has two main working positions, as follows:

a. Along the axle of the body, in which the arm may assume a variety of positions: from a transportation to a vertical position and to 30 degrees below the level of the roof, with an overall work sector of 210 degrees. The equipment which can be installed on it could range from 0 to 6,500 millimeters above the grounds;

b. Crosswise--used in mounting larger equipment at heights ranging from 0 to 4,500 millimeters above the ground.

If necessary, the equipment may be mounted on the arm or the roof with the help of special universal joints, which guarantees the strictly vertical or any other strictly defined location of the apparatus, regardless of the position of the arm or the bus itself. Using the flanges on the roof of the PNSSSI and with the help of the duraluminum pipes, a variety of other structures may be mounted in all directions for mounting the equipment, protective covering, and others. the roof is accessible through a light mobile ladder which could be mounted to the body in five different locations.

The roof of the PNSSSI is painted in red and white squares, in chessboard fashion. In the case of joint studies involving aircraft and helicopter laboratories, it could be used as a standard in terms of form and dimension (scale) for determining the influence of the atmosphere, a bench mark, etc.

The hull of the PNSSSI meets increased heat and humidity insulation requirements. It consists of a working and storage premises. The working premise has built-in shelves and stands on which the equipment can be mounted. The most efficient use is that of apparatus with a module design. Depending on their resistance to mechanical vibrations, they can be installed directly or through special shock absorbing elements.

In addition to the driver, the PNSSSI can handle four more passengers sitting on three luxury SV-type seats and one mobile seat. Natural and artificial ventilation, and kerosene and electric heating and facilities for air conditioning have been made available in order to maintain the necessary microclimate.

In addition to the standard automotive electrical system, the PNSSSI has special power, measurement and radio installations.

Primary power may be provided with the help of two systems:

a. Battery: A special shelf contains two 6-volt and two 12-volt Ni-Gd batteries with a 50 Ah power. The battery terminals lead to a panel from which the following voltage can be obtained: +6, +12, +18, +24, +30, +36, ±6, ±12 and ±18 volts. The batteries can be recharged. Furthermore, they can also be recharged while the bus is in motion through the electric generator of the bus' engine;

b. Power grid: In operating in the vicinity of a power grid electric power of 220 volt/50 Hz is possible. This is achieved with a corresponding installation, a control-measuring panel and a 180 meter-long cable.

All electric panels have the necessary control-measuring equipment, meters and safeguards. The feeding and measuring cables are switched on to the PNSSSI through special coupling panels. The body of the PNSSSI can be grounded.

In general, the equipment which is part of the PNSSSI facilities may be classified into the following basic groups:

Secondary power supply--for the transformation and stabilizing of electric tension obtained from the primary power supply system.

Measuring equipment--recorders and transformers of the parameters of the studied targets:

Recorders of spectral reflection characteristics;

Recorders of the temperature of the ground air stratum, the surface stratum and temperature profiles;

Recorders of the humidity of the surface stratum of the soil and depth profiles;

Recorders of the gradient of the electrical conductivity of the soil;

A standard meteorological set;

Equipment for hydrological measurements;

Magnet meters;

Counters of aerosol particles;

Seismic receptors, and others.

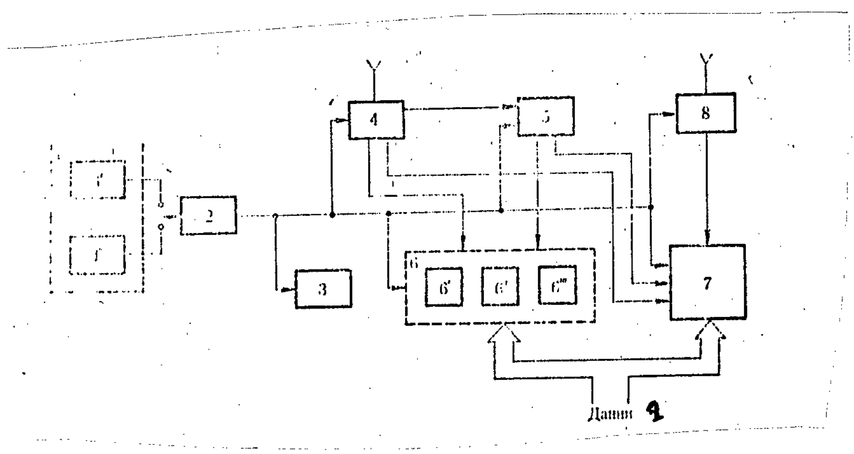

Figure 1. Most general block circuit of the apparatus in one of the PNSSSI variants:

1. Prime electric power: 1'--battery; 2"--power grid;
2. Secondary power supply;
3. Location identification equipment;
4. Precise time measurement system;
5. Programming system;
6. Independent recorders: 6'--tape recorder; 6"--photographic recorder; 6'''ink recorder;
7. Data gathering system;
8. Ultra shortwave radio;
9. Data

The data gathering system (SSD) consists of a central point (TsP), installed in the PNSSSI, and four peripheral points. In most general terms, the principle of action of this system is based on the automatic engagement of the individual peripheral points and the telemetric transmission of data which is received and recorded in digital figures in the TsP. The location and distance of the individual peripheral points are based on the nature of the terrain which affects such ultrahigh frequency transmissions. The TsP records, provides the initial processing and the visualization of the data.

Autonomous recorders: tape recorders, photographic recorders, ink and heat recording instruments, and others.

Location determining apparatus: various geodetic instruments such as a theodolight, a compass, and others.

Single accurate time system: electronic clock with a quartz generator and built-in radio receiver for making automatic corrections based on standard accurate time radio signals.

Official radio communications: portable radio telephones operating within the ultrashort frequency range, which provide radio communications between the individual units of the research complexes in the case of combined studies involving laboratories aboard airplanes and helicopters, and so on.

Service equipment: the most necessary apparatus and instruments for control, tuning and repair under field conditions.

Thanks to its functional nature and flexible structure, with minor equipment changes, mainly in terms of the measuring equipment, such a mobile station may be used for comprehensive as well as strictly specialized studies in all geonomic areas--geophysics, geology, geography, hydrology, meteorology, environmental protection, and so on. It may be also used for purely technical and engineering studies, such as in engineering seismology, vibration measurements, meteorological measurements, and others.

5003
CSO: 2202/2

MORE ACTIVE RESEARCH IN SOLAR ENERGY FIELD ADVOCATED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 3, 1982 pp 30-37

[Article by Prof Stefan Kunev: "Problems of Solar Power Industry"]

[Text] The question urgently arises of finding new and clean energy sources in connection with the energy and environmental protection problems affecting virtually all countries. In this sense, particular attention is being paid to the sun. As a source of energy, it may be described most generally speaking as follows:

1. It supplies the earth with huge amounts of energy (about 10 kilowatt hours per year, or 10,000 times the current energy requirements of mankind). In no more than a few weeks the earth's surface receives as much energy as would be generated by the use of all available energy resources on earth. Estimates have indicated that the area covered by a modern energy production unit (a thermoelectric power plant for example) is larger than the area receiving the same amount of solar energy on an annual average.

2. Solar energy is virtually inexhaustible, and resolving the problem of its tapping for purposes of large-scale energy production will resolve the energy problem of mankind forever.

3. The sun is a clean source of energy which can never result in environmental pollution.

4. For the time being no basic difficulties of scientific or applied nature exists related to mastering the use of solar energy.

The mastering and conversion of solar energy may be accomplished with the help of several already known basic methods.

a. Its transformation into electric power through semiconductor photoelectric or thermoelectric generators (solar batteries);

b. Through the photolysis of water resulting in the production of hydrogen, which is considered one of the most promising and clean fuel gases and an ideal storage of energy during sunless periods;

c. Through the absorbtion of solar energy by systens with large blackened surfaces (so-called heat collectors) and the use of the thermal energy thus obtained for residential, industrial and other needs;

d. Through the concentration of solar energy with the help of mirrors and the use of high temperature systems;

e. Through the use of the biological effects of photosynthesis, photolysis of water with biomembranes, and others.

It would be natural to expect that with such an apparent tempestuous development of solar energy that new even less expensive and more convenient methods will be discovered and used. Some of the currently existing methods are already being applied while others are considered quite promising. According to authoritative specialists in this field, the direct conversion of solar into electric energy is the main direction offering the best opportunities for resolving major energy production problems. The development of electric power plants based on photoelectric batteries offers a number of advantages. Such installations operate at low temperature, noiselessly, during sunny or cloudy days, without moving mechanical parts, covering relatively small areas. They also guarantee absolutely clean air.

The main scientific problems related to solar energy today are the following:

1. The development of technologies or new designs for the large-scale production of inexpensive photoelectric elements and batteries. Their cost must be reduced by a factor of 30-50 before they can compete with modern power industry equipment. No basic difficulties exist for the solution of such problems and the forecasts are clearly optimistic. It is believed that the existing scientific and technical problems involved can be resolved within the next 5 to 15 years.

2. The development of high capacity solar power plants on the basis of lower-cost concentrators. This problem may be resolved in the reasonably distant future.

3. The development of thin layer selective and protective covers with improved efficiency and technological qualities. Such covers will increase the efficiency and lifespan of the solar collectors, mirrors, phototransformers, and others.

4. The further development of existing physical and physical chemical principles for the production of inexpensive hydrogen through water photolysis, which will be used in storing the energy of the fuel gas.

5. Increasing the efficiency and lowering the cost of semiconductor thermoelectric and thermal pumps.

6. Improving thermal batteries and systems by using phase conversions into solid state, and others.

7. Development of even less expensive collectors and other thermal systems based on new physical principles.

8. Improving the efficiency of photosynthesis and other photobiological processes.

In addition to scientific problems, many other problems of technological and engineering design nature must be resolved in order to make possible the rational and efficient utilization of solar energy. All in all, for the time being, the limitation restricting the mass use of solar energy has been the high cost of equipment. The problems require expanded activities by large collectives (even involving the participation of several countries). With this in mind, in recent years an increasing number of countries have undertaken scientific research and applied activities related to the use of solar energy. National programs have been drawn up by Japan, the United States, the USSR, France, the FRG, Austria, Australia, Romania, Turkey, Yugoslavia, Italy, Spain, Belgium and many others. At the same time, international orgnizations have focused a great deal of effort to combine and enlarge the activities of individual countries in the solar energy area. For example, since 1976 work has been done along the CEMA line on a program for the use of solar energy and new energy sources. The member countries are participating in the long-term plan for cooperation on this problem with respective scientific research and applied developments. A plan is being enacted for building a facility for joint testing of equipment and systems aimed at converting solar, chemical, wind and geothermal energy into electric, heat, mechanical and other types of energy. A draft long-term program for cooperation through 1990 is being formulated.

Work in the solar energy field calls for the building of electric power plants based on thermodynamic and photoelectric principles, the construction of solar buildings, the improvement of heat transforming and storing systems, and others. Solar energy problems are being developed on a broad scale mainly in the USSR. Scientific and applied problems in this area are considered of prime significance and are being resolved on a high scientific and technical level. The USSR is participating in the CEMA program as an active partner with great possibilities and willingness to cooperate. Various scientific research centers are working on virtually all aspects of the solar energy problem on which research has been underway for a number of years. The construction of the first experimental 5 megawatt solar thermoelectric power plant is currently under construction. The construction of a new 100 megawatt electric power plant is contemplated on the basis of the experience which will be gained.

Among the other socialist countries Romania is particularly active in this area, as confirmed in the reports and plans submitted to CEMA.

Some European members of the European Economic Community (EEC) are coordinating their activities with the program for joint development and exchange of technology in the field of solar energy. The EEC program was adopted as early as 1975. As a result, an experiment with two solar electric power plants, each generating a capacity of 500 kilowatts, operating on a parallel basis, was launched in Spain in 1981. The first is based on the thermodynamic and the second on the photovoltaic conversion principles. The projects were based on the results of the joint research and development efforts of the EEC members.

UNESCO has a five-year program for assisting developing countries in research and applied activities related to the utilization of solar energy for the period between 1977 and 1982, with an overall budget of $1.5 million.

Several examples of financing national programs in the advanced countries indicate the scale on which such activities are being developed. Thus, for example, the sum of 10^{12} yens has been appropriated for the Japanese Sunshine program; in 1979 France spent 276 million francs, 165 million of which on science and development. The same year Italy appropriated more than 1 billion lira for photovoltaic transformation alone. The FRG, a country with a relatively low amount of solar energy, appropriated $70 million for the 1976-1980 period. The U.S. government appropriated $74 million for photovoltaic transformation alone for the fiscal 1982 and is planning to spend about $250 million for new energy sources in 1983; about $150 million of which will be on solar energy alone (50 percent of it for photovoltaic conversion).

Currently the use of solar energy for a variety of purposes is growing: desalinization of sea water, dehydration of agricultural commodities and quarry materials, and solar greenhouses may be found throughout the world. Hot water systems are being increasingly widespread in camps, resorts, sports installations and residential and industrial projects, for they lower in real terms annual energy consumption by as much as 50 percent. In Japan alone more than two million such installations have been installed. A number of developing countries have installed large numbers of pumping and irrigation systems powered by solar electric generators. The number of private and public building heated with solar energy is increasing in the United States, France and the USSR. In 1985 France alone is planning solar energy supplies for one million housing units, increasing it to 30 percent of all housing by the year 2000.

The direct transformation of solar into electric power is also gaining increasing support. Whereas until recently it was believed that the use of photovoltaic generators would remain limited (meeting the needs of isolated distant projects), during the last 3 to 4 years there has been increasingly frequent talk of industrial capacity systems. In the United States, which is a leading country in this direction, 7,000 square meters of solar batteries were produced in 1977 and 10,000 in 1979, generating a total power of 2 megwatts. By the end of 1982 17 photovoltaic solar power plants will be completed with a unit capacity of 20-500 kilowatts, with an overall generating capacity of 2.3 megawatts. The overall capacity of the power plants is expected to reach 2,000 megawatts by 1990 and 5,000 megawatts by the year 2000. In 1979 France produced solar batteries generating a total of 400 kilowatts; in the past 2 to 3 years it has commissioned 70 photovoltaic systems with a unit capacity ranging from 1 to 100 kilowatts. Currently Japan is building two photovoltaic solar power plants (of 1 megawatt each). By the end of the century the overall capacity will reach between 7,000 and 11,000 megawatts. Many countries have low power systems in operation, the results of which will be used as a basis in designing larger similar projects and drawing forecasts. The number of solar electric power plants with a thermodynamic conversion cycle is also increasing. As early as 1979 an electric power plant with a 1 megawatt capacity was completed in California; a second was commissioned in 1980, generating 10 megawatts. In France a solar electric power plant of the "tower" type, generating 3.5 megawatts was commissioned in 1981; a 1 megawatt power plant was commissioned in Adrano, Italy; a power plant generating 250 kilowatts is operating in Spain (not far from Madrid), and so on. Power plants of small or medium capacity are planned to meet the needs of the developing countries in Asia, Africa and Latin America. Actively participating in such efforts are countries such as Austria, Israel, Spain, Italy and others. Intensive efforts are being made in this area by the USSR and Romania.

What are the prospects and the expediency of the use of solar energy in Bulgaria?

Bulgaria is a country with rather limited organic and hydrolic resources (according to some data it has a per capita amount of energy one-tenth of the average worldwide level). Unquestionably, the energy problem will rise sharply in the next few years. This justifies the interest in the possible tapping of solar energy in our country. However, the assessment of the expediency of such developments must be preceded by a consideration of the specific characteristics of the individual countries in terms of their climatic, material-production and scientific potential.

Bulgaria is located within a very narrow geographic latitude--41-43 degrees northern latitude. For this reason, differences in the radiation regime between the individual areas are small and are determined mainly on differences in the cloudiness regime. Because of its southern location and relatively small cloud cover, Bulgaria receives a considerable quantity of solar energy located in the so-called "sun belt." The annual amount of sunshine ranges between 2,200 and 2,400 hours.

A simple estimate proves that it would suffice for no more than 1/500 of Bulgaria's territory, i.e., 200 square kilometers, to be covered with installations for the transformation of solar energy (using photoelectric batteries with a 10 percent efficiency, for example) to satisfy the country's annual electric power outlays (taking 1980 as an example--3.6×10^{10} kilowatt hours per year).

Based on most general considerations in comparing data on solar radiation with some European countries with a developed intensive scientific and production activity related to the use of solar energy (the FRG, France, Belgium, Austria and Romania), we could confidently say that Bulgaria has all the necessary climatic conditions for a profitable development of solar energy.

As to scientific research, design and applied activities in tapping solar energy, we have grounds to believe that they would require relatively modest financing and no specialized industry. Naturally, if we are not discussing the production of energy through artificial satellites but autonomous solar systems and installations and ground energy producing solar centers, this is entirely within the range of our country's possibilities.

For purposes of "small scale energy industry," in a country with a strongly developed international tourism, vegetable and fruit production, tobacco, and so on, flat water or air collectors can be successfully used for purposes of heating, hot water supply of resort areas, beaches, greenhouses, tobacco curing, etc. Based on acquired experience and computations, with proper construction, their use in so-called solar architecture could account for nearly one-half of the energy needed for heating and hot water supplies (naturally, following the recovery of production costs).

The use of photoelectric batteries for local electric power supplies is of essential importance as the initial stage in their use in the power industry. Solar electric power plants of low or average capacity could be built during the current decade. The lowering of their construction cost, however, would require considerable scientific research and development efforts. The importance and prospects of this type of solar installations have already been discussed.

The use of more powerful energy systems such as solar thermoelectric power plants is of interest. We could begin even now to experiment with a plant developing a few dozen kilowatts and, between 1985 and 1990, develop significantly higher capacities. The production of hydrogen, which is both an energy carrier and storer, is a more distant but quite tempting prospect.

Generally speaking, the development of an intensive purposeful scientific research and applied activity in Bulgaria, related to the tapping of social energy, is entirely timely and necessary.

Currently our country has two basic units engaged in specific work in this area: the New Energy Sources Scientific-Production Economic Combine (NPSK "NEI") of the Ministry of Power Industry, which is engaged in the development and production of water solar flat collectors and various heat installations on their basis. These are systems for water heating for a number of industrial, agricultural, tourist-residential and other projects.

The other unit is the Central Laboratory for Social Energy and New Energy Sources (TsL SENEI) of the Consolidated Physics Center of the Bulgarian Academy of Sciences.* It began its activities in 1978 and has a personnel of about 35 members. Within a relatively short time it was able to organize its activities and to begin work and obtain substantial scientific and practical results. In the past and currently it has focused on two basic topics:

1. Photometric transformation and utilization of solar energy (heat production), which involves scientific and technical problems related to the direct practical application of various types of systems, methods and installations.

2. Photoelectric transformation and utilization of solar energy (electric power production), in which most assignments are related to the future activities of some of our plants and the practical development of photoelectric systems.

*The activities of this laboratory are considered in greater detail in this article for it is part of the activities of the Bulgarian Academy of Sciences.

Interesting results were obtained in the course of the development of these two basic topics in the area of instrument manufacturing and measuring equipment, which led to the application and the undertaking of new production activities.

Along with the dozens of publications and authorship certificates, the TsL SENEI collective obtained the following more important results related to practical applications:

An aerial solar collector with improved indicators (Authorship Certificate No 29,979) was developed and tested. It produces hot air for farming, industrial and household needs;

Together with the ITTI in Plovdiv an experimental solar tobacco curing system with a 3-ton capacity was built. The results of its operation are used in expanding this type of construction;

A collector system for an evaporative installation was built jointly with NIPRORUDA in Shkorpilovtsi Village, Varna Okrug, for the production of iodine, bromium and other valuable elements contained in geothermal waters;

The designing of a large (400 kilowatt nominal capacity) solar dryer for agricultural commodities was completed in Kaloyanovo Village, Plovdiv Okrug, on contract with the G. Dimitrov NPSK [Scientific Production Economic Combine];

A technology was developed for fine-layer selective covering (Authorship Certificate No 30,105, and request for Authorship Certificate Registration Nos 42,540 and 46,430), of great importance in upgrading the efficiency and durability of solar equipment. They will be applied by the NEI NPSK and other enterprises using black galvanic covers;

A technology has been developed for the production of a heat resistant black paint (request for Authorship Certificate Registration No 51,132), applicable in solar collectors of different types (including those produced at the NEI NPSK), in industry and art. It can be produced by Lakprom. This paint was used in the building of the systems we mentioned;

A nonselective radiometer (Authorship Certificate 47,911) was developed, for determining the radiation energy from ultraviolet to far infrared, applicable in solar technology, radiometry, automated energy systems, and others. Production in small series will be undertaken next year;

A technological variant has been developed for the manufacturing of silicium photoelectric converters (photoelements) with a 15 percent efficiency, for laboratory samples (request for Authorship Certificate Registration No 47,741). They are made of defective silicium washers from the production of integrated circuits at the Semiconductors Plant in Botevgrad. The purpose is to make use of a large number of expensive imported material using the existing technological systems at the plant without changes;

A light-sensitive material has been developed on the basis of cadmium sulfide and, on its basis, a technology has been developed for the production of light resistors with a differential outlet (Authorship Certificate No 19,338), applicable in solar tracing systems, computers, and others. Such light resistors have been applied at the Plovdiv OZZU [Consolidated Plants for Memory Systems] and have been in regular production for the past few months. They replaced a certain type of imported light resistors, compared to which they provide faster action. The OZZU is making preparations to undertake the production of light resistors next year;

An instrument for the fast definition of parameters of solar light elements has been developed. Its production in small series will be based on requests submitted by CEMA-member countries and in connection with joint work done on this problem.

The following have been developed as well:

A method for determining the coefficient of (nesthyometry) of a hydrogen-oxygen mixture (Authroship Certificates Nos 29,413 and 29,694);

CVD technology for the production of amorphous silicium, applicable in solar photoelements (request for Authorship Certificte Registration No 50,449);

Method for electronic sorting by color of industrial samples and for technological control in the coloring process in various industrial sectors. Successfully tried at the "8 Mart" plant in Sofia;

The TsL SENEI is carrying out some work of organizational nature. It is the coordinator in Bulgaria and in charge of one of the CEMA problems on "Development of New Efficient Methods for the transformation of solar, chemical, wind and geothermal energy into electrical, mechanical and thermal energy and the delopment of corresponding systems and installations." The TsL SENEI organizes and implements measures related to the forthcoming construction of a Soviet-Bulgarian testing area for new energy sources in Michurin.

The laboratory organized a UNESCO conference on the creation of a consultative council on solar energy for Europe, which took place in Varna in 1978.

The laboratory personnel dedicated a great deal of effort and enthusiasm in carrying out these assignments. A substantial number of difficulties of most various natures, typical of any new activity in the lack of adequate cadres, equipment, materials, work premises, and so on, were compensated for by additional efforts. Thus, for example, the lack of equipment and technological facilities forced the laboratory personnel to use the equipment of the Semiconductor Plant in Botevgrad, whenever this did not interfere with the plant's work. Despite the difficulties it created, the lack of some equipment was of positive significance, for it created prerequisites for designing new methods and instruments.

A comprehensive program was developed for the activities of the country related to the use of solar energy through 1985. Furthermore, a scientific and technical forecast through 1995 was drafted.

Being a small country, Bulgaria must focus its efforts on scientific research and application activities in a lesser number of directions in the field of solar energy, those which are more profitable and require lesser funds. For this reason, it would be expedient for the TsL SENEI to continue its work along the two basic directions, as in the past.

These results provide a base for expanding the scientific activities of the laboratory and its efforts to apply in industry and construction experimental, semi-industrial and industrial solar energy systems. Furthermore, it would be expedient to continue and increase efforts to develop and apply more efficient types of light resistors, radiometers, tracking systems, and others.

More specific activities directly related to practical use are the following:

During the next and subsequent years we shall undertake the construction of industrial systems for curing tobacco and desiccating agricultural commodities and industrial raw materials. A contract has been concluded to this effect between the TsL SENEI and the OAPS in Blagoevgrad, for the construction and commissioning in the summer of 1982 of a tobacco curing installation which will be used in the spring in greenhouses for early vegetables. The 1982 NIPRORUDA plans include the joint construction with the TsL SENEI of an evaporation system for the production of kaolin (within the "kaolin" program) and of a drying installation for the production industrial quarry materials. According to TsL SENEI, again with its help, in 1982 the G. Dimitrov NPSK will undertake the construction of an industrial drying system for agricultural commodities.

The construction and the study of the work of such systems will enable us to improve and apply them on a broader scale during the present five-year plan. The drying of grain feeds, ensuring their lengthy preservation, is a particularly important problem. This will make necessary the series production of air collectors at the NEI NPSK by the Ministry of Power Industry, developed by the TsL SENEI.

In 1982 and later work will be done on improving the already developed air collectors and the building of high temperature collectors and concentrators with a view to the construction of insulations for hot air and steam needed by some industrial sectors for the production of concrete elements, in the canning industry, timber processing, etc.;

Experiments will be conducted with regenerative heat exchange systems used in preserving the heat which is released along with moist or polluted hot air by the heat generators and premises in various production facilities (such as drying equipment in various industrial shops, and others);

Work will be done to develop even more efficient selective and non-selective covers, such as a nonselective black paint produced by Lakprom for the NEI NPSK and other industries. Furthermore, experiments will be conducted to apply selective covers in industry;

Work will be continued on developing an industrial technology for silicium photoelements from waste silicium washers at the Integrated Circuits Plant in

Botevgrad. On this basis, or on the basis of imported photoelements and modules, the construction of a small experimental solar photoelectric plant may become possible in 1983, in order to obtain actual data on the operational possibilities and construction of such installations under Bulgarian conditions and their application during the five-year plan in some separate energy units (radiorelay stations, electronic calculators, water pumps, cattle breeding stations, etc.);

The technology for the production of amorphous silicium and fine-layer cadmium sulfide and photoelements made of them will be continued with a view to the development of inexpensive solar photoelements and batteries;

The TsL SENEI has the opportunity to apply new types of photoresistors (Authorship Certificates Nos 24,640 and 24,385) to meet the needs of automated equipment. Furthermore, it would be expedient to improve the developed radiometer and its production. To this effect and for the purposes of the solar tracing systems, it is imperative to continue and increase the work of the laboratory on instruments for solar tracing systems and of automatic equipment for radiation measurements;

Bearing in mind the fluctuations in solar radiation, the heat battery is the main element in various solar installations. Virtually no work is being in this respect in our country. This could be developed either at the TsL SENEI or the NEI NPSK.

No serious work has been undertaken in our country in the field of solar architecture. The future construction of housing and industrial buildings should be adapted functionally to an eventual addition of solar installations. Furthermore, one of the units of the Ministry of Construction (in cooperation with the solar energy units) should undertake work on the construction of buildings equipped with systems for the active and passive use of solar energy.

It would be expedient as of now to undertake preparations for and study of the construction of a new experimental solar thermoelectric power plant (eventually at the end of the present and the beginning of the next five-year plan).

Naturally, such activities cannot be developed or assisted by the TsL SENEI given its current cadre and material facilities. Greater concern and feeling of responsibility are needed in order to stimulate the work related to mastering the only significant energy resource at the disposal of our country.

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CSO: 2202/2

BULGARIA

CHRONOLOGIES, INSTRUMENTS, EQUIPMENT DESCRIBED

Sofia SPISANIE NA BULGARSKATA AKADEMIYA NA NAUKITE in Bulgarian No 3, 1982
pp 93-101

[Text] Methods and systems for planetary feeding of continual electrode in first, second and third generation IZAPLAN welding.

During the past 20 years qualitative developments have taken place in the technology of the electric arc welding process through the use of welding methods in a protective environment provided by an inert or active gas (MIG and MAG).

Development of these methods contributed to the automation and robotics in electric arc welding. Even semiautomated systems doubled and tripled their productivity, reduced material outlays by about 30 percent and improved the quality of the welds, particularly in dynamically stressed structures through the use of the MIG and MAG methods. The welding of aluminum, nonferrous metals and alloys became possible with the help of mechanized electric arc systems.

The mechanical feeding of an electrode to the welding arc is the basic problem in the application of the new methods (MIG-MAG).

Classical Feeding of Continuous Electrode

The classical solutions developed by more than 435 companies and institutes are characterized essentially by their heavy and complex design based on trivial kinematics. In this case the electrode wire is fed by two or four cylindrical wheels (1.1 and 1.2) with axles perpendicular to the cylindrical electrode which is pushed out (Figure 1). The rollers are powered by an electric motor through a reduction gear with a high conversion ratio and low efficiency. Because of the position of the cylindrical wheels compared to the electrode, they achieve spot contact with a small area. The organization of the interaction between the working wheels and the electrode takes place through normal pressure which is necessary for the creation of a driving power. However, because of the spot contact in all cases this takes place at the expense of the deformation of the electrode and the creation of internal stress within it.

Therefore, these solutions contain a number of shortcomings which result in an increased resistance in the subsequent crossing of the electrode through a flexible trailing cable, as well as the fast wearout of parts (contact nozzle). Furthermore, the continuous electrode rolled in a bobbin (Figure 2) comes out bent in the direction of the trailing cable which leads to the arc, which creates additional resistance. From the technical viewpoint, we are faced with a "vicious circle"--the need for a maximal pushing force to surmount the resistance of the maximally long trailing cable, on the one hand, and the application of normal pressure for feeding with increased power, on the other, which deforms the electrode, creates a stress within it and thus increases the resistance within the cable. A number of other shortcomings inherent in this method limit the practical application of the MIG-MAG welding methods as would be the case in the manufacturing of construction, ship (karni) and other structures and particularly robotic systems which require long welding seams. The best classical methods known so far have a limited feeding distance (not exceeding 4 meters).

Based on theoretical and practically tested studies, a new kinematic system was developed in our country in feeding a continuous electrode. It makes use of the planetary reduction of the rotary movement of the engine in feeding the con-tinuous electrode.

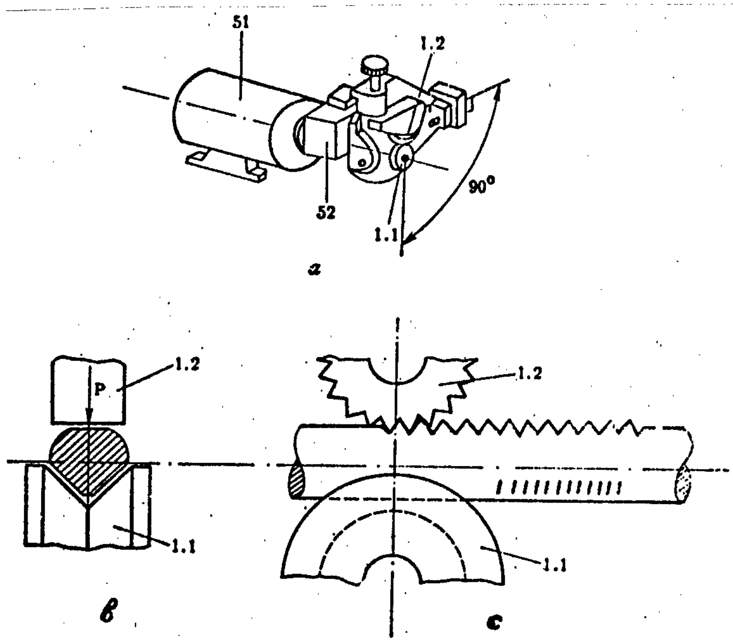

Fig. 1

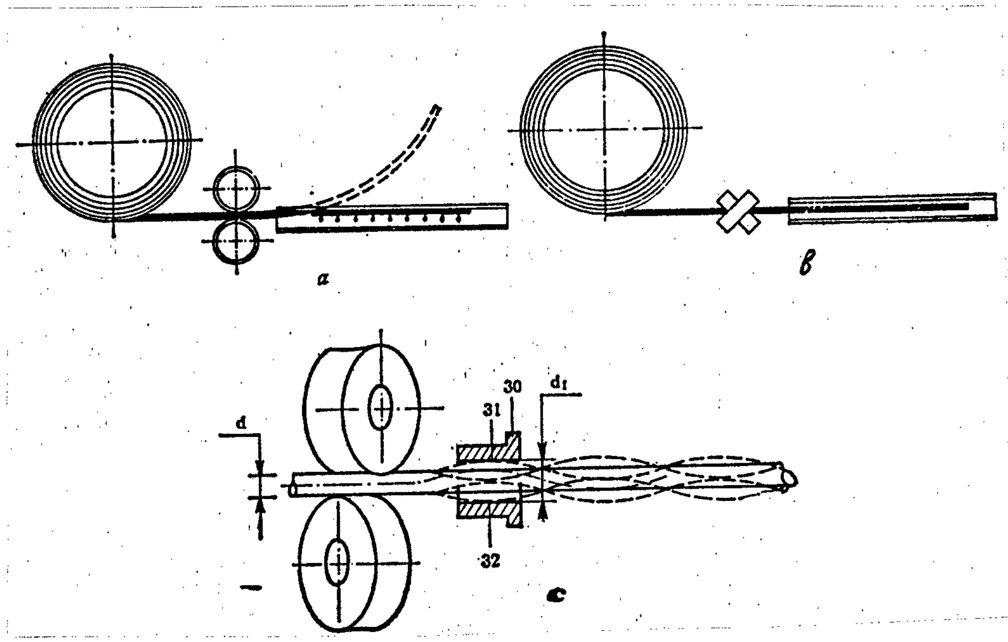

Fig. 2

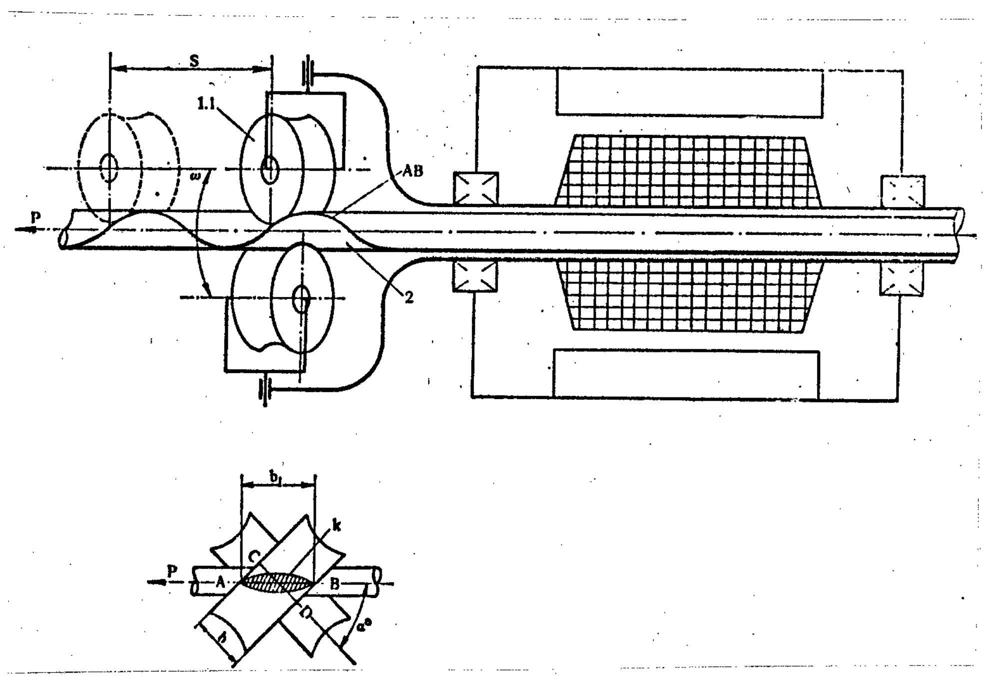

Fig. 3

Planetary Feeding

The system consists of no less than two hyperboloidal wheels 1.1 and 1.2, which rotate in a planetary fashion around the nonrotating cylindrical electrode 2, in a thread line 3, with an interval governed by a permanent or controlled angle between the wheel and the continuous electrode (Figure 3).

The feeding speed is determined by the planetary reduction of the rotating planetary turning of the electrode by rollers. This reduction is determined by the angle between the rollers. With a permanent angle the feeding speed should be constant.

In this case the speed is controlled by changing the revolving speed of the engine. In this kinematic dependence the feeding speed is proportional to the speed of the engine (rotary planetary wheels around the electrode cylinder), the diameter of the electrode and the angle of inclination of the rollers.

Since the planetary wheels are hyperboloid they establish linear contact between the frictionally interacting working wheels with the cylindrical electrode. The theory of the crossing of two cylinders in a space curve--a hyperbole--has been used. Each straight line, which marks the hyperboloid surface of the working wheels is a line of contact between the same and the electrode. Under the pressure of the two working wheels leading to the electrode cylinder a wide contact spot develops. This area determines the high pushing effort.

The rounding of the electrode cylinder by the two hyperboles creates conditions for the plastic deforming of the electrode, eliminates internal and external pressures affecting it, and straightens it out. Studies have indicated that in this manner the electrode enters the flexible cable with a lowered resistance.

Added to these studied and practically confirmed advantages is the additional vibration effect which is the result of the revolving of the electrode cylinder by the working wheels. Figuratively speaking, after it has been fed, the electrode vibrates like a string and moves like a "snake." The movement of a snake is a natural phenomenon and is related to the lowest possible resistance while entering the flexible hose. All of this doubles the length of the flexible hose, as a result of which the efficiency of MIG-MAG welding machines reaches a wide perimeter, i.e., a qualitative leap is achieved in the application of automatic welding methods.

Studies made of the dynamics of planetary friction transmissions in feeding a continuous electrode made possible the creation of second generation systems. Here the necessary measures were taken to compensate for the harmful consequences of parasitical centrifugal forces in the new kinematics, on the one hand, and obtaining a steady pushing force on the electrode at high feeding speeds, on the other, in which the friction coefficient is reduced. Thus, in the second generation a design was developed ensuring a permanent pushing force within the entire range of feeding speeds and welding systems. Furthermore, this brought about a record-setting level of evenness of 2.5 percent (1 percent in robots) with a standard possibility for classical systems and first generation systems of 10 percent.

The further development of the third generation system involved the use of another technical consequence based on the nature of the new kinematics. Unlike the classical systems, in which the rotary transmission from the engine to the electrode takes place through a mechanical reduction gear the planetary method ensures the direct transmission of the same. The lack of a reductor enables the planetary wheels directly connected to the axle of the engine and together with the engine to be used as a recording instrument for the mechanical resistance in the hollow cable.

This characteristic was used in the creation of a tandem system (mastersleyf) of two wire-feeding systems operating along both sides of a lengthy flexible cable. The first, which is closer to the welding arc, is used as a recorder which, with an increased resistance, develops a feedback with the second system whose speed is variable and depends on the load of the first. This simple interacting system ensures the increase in the distance of feeding a continuous electrode by a factor of 7, with an even feeding consistent with the second generation. The third generation of planetary feeding is known in its two modifications--IZAMODUL and POLIZAPLAN.

In the course of the further development of planetary friction feeding, attention was paid to some necessary applications in robot welding systems. These systems, known as the fourth generation, use the electromagnetic tuning of the planetary wheels based on the diameter of the electrode and the force of the feeding. The necessary control of the normal pressure on the planetary wheels on the cylinder-electrode is done electrically. This makes it possible to include in a robot program both the type of material supplied (steel, pipe wire or aluminum), as well as its diameter. This ensures control over all the parameters of the process.

The method of planetary feeding of a continuous electrode is a Bulgarian invention named IZAPLAN. It was used for the first time in our country in 1965 and its subsequent new developments were patented between 1971 and 1973 in 18 different countries. Within that period the method and systems obtained 150 foreign patents and patented publications owned by the Institute of Technical Cybernetics and Robotics (ITKR) of the Bulgarian Academy of Sciences. The high technical parameters of the method were noted by leading countries and firms in the field of welding. In 1975 the Bulgarian Tekhnika Foreign Trade Organization sold a license for first generation systems to the Polysoude Company

(France), belonging to the Phillips concern, and to Messer Grisheim (FRG) belonging to the Hoehst concern. Subsequently, through Polysoude the Cyclomatic Company in the United States applied this method in America.

Along with mastering production in foreign companies, the first generation method and systems were successfully applied in 1977 at the Optikoelektron Machine Building Combine in Panagyurishte, which produced and exported more than 20,000 modules and systems. By 1981 substantial foreign exchange had been earned (21 million foreign exchange leva) and savings totaled about 12 million leva.

The second and third generations developed at the "Robot Welding Systems" section (ITKR of the Bulgarian Academy of Sciences) developed in 1979-1980 made possible the mastery and production of 18 modified IZAPLAN-II, IZAMODUL and POLIZAPLAN systems at the Sasho Kofardzhiev Experimental Base. The results were astounding: the second and third generation systems produced in Bulgaria, successfully competing with the first generation, produced in France and the FRG on Bulgarian licenses, were purchased by a number of companies (Niemack--FRG, Hulfteger in Switzerland, TWS in England, MIC in Belgium, Arcos in Italy, Ramon-Ramon in Spain, MIGOMAT in Australia, and Osaka Denki in Japan). Currently Bulgarian wire feeding systems hold all world records in the area of the most important welding parameters.

Bulgarian wire feeding systems earned seven gold medals at a number of international expositions of inventions and new equipment and specialized exhibits of welding innovations (in Geneva, Brussels, Nuremberg, Leipzig, Zhilina, Plovdiv and Brno).

At the present time, thanks to this Bulgarian scientific and technical accomplishment, more than 15 percent of all MIG-MAG operating equipment in the world is using planetary welding systems, i.e., 5 years after they were initially applied in Bulgaria and abroad. We hope that this is the result of the studied and confirmed technical advantages of the new method, which may also be the reason for welding engineers in the advanced countries to continue increasingly to apply our results in the field of this "magic"--arc welding.

By Senior Scientific Associate David Samokovliyski

Lens and Optical Data Recording and Processing Systems

Based on a new method for synthesis and computation of fourier-lens and coherent optical systems, the Central Laboratory for Optical Information Recording and Processing (TsLOZOI) of the BAN [Bulgarian Academy of Sciences] has made 12 inventions, six of which jointly with the Leningrad Precise Mechanics and Optics Institute (LITMO) and one with the USSR Academy of Sciences. The authors are Scientific Associate Engineer I. D. Nikolov TsLOZOI BAN) and Prof M. M. Rusinov and S. A. Radionov (LITMO--Leningrad).

Based on the joint inventions Registration No 47,568 "Lens Orto-Rusar-4" and Registration No 50,546 "Optical System," contracts are being drafted for joint patenting and licensing in the United States, Canada, Japan, the FRG, the GDR and France.

For the first time in world practice qualitatively new orthoscopic telecentric lenses with an ortho-Roussar-type removable pupil have been computed. They offer great advantages in work with coherent systems for fourier recording, reading and interpretation of data with increased compactness and reduced distortions. The original lenses and optical systems for data recording and processing are based on the modular principle: a base orthoscopic element and an anastigmatic apparational compensator.

In addition to optical and holographic data recording and processing, the ortho-Roussar lenses can be used in laser systems, microelectronics, cartography, machine building, photogrammetry, space research, and others.

The development has been applied at the BAN. The TsLOZOI has developed two one-of-a-kind ortho-Roussar-2M systems for various scientific and applied research, such as the development of highly efficient holographic filters in data recognition systems, the creation of adaptable optical processors for fast data processing, the development of optical-electronic memory systems with large memory banks, the testing of holographic difraction grids in earth telemetric electrophotometric systems. According to Soviet data the cost of a single such lens is 12,000 rubles.

The use of ortho-Roussar lenses in Bulgaria will save on foreign exchange and will improve the quality and efficiency of the optical systems developed in the country for computer equipment.

Automatic Fiber Extinguishing System (SAP)

The automatic fire extinguishing system is an invention (Registration No 49,071/1980) created and made at the Institute of Technical Cybernetics and Robotics of the BAN by a group of authors as follows: from the BAN: Senior Scientific Associate N. Milev (head), Corresponding Member A. Angelov, Engineer G. Kirilov, and Engineer E. M. Veselinov; and from the Central Fire Prevention Savety Administration of the Ministry of Internal Affairs, Engineer Khr. Nenchev, Engineer G. Penchev and Engineer T. Shopov.

The fire extinguishing agent used by the system is carbon dioxide. It involves an electronic system for signaling, selective direction of the action of the system and a structure for active weight control of the amount of carbon dioxide.

The automatic fire extinguishing system (SAP) will be used for the automatic extinguishing of fires in premises the very moment the fire breaks out, extinguishing it within no more than 3 minutes. The advantage of the system is that it protects two premises with enhanced operational safety. The system is applied in the comprehensive extinguishing of fires in premises containing extensive equipment and materials and areas with increased fire risk such as computer centers, book repositories, paint shops, special production facilities, and others.

The instrument went into regular production in November 1980 at the experimental base of the BAN Institute of Technical Cybernetics and Robotics. This terminated the import of similar fire extinguishing systems from capitalist countries, which has saved the country substantial amounts of foreign exchange. Annual savings total 1,385,000 leva. Great interest has been shown in this instrument on the part of the USSR. In 1982 the first Bulgarian system for automatic fire extinguishing with carbon dioxide will be commissioned in Moscow.

System for Automatic Control of the Technological Process at the Betonkontrol Concrete Manufacturing Center.

A system for the automated control of the technological process in concrete assemblies has been created at the BAN Institute of Cybernetics and Robotics, headed by Engineer K. Tropolov (the purpose is to stabilize the consistency of the concrete mixes and to reduce fluctuations in the tensial characteristics of the concrete).

It is a module microprocessor system which automatically measures the moisture content of quarry materials (sand and felt), corrects the initial prescriptions for the manufacturing of concrete mixes depending on the established moisture level, automatically establishes the dose based on the amended recipes, and controls the technological stages in concrete mixing and preparations for transportation.

In terms of the precision of measurement of moisture, dosing, stabilization of the consistency of prepared mixes and productivity, the technical and economic indicators of the system are considerably superior to existing Bulgarian controlling systems and are on the level of the best systems applied by the leading firms throughout the world.

The system includes two inventions. In 1982-1983 twelve systems will be applied by the branches of the Ministry of Construction and Architecture. Possibilities exist of applying the system in many other economic organizations and departments engaged in concrete manufacturing.

The expected economic savings from the use of the system at the Gen. Galetski Plant for Construction Structures in Pleven is about 135,000 leva; for the country at large it will exceed 5 million leva annually. In addition to savings from the use of the Betonkontrol system, the working conditions of the operators at concrete mixing centers, who are now working in heavy dust environments, will be improved.

'Karobeta' Orange-Type Tomatoes

A collective at the BAN genetics institute, headed by Senior Scientific Associate Khr. Georgiev has developed a new strain of "Karobeta" tomatoes used in the production of orange tomato juice with a high content of carotin and with a dietetic-prophylactic value and pleasant taste.

The "Karobeta" strain is a rare combination of a determinant habitus and orange fruits whose carotin content is higher by a factor of 6-8 compared with ordinary tomatoes. This is a top accomplishment in worldwide selection work. It is suitable for the use of the latest industrial technologies, including direct seeding and simultaneous harvesting. The strain is early, high yielding and resistant to the tobacco mosaic virus. Its average yield is 5 to 6 tons per decare.

The strain was applied experimentally in 1980 at the Bregovo Agroindustrial Complex in Vidin Okrug on 20 decares and at the Pordim Agroindustrial Complex in Pleven Okrug on 10 decares. During the 8th Five-Year Plan it will be applied on an industrial scale in the production of orange tomato juice for domestic consumption and export.

The use of the Karobeta strain is expected to yield considerable savings in the agroindustrial complexes, the canning industry and the export enterprises. The consumption of Karobeta-type tomato juice will be of great prophylactic importance in terms of the population's health.

5003
CSO: 2202/2

CEMA COOPERATION IN ENGINEERING CRITICIZED

Prague JEMNA MECHANIKA A OPTIKA in Czech No 9, Sep 82 pp 225-227

[Editorial: "CEMA 36th Session -- Stimulus for Intensified Cooperation"]

[Text] Another meeting of CEMA was held in early June, this time at the level of chairmen of councils of ministers of member states. This in itself is indicative that the program and its conclusions represent something out of the ordinary for the usual work of the council.

It is no secret that CEMA needed a stimulus for intensified work. This was the case because the orientation of the council's work, its scope and methods, have for a long time not corresponded to new needs and requirements. It is true that in 1972 the first secretaries of the central committees of our parties delineated a slogan and program of economic integration. There has, to be sure, been some improvement: so-called long-term target programs of cooperation have been worked out and there has been increased specialization in additional products and areas, but the basic problem still remains. We are still constantly faced with the problem of frequent lack of coordination of plans, in economic matters [each country] goes its own way, and frequent noncompliance with agreements sets off chain reactions in linked areas and economies. Although the basic basic directive on integration is still in effect, there has not been coordinated development of economic structures.

Evidence for this is provided by the following facts: Member states of CEMA have a 31 percent share of the world's population, 30 percent of industrial production, and only 8 percent of world trade. Their share in the production of basic raw materials exceeds their share in industrial production. We mine nearly half of the world's production of coal, 18 percent of its petroleum, and 35 percent of its iron ore, and produce 23 percent of world electricity and 39 percent of the world production of steel.

These facts are characteristic of the topics which we will discuss in the present article, written as a response to the 36th session of CEMA in Budapest. That is: the CEMA states belong to the group of economically developed countries; their production efforts are, however, focused more on raw materials and basic industry than on processing industry; a low share in world trade is evidence of poor connections to the international division of labor and underevaluation of both economic and scientific and technical cooperation.

Figures on our share in mining and raw materials production are also eloquent. Intensive economies are characterized by having large quantities of electricity and petroleum, which we lack; extensive economies are characterized by having a large production, which we have. It is interesting how few figures suffice to indicate our problems and, in the final analysis, those of the entire socialist camp.

This situation in itself lesds to a demand for the vigorous revival and intensification of an international division of labor and the implementation of true integration in the socialist camp, especially among CEMA member states.

We do not deny the possibility of increased international division of labor and economic relations with nonsocialist countries as well, but here our own efforts and readiness alone are not sufficient. We have always encountered discrimination measures in this area, with the leading role always being played by the United States, but today this concerns not only the United States but the individual EEC states. We are discriminated against collectively, in a planned fashion, and it is a question of global contingents of the entire EEC against all the socialist states, or the coordinated refusal to extend credit or prejudicial treatment in giving credit, for fabricated reasons of health and hygiene, or the like. These states are simply consolidating their own discriminating solidarity and cooperation. They divide us into favored and nonfavored, into those loyal to Moscow and those less loyal, and the situation is steadily growing worse.

At the CEMA meeting the following statement was made:

"The imperialistic circles of the United States and a number of other NATO countries have, with an aim toward developing political pressure, increased discrimination against CEMA member countries, and begun to use 'sanctions' and to limit trade and economic relations with them, especially with Poland and the USSR. They are intensifying the illegal policy of economic blockade of our brother Cuba. A declaration recently placed onto the agenda in Versailles indicates that the major capitalist countries intend to further complicate trade, credit and other economic relations with CEMA member countries."

There is of course no doubt that we will weather this out, that this is a repeat of the situation of the fifties, when the stimulus for imperialistic sanctions was the Korean War, or that of the sixties, when the alleged reason was the Cuban and the Berlin crises, but we still cannot remain indifferent to this new situation. After all, trade with the capitalist states continues to make up one-third of Czechoslovakia's foreign trade.

This is precisely why Czechoslovak economic circles showed such exceptional interest in the conclusions which were mentioned both in the proceedings of the last meeting of CEMA in Budapest and in particular in the speech by leader of the Soviet delegation, Comrade Tikhonov. At the meeting, this exceptional was conveyed by Comrade Strougal. And this is no small matter, as concerns the vital interests of the CSSR. Let us discuss this, following Strougal's address directly. We all know that the technical level in a number of production areas in the CSSR is lower than the world level. One of the reasons for this is that the large army of researchers and technical workers throughout the socialist camp is not working in a coordinated manner but in parallel, scattering its forces and thus not achieving optimal results. Connected with this is the intensification of manysided campaigns for cooperation in science and technology, coordination of an integrated cycle involving research and development, production and utilization, and public measures for the development of new technology and for decreasing the dependence of science and technology on the developed capitalist states.

We all know the great importance of nationally agreed-upon action and long-term contracts. Every country is managed in accordance with them. We also all know the economic and political harm which can result from noncompliance by one side. It is therefore, in our opinion, extremely important that agreements and contracts concerning coordination be the starting point for a short-term economic policy of CEMA member states. This would prevent some solution chosen by one state from causing a chain of complications in the relations with its partners. Such coordination allows us to react resiliently to economic developments within individual states.

We must consider as an important and relevant measure, albeit an unwritten one, the agreement that great responsibility for fulfilling cooperative deliveries should become a law, in a legal and political sense, which allows for no exceptions or concessions and which functions as a reliable driving force in the mechanism of integration. The work of the council and its organizations was openly evaluated from precisely this viewpoint of functioning of the mechanism of integration, in order that the entire mechanism might function perfectly and be prepared to react to changes in market and production demands. The operation of the mechanism would benefit from increased integration at the level of ministries, associations and enterprises, as Comrade Leonid Brezhnev mentioned in his speech at the 26th CPSU Congress.

We must consider as the most important relevant issues of the recent meeting four significant manysided agreements concerning robotization, microprocessor technology, the components bases of microelectronics and color television. These useful and necessary agreements strengthen international socialist economic integration in significant areas. They are aimed at contributing to the growth of labor productivity and labor-saving, and at eliminating laborious production operations and work in unhealthy environments. The goal and common denominator of these agreements is to attain a peak technical level in these areas, primarily on the basis of our own strengths and mutual cooperation.

We consider these four agreements to be revolutionary in that we are very well aware that we lag behind in implementing this movement of the scientific and technical revolution, primarily because we have not mastered the components basis for assembly of finished electronic products, thus raising their technical and economic level. It is even the case that, under conditions of the production process in the economies of economically developed states of the world, electronics has been transformed overnight from an attractive branch of industry to a strategic factor in continued economic growth, which is ascribed a basic role in eliminating barriers placed in the path of effective functioning of the economy as a whole. The extent of governmental support of the development of the industrially most progressive states (the United States, Japan, the EEC), and the fact that in the most liberal state economic systems programs of electronics are as a rule centrally followed, all only confirm this. It is even claimed that at present there are basically three conditions and key issues for growth: a sufficient energy supply, a large quantity of foodstuffs and future generation electronics. From this viewpoint, electronics in the CSSR is not a defective component or structural element of engineering but rather a multi-structural element of the entire Czechoslovak economy. Electronics is doing away with traditional production methods and technologies, fundamentally changing and developing sets of utility values, and changing the quality of social and labor conditions of people's lives. Within it there is forming a so-called "fourth" sector of the economy, the information industry, which is showing a tendency to become in the future the backbone of industrial development. A country will have claim to being eceonomically developed only if it subordinates its entire structure to this industry. This explains the reason and pressing need for priority growth of the electronics industry, not the fact that it somewhat "improves" the level of traditional areas and branches.

This was the particular viewpoint of the CEMA meeting in Budapest in discussing the role of electronics, and it is this particular viewpoint from which we will evaluate the significance of the above-mentioned four agreements and their content.

Intensified cooperation must follow the use of the specificity of electronics, which consists in an organic interface between the phases of development and production and in some cases in the joining of these phases with utilization of electronics output. This phase of electronics is exponentially increased by claims to specific demands for material inputs. In this connection the solution of such consequential problems by the forces of an individual member state of CEMA or through forms of cooperation thus far developed among CEMA member states is unthinkable. Most of the industrially developed states invest huge sums in such technology, and research institutes in this area employ as many as 10,000 people. There are six or seven firms in the world which can afford to expend such sums. It is definitely unthinkable that little Czechoslovakia might be able to expend such sums. The socialist camp, however, must expend such sums, for to continue to lag behind in this area means to subscribe to the economic backwardness of the economy as a whole.

Therefore, the main guideline of the current process of integration in electronics is considered to be a solution which utilizes forms of international association of research and development and production facilities, such as joint laboratories, production research associations and joint production facilities.

In the development of microelectronics, it is essential to master this path of the modern technology of production of highly integrated circuits, as well as to provide for sufficient special technological equipment to produce these. The output of this technological equipment is greatly in demand for research, development and production facilities. The Czechoslovak people may contribute to the joint solution of these problems, particularly in the areas of laser technology, x-ray and electron lithography, measurement devices, microassembly and layer technology.

A basic prerequisite for the development of the production of electronics output is a supply of high-purity materials for microelectronics, the present dependence of the large majority of CEMA member states on imports of such materials from developed capitalist countries being strategically undesirable. The production of such materials calls for qualitatively new technologies and special equipment, the facilities for which, considering the relatively small production volumes, could advantageously be constructed jointly by CEMA member states. The Czechoslovak people may participate within the framework of these joint production facilities by producing ultra-pure and reactive materials.

An important problem at the present time is the effective introduction of computer technology for use in the comprehensive management of production technologies in all branches of the national economy. The reason for this is a shortage of basic programming systems. There is also a shortage of all types of memories and a number of peripheral devices needed for the assembly of computer systems.

A solution of such problems in a situation which is equal to all CEMA member states requires the integration of production and planning facilities, and the Czechoslovak people can contribute here in both areas.

In the area of the technology of transmission, new and highly effective technological possibilities are becoming available as a result of the mastery of the production and utilization of optical electronics. This is a promising branch of transmission devices, which spare scarce metals, and whose use significantly increases possibilities for the cybernetization of the national economy. Likewise, cybernetization, by ensuring the production and introduction of industrial robots and manipulators, is a basic precondition for and component of an effective solution of the automation of workplaces and entire production systems both in industrial and nonindustrial branches. The use of industrial robots and manipulators is of exceptional significance for machine-building production, where a number of positive effects are becoming apparent.

The development and production of industrial robots and manipulators is proceeding in an uncoordinated manner, with a divided approach in research and development and in provisions for production, and although contractual documents have been signed, we lack production facilities and bases for the production of unified components and junctions, both mechnaical and electronic. The technical level of the types produced is inferior to the peak world level, as is the extent to which they have been introduced. We need to import from the developed capitalist states, at a considerable cost in foreign currency, essential junctions and components.

Czechoslovak interest is motivated primarily by the economic effectiveness of introducing industrial robots and manipulators. In addition, the area of industrial robots and manipulators offers promise as a production and export program which corresponds to the technical and production capabilities of the Czechoslovak engineering industries.

The bases have been created in the CSSR for further planned and gradual development of industrial robots and manipulators and for the robotization of production processes, but the wider introduction of industrial robots and manipulators and their development, research and production to the full extent necessary cannot be sufficiently effective without the required cooperation within the framework of CEMA member states.

An object of great interest to Czechoslovakia, which is also gradually beginning to interest the other member states as well, is the extensive coordination of the construction of nuclear power plants and the development of nuclear equipment. According to the USSR, which understandably occupies a decisive place in the research and development of this equipment, the CSSR is in second place. Since 1974, we have been building a production basis for nuclear engineering in Plzen, Vitkovice, Olomouc and elsewhere. We have constructed facilities and are now manufacturing reactors, steam generators, volume compensators, main circulation piping, main shutoff fixtures, and other components. We intend to advance in the production of such equipment at a higher technical level as well. We are practically in the middle of preparations for initiating the production of nuclear equipment with a unit capacity of 1,000 MW, which equipment should ensure the construction of nuclear power plants by no later than the year 2000.

This great interest by Czechoslovakia derives from the fact that nuclear energy is for the CSSR the only energy source with the capacity for long-term dynamic development. It is, not only for the present but for the next 50 years, practically the only possibility for ensuring the growth of primary energy sources. Nuclear power plants will by the year 2000 take over a decisive share of the output and production balance of electricity (in 2000 from 57 to 60 percent).

We are considering as part of nuclear energy sources also the use of these sources for supplying heat.

The development of the fuel and energy balance requires that we take into consideration, for all nuclear plants of the CSSR, the consumption of thermal energy for heating and, where appropriate, for technological processes. At present, the limiting distance for supplying heat and hot water is considered to be 50 km, for steam 25 km. Czechoslovak VVER-440 housing blocks are able to consume up to 416 MW of thermal energy, while VVER-1000 blocks can consume up to 1000 MW of thermal energy.

The construction of nuclear district heating plants, for which we have at present, looking 50 years ahead, developed preliminary plans for 14 localities, with a power supply of 200-3000 MW, has not yet been completely worked out from the standpoint of providing for the appropriate equipment.

As in every highest order innovation, the construction of nuclear power plants has given rise to a need for basic innovations in a number of areas of industry (primarily the metallurgy, engineering, electronics and construction industries), with related demands for investment and personnel provision for the necessary reconstructions. Basic innovations, especially in the metallurgy and engineering bases, have been completed in the past, and are underway in some areas at present, but in the future capital investment requirements for engineering will decline significantly.

Also of particular significance for the CSSR is the further expansion of cooperation between CEMA member states and developing countries, especially states with a socialist orientation. We are referring primarily to the Socialist Republic of Vietnam, Cuba, and Mongolia, but also to Afghanistan, Angola, Ethiopia, Yemen, Laos and Mozambique. The aim of this cooperation is primarily to strengthen the government sectors of the economies, to utilize their natural sources and to intensify the training of native personnel. We have rather significant possibilities in this direction. We have already mentioned that at present the development of the Czechoslovak economy is limited mainly by shortages of raw materials and qualified personnel. Both of these problems can to some extent be solved through cooperation. There are enough topics, if our enterprises approach them without bias and with initiative. It is, to be sure, true that it is more convenient to have a factory in the Malesice district of Prague or in the Petrzalec district of Bratislava and to employ personnel with 50-100 year traditions of industry, but thinking like this solves nothing. If world producers thought like this, there would be no production in Singapore, Hongkong, India, the Philippines, etc. This must involve assembly line, technically less demanding production, relatively labor intensive and marketable, and located in the cooperating country. These should also be production facilities which are lacking in the CSSR, such as those for automobiles, transducers, small hydroelectric power plants, pumps, small gasoline engines, tools, etc.

Finally an agreement on coordination, not only of plans but of economic policy as a whole for the period 1986-1990, formed the concluding topic of the 36th session of the council, which, as regards scope, will mean the opening of a completely new stage in its work, a stage of intensive development of all society. It can therefore be said with justification that the CEMA meeting in Budapest means another fundamental step forward in consolidating mutual cooperation. Not only from the viewpoint of specific agreements and documents which were adopted at the meeting, but to an equal degree from the viewpoint of defining and unifying, or at least bringing closer together, opinions, and openly and critically evaluating the situation, its possibilities and mutual responsibilities.

9832
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ZEOLITE IN LIVESTOCK FODDER TO SAVE GRAIN

Bratislava ROLNICKE NOVINY in Slovak 12 Nov 82 p 3

/Article by Dusan Koncek: "Fodder Mix with Additive of Zeolite, a Valuable Mineral"/

/Text/ In recent years we have had to cover the high consumption of meat in our republic by importing grain and fodder, especially from capitalist states. During the Sixth 5-Year Plan alone we imported almost 8 million tons of grain and in addition 3.6 million tons of concentrated protein fodder. Approximately every fourth kilogram of meat consumed between 1971 and 1980 was produced from imported ingredients. And importing these nowadays is becoming more and more demanding of foreign exchange. Prices on capitalist markets are increasing and such importation has exceeded the limits of our capacity as regards foreign exchange.

Seeking nontraditional sources of feed, in addition to increasing production of traditional ones, is one of the ways that is well established here. We have plenty of unused resources in this area. The preparation of livestock fodder is of basic importance in accelerating the growth of livestock production. In the CEMA countries, for instance, the preparation of fodder from petroleum products is under study in goal-oriented programs. All this, however, means taking from where, on the other hand, it is needed.

However, taking it from wherever it is located and where so far nothing is being done with it, taking it from the bosom of nature without doing any harm, that would really help reduce grain imports and be a considerable contribution toward self-sufficiency.

In 1756, the Swedish mineralogist Cronstedt discovered the zeolite group of minerals, technically known as crystalline hydrous aluminosilicates of alkalis and alkaline earth cations and gave them the Greek name zeolite which, translated, means "boiling stones." These, however, have been well known for decades to the inhabitants of Nizny Hrabovec and Kucin in what is now the district of Vranov. They had early recognized, unknowingly, the properties of this rock, light green to light gray in color. It was put to good use in their cellars. Everyone who paved his cellar with this stone, obtained from the nearby mountain, could be certain that the vegetables, potatoes or fruit stored in his cellar would keep fresh until late spring. Farm animals also wandered here and they liked the taste of the rocks.

Five years ago members of the Geology Department of Comenius University in Bratislava came to this region and reported on the interesting occurrence of zeolite near the towns of Nizny Hrabovec and Kucin. Up to that time we had not encountered any occurrence of zeolite here, even though zeolite and its mineral components have been used worldwide for decades. Mineralogical examination which followed the interesting findings showed that the chief mineral component of this tufaceous rock is a zeolite mineral called clinoptilolite.

This discovery produced a reaction among geologists and then also among researchers. In fact, there is literature on the use of this rock, not only in agriculture but particularly in it, as used in such countries as the USSR, the United States, Bulgaria, Hungary, Japan and others. It sufficed to look into this literature to see that the uses of zeolite offered interesting possibilities here too.

At first glance this is a logical question: What does Gejza Langer, enterprise director of the Ceramics Works in Kosice, have in common with agronomists? Nowadays this question is irrelevant because agronomists are becoming more aware of this Gejza Langer than they are in his own factories. Agricultural enterprises are turning to him and to the commercial department with requests indicating an interest in zeolite. It was precisely Enterprise Director Gejza Langer who did not hesitate even a moment when it came to starting down quite challenging but very promising paths. And so began his collaboration with geologists and with employees in the Department of Internal Diseases of Ruminants and Hogs at the VSV /College of Veterinary Medicine/ in Kosice. The driving force of this machine was and still is Gejza Langer. With the resources of his plants he went about extracting the first tons of the rock for experimentation and had them ground into the necessary sizes in his plants. And that was not all. Around the mountains of Nizny Hrabovec and Kucin he set in motion a merry-go-round which, to be sure, still does not turn enough, but the results of clinical tests showed he was right. It pays to aim high when something like this case shows up. I think it suffices to say that before long the Slusovice JRD /Unified Agricultural Cooperative/ in the district of Gottwaldov was interested enough to buy a great amount of the rock...And this agricultural enterprise is not used to buying a pig in a poke.

The activity of the enterprise director was great. Doc MVDr Pavol Bartko, CSc, of the VSV in Kosice and Prof MVDr Leopold Vrzgula, CSc. of the Institute of Experimental Veterinary Medicine, undertook, together with their coworkers, to verify the suitability of using zeolite in livestock production. Those first small-scale experiments showed that zeolite added in a ratio of 5 percent to feed mix had no negative effect on the health of the animals. On the contrary, there was an increase in weight and improved conversion of nutrients. The use of zeolite had a favorable effect on dietetic diarrheal symptoms and tests to eliminate odors in large-capacity buildings were also positive.

When Enterprise Director Gejza Langer learned of these results he gave the merry-go-round another whirl. It's a wonder he did not wear out his legs going to offices just to manage to get these results, together with MVDr P. Bartko, CSc, to the world conference which was held in Rochester, in the United States. He succeeded. The two enthusiasts did not go on a junket, rather they wanted not only to give their presentation, but to hear something of interest about zeolite and also to learn something. The results of the small-scale experiments of our researchers aroused well-deserved attention "across the pond." Zeolite has been known in the United States for over 40 years. They do not use it as an admixture to fodder because they have enough grain and the cost of their grain is actually the world market price. But they have experience with the use of zeolite in water management, in purifying waste waters, in filtration, in fishpond management and in trapping gases. In other countries, as for example in Japan, zeolite is proving useful in raising poultry, in plant production, increasing the fertility of the soil and in cultivating fodder crops.

Zeolite is very important to us in that first phase of investigation, in conserving grain. And in this regard, at the conference it was shown that we are a jump ahead of the world, even though so far only in experimental feeding. And we will be working on this use of zeolite for 3 to 4 years.

After the clinical tests, or rather small-scale tests, the researchers started on a more challenging job, to prove their claim about the good and positive properties of zeolite in livestock production through large-scale experiments under production conditions.

These tests are now going on. Some have already been completed and a conclusive report on the results will be published in the spring of next year. Even so it can now be said that zeolite from Nizny Hrabovec and Kucin as an additive to feed mixes is a very useful thing, not only from the point of view of the national economy.

Prof MVDr Leopold Vrzgula, CSc, who is the chief coordinator of the project to research the preparation and verify the suitability of using zeolite in livestock production, says, apropos the tests:

"The results of our observations in clinical tests of adding 5 percent zeolite to feed mixes are very favorable; frankly stated, they exceeded our expectations. Except for the noteworthy weight accretion in the test groups compared with the control groups, we did not ascertain anything substantive that would have a harmful effect on he animals. When we learned that the weight increases in the test animals were greater, we asked ourselves why this was so. The fact is, the researcher must probe deeply, just as in computation: when we add up two figures we have to test for the correct answer. There is no point in burdening the reader with scientific theories, even though they are significant to us, but one can perhaps imagine the process like this. When we give the animals zeolite, where its mineral component clinoptilolite plays a large, determinant part, then the process of digesting food lasts considerably longer. Zootechnicians know how complicated the digestive process is, what all goes on within the animal's stomach, the kinds of influences there and the like. For lay persons it should be said that clinoptilolite binds the nutrients in the stomach and prevents them from leaving quickly. That 'factory' which the animal's stomach resembles, makes better use of the nutrients, which is later reflected in increased weight and also the quality of the meat. Tests, for example, showed that young cattle had better appetites for feeding. Results with diarrheal problems are noteworthy. The addition of zeolite to the feed mix stopped diarrheal symptoms but, what is more, they did not return as is the case nowadays, where after the use of antibiotics the problem recurs.

"We found similar results in experiments with sheep. Moreover, in the case of sheep it is possible to add zeolite to their bedding to prevent an infectious hoof disease. But this also applies to beef cattle where the addition of zeolite to their bedding makes it drier, eliminating odors."

It can also be said that, on the basis of clinical tests, zeolite is opening the gates to the versatility of its applications. For the time being, however, we have directed our experiments primarily toward livestock production. Known tests up to now under production conditions only confirm that from the national economic point of view the merry-go-round should greatly speed up its revolutions around the uses and application of zeolite.

For example, before adding zeolite to the feed of hogs the control specimens each gained 0.428 kg per day and the experimental ones 0.486 kg. The difference is apparent. There is also economy in the consumption of feed. In the same test, it was 3.68 kg for the control group and 3.61 kg for the test group.

A test with the feeding of 115 bulls over 6 months with the addition of 5 percent zeolite to their fodder mix has also been completed. Weight increases of the control group were 0.828 kg, of the test group 0.853 kg. This is a clear plus with a high economic impact. Another experiment with 1,888 pigs over 6 weeks showed that the weight increase per animal per day was 0.305 kg in the control group and 0.315 in the test group. The control group consumed 2.31 kg of feed, the test group 2.25 kg.

The results of clinical experiments are practically identical with those done under production conditions. Even though all of the production tests are not completed, one thing can be said today: By adding zeolite to the HZ feed mix, better weight increases are obtained, great savings in feed are achieved and the animals' health is improved, with fewer dying. And these are significant factors which indicate that the results of the tests should be put into practice as soon as possible.

Nothing has been said of the fact that other positive factors are also detected here. Adding zeolite to the feed of pigs results in greater weight of the pigs. Certainly positive results are shown also in the use of zeolite in raising poultry. We have already started with these tests, for example, at Salgovik near Presov. The experiences from Japan, where they are already doing this, indicate that by adding zeolite to poultry feed its usefulness was increased up to 20 percent, weight accretions increased, there were fewer deaths and the poultry droppings were denser. The Japanese are also making successful use of zeolite to improve the microclimate in large poultry houses.

Experiments with livestock production speak clearly. Even those orders at the commercial department of the Ceramics Works in Kosice, though it must be said that zeolite is not so much of a miracle that we should rely on it, as is the custom with us. It is, though, a big help in savings of grain. It is literally a pile of bread. We just have to bite into it.

The entire cycle of tests and their official results are to be concluded next spring. Employees of the Geological Survey have everything nicely mapped out, all prepared from those positions of theirs. They can already lay it on the table and say, "So you can begin with the mining, processing and production." Meantime, raw materials for the tests are being extracted in small quantities by the Ceramics Works in Kosice, on their knees, so to speak. Work should be started in a few months when the results of the tests are evaluated. Except that for the time being everything is on the back burner. Research on the processing, verification and application of zeolite is in the plans of departmental research of the Ministry of Agriculture and Food /MPV/ of the SSR. Except that, while the Vrzgula people from the VSV in Kosice, the Geological Survey and the Ceramics Works (they are not in the SSR MPV department) are doing everything to make use as soon as possible of the results and possibilities of zeolite, we find that the Research Institute of Soil Science and Plant Nutrition has not even started with its tests. Meantime, at a recent conference held at the Ceramics Works, we heard that successful use of zeolite in nuclear power plants is showing up. From this point of view, it is clear that the research task in the research institute itself, which is in the SSR MPV department, was not duly appraised and, on the other hand, that it was not supposed to be only the departmental task of the SSR MPV. The procedure whereby a departmental research project becomes one of the statewide research projects is a protracted one. But it need not be so if in the department itself all components discharged their responsibilities in time.

Persons from the Research Institute of Soil Science and Plant Nutrition came to the meeting mentioned earlier without reporting any kind of results and their employee said a few words about the kinds of soils in Slovakia. After all, we know that. What we want to know is how zeolite is being used in plant production. In Bulgaria and in Hungary, they successfully completed testing zeolite tuff in plant production. Likewise, in the USSR and Romania they already have the results and are utilizing the mineral substrata successfully in practice. At the coordination conference mentioned above, the president of the JRD from Slatinske Laze came forward with some initiative. That cooperative farm wants to produce a feed mix with zeolite added. One must appreciate that tests are being run by them, too, and in this cooperative they certainly can figure out what to do with them.

I would like to point out his initiative and his courage to stick with it when something like this is going on. Except that when I think about it as a national economist, then it seems silly to haul zeolite from Vranov to Zvolen and then that fodder mix back to eastern Slovakia. From a Slovakwide point of view, it would be sensible if there were only one central factory for such fodder mixes. But then why couldn't one be somewhere near Vranov?

Finally, going back to that coordination conference, to one impartial participant it seemed that all the skirmishers made a great deal with their elan and enthusiasm over utilization of this valuable mineral. It also appeared, however, that there is too much on their shoulders. There should be some coordination of all components that are taking part in the matter. And since the results of using zeolite in livestock production are quite clear, they should start mining, processing and grinding the "boiling stones." We could benefit from the highly important effects on the national economy, the millions of savings in grain feed and the substantial increases in yields from livestock production. Not to mention where else we might encounter its usefulness. Zeolite really offers an unusual range of applications and it is cheap, coming from nature itself, without any detriment to its "health."

In the next article on the use of zeolite, we will visit an agricultural enterprise where we will encounter the use of zeolite under production conditions as an additive to feed mixes. We will try to ascertain what effect it is having and what kind it may have in the future.

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ORGANIZATION, FUNCTIONS OF ACADEMY CENTRAL OFFICE DEFINED

Budapest AKADEMIAI KOZLONY in Hungarian 27 Sep 82 pp 137-153

[Appendix to Directive No 20/1982 (A.K. 8.) MTA-F of the secretary general of the Hungarian Academy of Sciences, concerning the organizational and operational regulations of the Central Office of the Hungarian Academy of Sciences]

[Organizational and Operational Regulation of the Central Office of the Hungarian Academy of Sciences]

[Text] Chapter I

The Role of the Central Office in the Organization of the Hungarian Academy of Sciences

Paragraph 1

(1) The task of the Central Office is: to perform the decision preparation, planning, organizing, coordinating, implementing and control activities necessary for the operation of the Hungarian Academy of Sciences (hereinafter: academy), and to perform the office work corrected with this.

(2) The Central Office handles the administrative tasks which fall on the academy in directing research nationwide, as well as the tasks related to the direction and control of the academy's institutions; it also cooperates in the organizing and management work needed for the activities of the various bodies.

(3) In the national administrative organization, the Central Office functions as a national administrative organ with nationwide authority.

(4) Supervision of the Central Office is provided by the academy's secretary general by his legal authority as head of the organ with nationwide authority; the directing is accomplished with the cooperation of his deputies and of the office manager appointed by him.

Paragraph 2

(1) The secretary general handles the tasks which fall on the academy in the nationwide direction and coordination of research projects, with the cooperation of the Central Office--and relying on the academy's scientific bodies.

(2) These tasks are as follows:

--taking care of implementing the research or research coordinating activities assigned to the academy by the Council of Ministers, and of preparing proposals, opinions and evaluations related to scientific research;

--participating in developing, modifying and executing the national research plans;

--organizing and directing the main directions and programs in the national research plans and assigned to the academy;

--preparing the academy's position in connection with the proposal and statute drafts submitted by the ministries and organs of nationwide authority for opinion;

--supporting research projects conducted at other than the academy's research facilities--primarily at the universities--which particularly serve the scientific policy goals; promoting the cooperation of the academy's and other research facilities;

--promoting the practical application of research results with the cooperation of the affected ministries and organs of nationwide authority;

--implementing those national assignments of the personnel policy tasks affecting research which have been assigned to the academy, and contributing to the enlistment of researchers in institutions which do not do research as their basic task;

--examining the scientific basis of major national investments and furnishing an opinion about the major investments on this basis;

--national coordination of Hungarian participation in nongovernmental international scientific organizations;

--national coordination of the international scientific connections of the domestic social science research facilities;

--implementing the domestic tasks related to the United Nuclear Research Institute in Dubna;

--handling our country's tasks in the "Interkosmos" space research cooperation, and coordinating domestic space research;

--handling the operation and modernization of the system which provides the research work with professional information;

--handling those national tasks of managing the research instruments which have been assigned to the academy;

--handling the other national administrative, research organization and research directing tasks assigned to the academy by the Council of Ministers.

Paragraph 3

(1) The secretary general handles the implementation of tasks related to the supervision and directing of the academy's institutions, with the cooperation of the Central Office--and relying on the scientific bodies of the academy.

(2) These tasks are as follows:

--taking the initiative in establishing, transforming and closing down the academy's research institutions;

--establishing, transforming and closing down enterprise organizations which belong under the academy's supervision;

--defining the basic functions of research facilities and other institutions which belong under the academy's supervision;

--determining the organizational and operational principles of the academy's institutions;

--analyzing and evaluating the operation of institutions which belong under the academy's supervision;

--issuing normative directions whose authority covers the institutions supervised by the academy;

--occasionally assign some specific research, expertise and opinion-rendering, etc., tasks;

--implementing the initiatives and measures which promote practical application of the scientific results achieved by the academy's research facilities, supporting research efforts and developing new formats of operation;

--aiding and organizing the contacts of the academy's research facilities among each other and with other organizations outside the academy (research facilities and enterprises and institutions interested in research); analyzing the experience of the cooperation;

--directing the publishing of scientific books and magazines in the interest of publicizing the results of scientific research--with the cooperation of corporate organs;

--promoting the utilization of inventions developed in the academy's institutions and implement the academy's invention policy principles;

--analyzing, coordinating, and planning the budgetary, investment, wage and personnel needs of the academy and of the institutions it supervises, distributing the financial means and personnel approved by the Council of Ministers in accordance with research policy goals, and supervise and control the economic operation of the institutions;

--supervising and controlling the personnel work of the institutions supervised by the academy;

--issuing guidelines, directives and normative regulations for the academy's institutions concerning international scientific relationships;

--providing supervision from the legal viewpoint for the scientific associations and companies which belong to the academy;

--handling the reports and complaints of public interest related to the operation of the organs which are supervised by the academy;

--and further, handling all those other activities which are related to the work of supervising and directing, or which the secretary general assigns to it for handling from time to time.

Paragraph 4

Handling the preparatory, organizing and administrative work necessary to implement the tasks of the scientific bodies defined in their bylaws and in special regulations is the task of the Central Office.

Chapter II

Management of the Central Office

Paragraph 5

The Secretary General

(1) Within the framework of the statutes which apply to him, the secretary general directly, or indirectly through his deputies, directs the implementation of the tasks detailed in para 2 and 3 of Chapter I, and of other tasks within his authority, in accordance with the contents of the resolution of the Council of Ministers and with the bylaws in effect at the time.

(2) The secretary general makes the decision or takes the necessary steps in all matters which the statutes expressly refer under the personal authority of the secretary general, or which he takes into his personal jurisdiction.

(3) The secretary general has the personal authority to act especially in the following matters:

--according to the terms of law decree No 6 of 1979 dealing with the academy, in representing the academy as an organ of nationwide authority, in dealing with superior and concordant organs;

--in submitting presentations, proposals and reports to superior and concordant organs;

--in issuing the secretary general's normative directives, and measures aimed at the implementation of higher order statutes and other regulations;

--in issuing orders concerning the establishment, reorganization, and closing down of institutions, enterprises, and service facilities supervised by the Central Office of the academy;

--in the planning and distribution of financial and intellectual resources necessary to operate the academy's institutions;

--in determining the organization and operating rules of the Central Office, and in approving its working plan and control plan;

--in submitting proposals for governmental decorations, and in the granting and revoking of the "For Excellent Work" order and other nongovernmental decorations;

--in determining the personnel policy to be followed in the Central Office and in the institutions it supervises--within the framework of the statutes in effect--and in designating important and confidential jobs;

--in the theoretical guiding of tasks which fall onto the Central Office from the academy's domestic and foreign contacts;

--in providing guiding principles for the academy's information, press and propaganda activities.

Paragraph 6

The Deputy Secretary Generals

(1) The deputy secretary generals independently direct the work of organizational units placed under their supervision by the secretary general and handle all the tasks the secretary general assigns to their spheres of activity.

(2) They make decisions in matters referred to their authority, inform and receive reports from the heads of organizational units they direct, and regularly inform the secretary general about their activity.

(3) Upon case-by-case approval, they represent the academy in domestic and foreign organizations, in connection with their supervisory work in negotiations with the appropriate leaders of ministries and organs of nationwide authority.

(4) With the cooperation of the main departments they supervise, the deputy secretary generals.

--coordinate the development of research concepts;

--follow the work of the research facilities with attention, analyze, provide opinions about and evaluate the activity of the research facilities;

--initiate and support the working relationships among the research facilities and with other institutions.

(5) The deputy secretary generals exercise the rights of employer according to specific regulations.

(6) In order to perform their jobs, the deputy secretary generals may make use of the cooperation of any main department or institution supervised by the academy. Inasmuch as the measures they take may affect the supervisory sphere of authority of another deputy secretary general, they inform the deputy secretary general in question so affected.

(7) If the secretary general is unavailable, the deputy secretary generals also handle the tasks which belong under the personal authority of the secretary general, according to the order of succession designated by him.

(8) If the deputy secretary generals are unavailable for an extended period of time, the secretary general provides aubstitution for them.

Paragraph 7

The Office Manager

(1) The office manager appointed by the secretary general exercises internal office supervision over all organizational units of the Central Office, which means supervision of operation, internal management, and administration.

(2) The office manager takes care of modernizing the technological and organizational conditions of office work, strengthening office and work discipline, rational utilization of the working hours budget, ensuring proper working conditions for the personnel, etc.

(3) The office manager exercises full control over the organizational units placed under his direct control.

(4) The office manager organizes, coordinates, directs and controls the implementation of tasks contained in the resolutions of the secretary general and other management persons in the work plans and in other decisions mandatory for the Central Office.

(5) The office manager represents the Central Office in working relationships which exist with the appropriate heads of national administrative, social, and interest-protection organs.

(6) In those cases when implementation of a higher level statute or effectuation of other measures does not make it necessary for the secretary general to issue normative directions, the office manager--on the basis of authorization from the secretary general--may issue mandatory regulation, directives, circulars, etc., for the Central Office and for the academy's institutions.

(7) The office manager exercises the rights of employer within a sphere of authority defined by special regulations.

Chapter III: General Tasks of Employees of the Central Office

Paragraph 8

Main Department Heads, Their Deputies, and Leading Employees

(1) The main department heads and independent department heads (hereinafter: main department heads) are responsible for directing the work of organizational units placed under their supervision.

(2) Among the general tasks of the main department heads is to

--organize and direct in their specialty areas the planned professional and economical implementation of tasks deriving from the resolutions of higher organs, from the organizational regulation and work plan of the Central Office, and from the resolutions and decisions of the secretary general, his deputies and the office manager, and to supervise this implementation; to

--define the job assignments of workers of the organizational unit they head and provide the necessary working conditions for implementing these tasks; to

--encourage the constant improvement of political, economic and professional knowledge as well as the knowledge of foreign languages for themselves and for their employees.

(3) It is within the sphere of authority of main department heads and their responsibility to:

--maintain contacts with the appropriate leading employees of ministries and organs of nationwide authority appropriate for their areas of operation;

--develop and represent the viewpoint of the organizational unit they head in outside organs which belong to their area of operation and, based on specific authorization, represent the viewpoint of the Central Office;

--maintain contacts with foreign organs in matters corresponding to their area of operation on the basis of authorization granted by the secretary general or his deputies;

--make suggestions for building up and operating the organizational unit they lead;

--make decisions or issue opinions in personnel and disciplinary matters of the organizational unit's workers according to the order of authorities approved by the secretary general;

--according to the rules dealing with exercising the rights of employer, participate in qualifying the unit's workers, make suggestions regarding the pay, bonuses or recognition of the workers, or express an opinion in connection with such initiatives arriving from elsewhere, and within the organizational unit coordinate the times for vacations and authorize vacations.

(4) A separate section contains the special tasks of main department heads according to the characteristics of the individual main departments.

(5) The deputy main department head substitutes for the main department head in his absence, and in harmony with the characteristics of the main department participates in directing the main department on the basis of distribution of work as determined by the main department head, handling the tasks referred to his sphere of authority.

(6) The leading employees of the main departments (chief advisors, advisors) perform organizing, coordinating, supporting, directing, control, etc., work in matters which belong in their area of specialty, independently and on their personal responsibility, based on assignment and authorization by the main department head and in representation of the Central Office.

Paragraph 9

Scientific Secretaries

The scientific secretaries perform their work under the theoretical and professional guidance of the academy's chairman, vice chairmen, or department chairmen, within the framework of the Scientific Corporate Secretariat, under the direct supervision of the secretariat's head.

Paragraph 10

Department Heads and Their Deputies

(1) The department head and independent group leader (hereinafter: department head) is responsible for the operation of the organizational unit under his leadership. According to the orders of the main department head, he organizes, and in his area of specialty, directs the planned, professional and economic implementation of tasks which belong to the unit he supervises, and supervises this implementation.

(2) The deputy department head handles the department head's duties in his absence, and also directs and supervises the work of employees assigned to him, and in addition to this he also handles case-expediting activities.

Paragraph 11

Workers (Case Expediters)

(1) Case expediters handle matters with personal responsibility which belong to their job areas, as well as matters assigned to them by the leaders.

(2) Case expediters must be familiar with their areas of specialty, with the academy's tasks, with the general rules of case handling, the statutes in effect concerning their area of work, the regulations affecting the work of the organizational unit, etc.

(3) Generally only his immediate superior may give orders to a case expediter. If a higher leader gives a direct order to a case expediter, he must afterward inform his immediate superior about this.

(4) Case expediting and assistant workers are required to handle the tasks determined for them by their supervisor.

Chapter IV: Advisory Organs

Paragraph 12

The secretary general and the Central Office operating under his supervision primarily rely on the academy's bodies as advisory, opinion-rendering, and suggestionmaking organs--in accordance with Paragrph 32 of the bylaws--in handling tasks which derive from directing nationwide research, and from supervising the research projects conducted in the academy's institutions.

Paragraph 13

(1) In order to help handle the tasks which fall upon the academy within the framework of directing and coordinating nationwide research, the secretary general operates the Research Policy Council as an opinion-rendering and suggestionmaking organ.

(2) In the interest of promoting the implementation of specific directing tasks, the secretary general may set up professional directing committees and various ad hoc advisory organs as opinion-rendering, suggestionmaking and decision-preparing organs.

(3) The secretary general holds secretary general's conferences in the interest of preparing administrative- and research-organizing decisions which affect the academy or the Central Office as a whole, and also for evaluating the academy's presentations, reports, etc., submitted to the superior organs, as well as in the interest of promoting the organization, systematic review and evaluation of office work.

(4) The deputy secretaries general hold deputy secretary general's conferences as necessary in matters which affect several office divisions.

(5) The office manager holds office manager's conferences for familiarization and discussion of tasks before the organizational units of the Central Office, as well as for evaluation and control of the work done.

(6) The main department heads hold main department conferences to discuss the tasks before the organizational units, and to control the work.

Chapter V: Organization of the Central Office

Paragraph 14

(1) The Central Office is divided into the following main departments:

--main scientific departments:

Main Department for Natural Sciences
Main Department for Social Sciences

--functional main departments:

Main Department of Personnel
Main Department of Research Organization
Main Department for International Relationships
Main Financial Department
Main Administrative and Legal Department

(2) Concerning the place they occupy in the organizational order, the following organizational units are judged on the same level as the office's main departments:

Interkosmos Council Secretariat
Scientific Corporate Secretariat
Secretariat of the Scientific Qualification Commission

(3) In the absence of regulations to the contrary, in applying the current regulation the organizational units listed in Section (2) must be considered as main departments of the Central Office.

(4) The secretary general may set up permanent or temporary offices, secretariats, services, etc. for handling unique (branch, coordinative, etc.) tasks. The place of these in the organization is determined at the time they are established.

Chapter VI: Operational Rules of the Central Office

Paragraph 15

The Basic Principle of Case Handling

(1) Tasks must be handled creatively, with initiative, independently, quickly and accurately, in a well-considered and responsible manner.

(2) Those procedures must be applied in case handling which increase the independence and responsibility of institutions and rationally decrease administrative activity.

(3) Primarily those regulatory, organizational and other tools and methods suitable for orientation must be used for the necessary influencing of the main processes of research activity which shape the interest relationships;

support must be given to the research undertakings which promise valuable new results; to the outstanding basic research projects; while make-do activity valueless from the scientific and practical viewpoints must be cut back.

(4) During the course of case handling, one must proceed in cooperation with the appropriate corporate organs of the academy in all matters whose importance requires this.

(5) The main departments are official organs on the same order and are obligated to perform their activities in close cooperation with each other; during the course of solving some concrete problems this being on the same order may be temporarily replaced by dependence, super- or subordination.

(6) All workers must be familiar with and apply the regulations concerning case handling.

Paragraph 16

General Rules of Case Handling

(1) Within the sphere of official tasks, cases must be handled on their merit, observing the statutes which concern them, the superior's guidance, and the designated deadline. The facts and conditions needed to make the decision on its merits, as well as the expected consequences of the decision, must be clarified in all cases.

(2) The general deadline for handling a case is 8 days, calculated from the day the case handler receives the document. Governed by the nature of the case, the appropriate leader may specify a shorter or longer case-handling deadline than this. If the deadline is established by statute, the statutory regulation must be followed.

(3) Work must be organized in organizational units in such a way that the person responsible for handling each case, or for failing to handle it, should be identifiable.

(4) If the history of the case handled cannot be established from the document itself, a written summary of it must be prepared and attached to the document.

(5) Any agreements reached within the framework of direct working relationships concerning the handling of a case on its merits, if no record or notes of it were made, must be reduced to writing according to the contents of the previous section.

(6) If the case was handled on the basis of a supervisory directive with which the case handler or the person initialing it does not agree, the opposing opinion must be recorded on the document, specifying the reasons for it.

(7) Workers of the Central Office are obligated to keep national secrets and service secrets they may have learned during the course of handling a case. Documents containing a national or service secret may be taken or send abroad according to specific regulations concerning this.

(8) Case expediting and case handling must be performed according to the regulations of the document-handling regulations.

(9) If, on the basis of this regulation, which organizational unit has the authority to handle a certain case is not clear, the office manager will specify the organizational unit responsible for handling the case.

Paragraph 17

Cooperation Among Main Departments

(1) The main departments perform their activities in close cooperation with each other. This cooperation must be initiated primarily by the main department responsible for implementing the given task. In matters which belong within the sphere of tasks of certain main departments but also affect the spheres of tasks of other main departments, one must proceed by involving the other main departments. In contested questions which occur during the course of this procedure, an attempt must be made to develop a common standpoint by way of coordination. If this leads to no result, the contested issue must be submitted to the office manager who will make the decision under his own authority, or the matter must be prepared for the secretary general or--depending on the division of tasks--for the appropriate deputy secretary general for decisionmaking.

(2) [sic] Scientific departmental secretariates operating within the framework of the Scientific Corporate Secretariat maintain direct contact with the main departments in matters which belong within their sphere of tasks.

Paragraph 18

Cooperation with Corporate Organs

(1) The Academy Coordinating Conference handles coordination of the corporate and professional administrative work conducted in the academy's area of activity.

(2) The main departments of the scientific branches systematically cooperate with the scientific departments corresponding to their professional areas.

(3) The heads of main departments of the scientific branches pay regular visits to the department chairmen and conduct discussions about the most important research management and other timely tasks and about implementation experience.

(4) The leading workers of the main department of the scientific branches in question (corresponding to their professional areas) participate in departmental meetings and provide information there when requested to do so about the main department's activities, about measures which have been taken or are planned; they use the opinions heard at the departmental meetings in their work.

(5) The leaders of main departments of the scientific branches ensure that the departments be able to analyze and evaluate the work of the academy's research facilities continuously and in a planned manner.

(6) The heads of main departments of the scientific branches see to it that the scientific departments are given the opportunity to state their opinions and make suggestions before all research policy decisions of major significance--affecting their professional areas--are made; the departments are kept informed about the use of these opinions and suggestions.

(7) During the course of performing their activities, the functional main departments maintain systematic contact with the scientific departments.

(8) Heads of the main departments of the scientific branches systematically invite the scientific secretaries of the affected departments to the working conferences of the main departments of the scientific branches.

Paragraph 19

Maintaining Contact with Organs Outside the Academy

(1) Organizational units are authorized to proceed to maintain official contact with outside organs in matters within their authority or referred to their authority on the basis of specific assignment. During the course of such contacts, in matters which also affect the sphere of tasks of other organizational units, they involve and inform the other organizational units. The head of any organizational unit may proceed--even without specific coordination--in a preparatory or information-gathering manner in matters within his sphere of tasks even if the final decisionmaking belongs within the sphere of tasks of another organizational unit. In such cases, it is mandatory to immediately inform the appropriate organizational unit to which the task belongs. Negotiation on the merits with outside organs may begin--if it also affects the authority of another organizational unit--only if the office manager has completed the coordination concerning the basic questions, or if a concrete directive has been issued by the academy's leadership (secretary general, deputy secretaries general) for the viewpoint to be represented.

(2) Working relationships with the ministries and with the appropriate main departments of organs of nationwide authority are maintained by the appropriate main departments in matters which belong within their spheres of tasks.

(3) In matters of codification, the Administrative and Legal Main Department of the Central Office maintains contact with the Legal and Administrative

Main Department of the Secretariat of the Council of Ministers, with the Secretariat of the Scientific Policy Commission of the Council of Ministers, and with the legal organizations (secretariats) of the ministries and organs of nationwide authority.

(4) The Administrative and Legal Main Department maintains contact with the Information Office of the Council of Ministers and with the Hungarian Telegraph Office [MTI]. The contents of releases or information to be given to the press must first be given by the heads of main departments to the Administrative and Legal Main Department. The authority for publication is granted by the appropriate deputy secretary general and, in matters affecting the academy as a whole, by the secretary general.

(5) In matters of economic mobilization, civil defense and fire prevention, the Administrative and Legal Main Department maintains contact with the Ministry of Defense or with the Ministry of Interior, respectively.

(6) In procedures before the courts, the Central Office is represented by the Administrative and Legal Main Department.

(7) In matters related to laying down the scientific foundations for national economic planning, long- and medium-range planning of research, research management, the statistical data service and information system, and invention activity, the Main Department of Research Planning maintains contact with the National Planning Office, the Secretariat of the Scientific Policy Commission, with the National Technical Development Committee [OMFB], with the Central Statistical Office [KSH], and with the National Office for Inventions [OTH], respectively.

(8) In financial, budgetary, and investment questions the Financial Main Department maintains contact with the National Planning Office, the Ministry of Finance, and other appropriate organs.

(9) The secretary general appoints the appropriate workers in certain cases and gives them the necessary authorizations to represent the academy in governmental commissions, program councils, interportfolio commissions, etc.

(10) The Interkosmos Council Secretariat maintains contact with the appropriate departments of ministries and organs of nationwide authority in questions relating to space research.

(11) The Financial Main Department maintains contact with the appropriate national organ in labor matters.

(12) The Main Department of Personnel maintains contact with the Main Department of Personnel of the Secretariat of the Council of Ministers and with the Ministry of Interior in personnel matters regulated by separate directives.

(13) The Main Department for International Relationships maintains contact with the appropriate departments of the Foreign Ministry, Ministry of

Interior, Secretariat of the Scientific Policy Commission, Secretariat of the Commission for International Economic Relationships, as well as the other organs of nationwide authority affected by the international scientific cooperation.

(14) A separate paragraph defines the rights and obligations of the main departments of the scientific branches in maintaining these contacts.

Paragraph 20

Contact with Foreign Organs

(1) Contact with foreign organs is maintained primarily by the Main Department for International Relationships. The other main departments contact foreign organs only in matters referred to their authority and in a manner regulated by separate directives.

(2) The main departments may receive foreign guests and conduct official discussions with them only after coordinating it with the Main Department for International Relationships and in a manner regulated by separate directives.

(3) Unless statues regulate it otherwise, the approval of the appropriate deputy secretary general is needed for giving any kind of official document to foreigners.

Paragraph 21

Cooperation with Trade Union Organs

(1) The office manager represents the academy's Central Office before the appropriate branch trade union organs.

(2) The office's leaders are required to cooperate according to the statutes in effect with the appropriate official trade union organs in matters affecting the work relationship, working and living conditions of the workers.

Paragraph 22

The Right to Release Documents and Authorize Funds

(1) The secretary general has the right to release the documents of all matters in which he acts on his personal authority, or which he takes under his personal authority.

(2) The deputy secretaries general and the office manager have the right to release the documents concerning the handling of matters referred to their authority.

(3) The main department heads, their deputies, and leading workers, as well as scientific secretaries, exercise the right of releasing documents in all those matters under their authority in which the right of release is not reserved for higher level leaders.

(4) Department heads, their deputies, group leaders and case handlers have the right to release documents in those cases under their authority for which they have received authorization from their superiors.

(5) Heads of main departments are required to determine the sphere of the right of their deputies, leading workers, or department heads, group leaders and case handlers to release documents, and the conditions for exercising this right.

(6) The person releasing the document is responsible for the content and legality of the documents, along with maintaining the responsibility of the case handler who prepared the case. If a unified position of the Central Office has not been reached in connection with the document, the person preparing the document is responsible for presenting the various opinions without prejudice. Forwarding a document released without authorization is prohibited.

(7) A document released by an authorized person must be stamped with the circular stamp and forwarded to the addressee--according to the regulations of the document handling regulations.

(8) The office manager determines the utilization plan of the financial (budgetary, investment, etc.) means made available to the Central Office for handling its tasks, subject to the secretary general's approval.

In addition to the academy's leadership, the office manager and those workers who are so authorized by the office manager, have the right to authorize funds from the financial means, within the framework specified in the plan. The authorization can be implemented only after it is countersigned by the head of the Economic Department.

Paragraph 23

Preparation of Presentations, Reports, and Normative Directives

(1) The professional draft of presentations and reports prepared for the higher organs (Presidential Council, Council of Ministers and their commissions) on the basis of an approved working plan of the academy or of a special resolution, must be prepared by the most appropriate main department--in cooperation with the other main departments--according to its subject matter, as assigned by the secretary general or his deputies, or in some cases by the office manager. The main department must rely on the professional opinion of the scientific departments, research facilities and other institutions in establishing the foundation for the professional draft. Attention must be given by the main department responsible for the preparation to earlier resolutions, analyses, studies, etc., relating to the matter. Preparation of the presentation or report must be done according to the methodological guide published separately; the resolution proposal must be worded concretely, designating the responsible persons and deadlines.

(2) The responsible main department, after review within the Central Office, sends the professional draft of the presentation or report to the Main Administrative and Legal Department by the specified deadline.

(3) In case of a difference of opinions within the Central Office, the procedure concerning the resolution of contested matters (Para 17, Sec (1)) must be followed.

(4) The Administrative and Legal Main Department examines the draft of the presentation or report from the legal, legitimate and structural viewpoints, then on the basis of authorization by the appropriate deputy secretary general or, in matters of outstanding importance, by the secretary general submits the draft to outside organs for their opinions. The draft of the presentation or report must be submitted for opinions with such timing that at least 15 days remain available for developing the ministerial (main authority's) position.

(5) If the outside organs make an observation unacceptable within their authority in connection with the draft, coordinative negotiation must be proposed. Generally the head of the main department preparing the presentation or report is responsible for the coordinative negotiation, but in case of a separate decision the office manager or the appropriate deputy secretary general has the responsibility. Organization of the coordinative negotiation is the responsibility of the Administrative and Legal Main Department. If the ministerial opposing opinion remains, it must be so noted in the presentation together with the reasons for it, along with the academy's position on the subject.

(6) If the presentation, report, etc. cannot be submitted to the superior organ by the specified deadline, the appropriate main department head by subject is required to make a proposal to extend the deadline or cancel the submission obligation. The deputy secretary general exercising supervision submits the proposal, with the proper justification, to the secretary general, who in turn requests the necessary modification from the superior organ directly or through his appropriate representative.

(7) The rules for preparing presentations and reports for the higher organs must also be used as applicable for the preparation, coordination and final development of the secretary general's normative directives applying to the academy and its institutions, with the supplementary specification that the directive proposal must also be coordinated with the appropriate heads of the most affected institutions and facilities.

The head of the Administrative and Legal Main Department takes care of publishing the secretary general's normative directives in the AKADEMIAI KOZLONY.

(8) The issuing main department must coordinate drafts of guide principles, theoretical positions and publications with the Administrative and Legal Main Department and with the other interested main departments. Publication is authorized by the office manager or, in case of a separate decision, by the appropriate deputy secretary general.

Paragraph 24

Rendering Opinions on Presentations and Statutes

(1) Within the framework of working relationships, the head of the affected main department, the office manager in the name of the Central Office, or the head of the Administrative and Legal Main Department may give opinions of a nonobligatory character for the preliminary drafts of presentations and statutes submitted by outside organs. For drafts submitted for official circulation, the secretary general or his appropriate deputy may give agreeing, modifying or opposing opinions.

(2) The head of the Administrative and Legal Main Department organizes and summarizes the work of rendering opinions on drafts of presentations and statutes received from other organs (ministries and organs of nationwide authority), during the course of which, he takes care that the Central Office furnishes the answer by the deadline--according to the work schedule of the higher organs. He designates--on the basis of guidance by the secretary general or deputy secretary general, if necessary--those organizational units which must give opinions on the draft. The affected main departments which render such opinions are required to develop their opinions by involving the experts of the research facilities and other institutions, and in more important matters the corporate organs of the academy, and are required to submit it, together with the supporting documents, to the Administrative and Legal Main Department by the deadline. The opinion

--must make agreeing or rejecting, or modifying observations, keeping in mind the interests of society and science, and the position must be justified;

--must take a position as to whether the tasks possibly affecting the academy as included in the presentation and in its resolution proposal really belong within the academy's authority, and if so, then do the conditions necessary for implementing it exist or can they be created; and, are there any other tasks which the academy would have to undertake in addition to those proposed;

--must indicate if measures have already been taken in the past in the interest of implementing the tasks which affect the academy and are projected in the presentation, together with a brief description of these;

--must extend topic coverage to the tasks and obligations of other organs if in connection with them significant observations of theoretical significance occur.

(3) Coordination of the differing internal opinions is handled by the appropriate deputy secretary general at the coordinating conference organized by the Administrative and Legal Main Department. The deputy secretary general submits the position developed at the coordinating conference to the secretary general for his approval.

(4) Based on the approved position, the head of the Administrative and Legal Main Department prepares the academy's position to be signed, for the secretary general or his appropriate deputy, by the deadline, and then forwards it to the head of the outside organ. He sends copies of the submitted opinion to the interested subdivisions of the Central Office.

(5) In matters in which the outside organs approach the scientific bodies for advice or opinion, the Scientific Corporate Secretariat prepares the reply drafts of the academy's president, or of the appropriate scientific bodies--with the cooperation of the Administrative and Legal Main Department, if necessary.

Paragraph 25

Keeping Records of Statutes, Resolutions, and Directives, and Control of Their Implementation

(1) Keeping central records of the statutes and resolutions is the task of the Administrative and Legal Main Department. The Administrative and Legal Main Department is required to keep records of the resolutions of higher organs, statutes, the secretary general's directives, and positions taken by the secretary general's conference in an easily reviewable system. This documentation must be made available to all interested workers of the Central Office--according to the specifications of the document-handling regulations.

(2) After the resolutions (statutes, directives) are published, the Administrative and Legal Main Department is required to immediately determine what tasks fall upon the Central Office as a result of them. Based on a suggestion made by the head of the Administrative and Legal Main Department, usually the office manager will designate the organizational unit responsible for implementing it, and notifies its head about the task to be performed, and also informs him of the deadlines for implementation and reporting. In particularly important cases, the office manager requests the decision of the appropriate [deputy secretary general], or, upon his suggestion, the decision of the secretary general, for such designation. The applicable part of the statute (resolution) must be attached to the notice of designation, or information must be furnished as to where the regulation containing the task was published. The notice must also provide information about which persons have received the resolution at the academy. If there are several responsible parties, in the absence of specific designation, the person named in the first place must be considered the responsible party.

(3) If the statute (resolution) serves only as information, the Main Administrative and Legal Department sends it out to the interested parties as such.

(4) The head of the designated organizational unit is responsible for implementing the task contained in the statute (resolution, position, etc.). The office manager continuously monitors the work of the organizational unit related to implementation.

(5) The organizational units are required to send a written report each quarter about implementation of the tasks, to the Administrative and Legal Main Department. The Administrative and Legal Main Department keeps itself continuously informed about the implementation of directives, resolutions, and positions, and prepares a quarterly summary report about this. In case of falling short, it so informs the office manager, the appropriate deputy secretary general, and in all cases the secretary general, too, immediately.

(6) If it is justified to request dispensation from carrying out certain tasks or ask for more time for this, the head of the responsible department is required to take the initiative for it prior to expiration of the deadline.

(7) The Administrative and Legal Main Department keeps record of and guards

--the original publications of the secretary general's directives, and of the publications and theoretical positions developed by the main departments;

--the original copies of agreements and framework contracts related to directing and controlling the implementation of national research and development programs which legally bind the academy;

--contracts, agreements, etc., made by the secretary general and his deputies with the heads of domestic organs;

--original copies of agreements, records, reminders, official trip reports dealing with the academy's international cooperative agreements.

Paragraph 26

Work Plans

(1) The next main tasks of the Central Office must be defined in work plans. The work plan is prepared for a 6-month time period.

(2) The basis for the work plan is formed by the work plans and other resolutions of the higher organs, the tasks specified by the leading organs and leaders of the academy, and the proposals and resolutions of the academy's corporate organs concerning their own tasks.

(3) The proposal for the work plan is prepared by the head of the Administrative and Legal Main Department--with the cooperation of the other main departments and of the Scientific Corporate Secretariat--and submitted to the secretary general's conference. The work plan is approved by the secretary general.

(4) If the work plan designates several people responsible for the implementation of some task, the leader who has the overall responsibility for its implementation must be separately designated. His responsibility is the overall organization and coordination of the entire task, ensuring fullness of implementation and observation of the deadline.

(5) The head of the Administrative and Legal Main Department keeps informed in the manner specified in Para 25, Sec (5) and prepares a report about the implementation of the Central Office's work plan covering the entire office.

(6) Based on the Central Office's work plan the main departments prepare 6-month work plans which are approved by the secretary general, the deputy secretary general supervising the main department, or the office manager.

Chapter VII

The Circle of Tasks of Main Departments

Paragraph 27

Tasks of the Main Department of Natural Sciences

(1) The main task of the Main Department of Natural Sciences is to contribute to increasing the success of domestic and especially the academy's research in the natural (technical, agricultural, and medical) sciences, improve its quality standards, and increase its social usefulness by performing organizing, coordinating, support, analytical, control, etc. activities.

(2) In the interest of establishing the long- and medium-range research concepts the main department

--prepares studies and analyzes in cooperation with the academy's corporate organs, research facilities and the experts of other institutions about the way scientific growth is expected to develop, and about its social and economic effects;

--regularly reviews and analyzes the foreign initiatives, research-policy decisions and economic-policy actions affecting its professional areas;

--takes care of publishing these analyses from time to time.

(3) The main department aids and supports in its professional areas the contacts between the academy's research facilities and the enterprises, and promotes the development of various associative and enterpreneurial formats to serve the practical utilization of research results.

(4) The main department in its professional areas follows with attention and regularly analyzes the domestic situation of the more significant basic research projects and initiates measures in the interest of support for basic research projects important from the viewpoint of the future.

(5) It is the job of the main department to regularly review the implementation of the nationally emphasized research tasks (programs) in its specialty areas which are assigned to the responsibility of the academy's secretary general, and to take the initiative for the necessary indications and measures.

(6) Through its working relationships, the main department keeps systematically informed about the content and situation of implementation of those nationally emphasized research tasks (programs, main directions) in its specialty areas, for which, even though other ministries or organs of nationwide authority are responsible, but in whose implementation the academy's research facilities are also participating.

(7) It is the task of the main department to coordinate the work which lays down the foundations for starting the academy's (portfolio level) programs, main directions, etc. in its speciality areas, and to follow and supervise the implementation of the approved programs and main directions.

At the same time, the main department must also have [the right of] review of the portfolio-level research tasks affecting the specialty areas of other ministries and organs of nationwide authority.

(8) Based on the advice of corporate organs, the main department, according to the guiding principles defined by the secretary general

--prepares the announcement of competitions for research grants;

--renders opinions on the submitted applications and submits proposals for decisionmaking on whether to accept or reject them;

--together with the Financial Main Department, negotiates contracts at the expense of the Central Research Fund, for the accepted applications with the organizations which own the right to the subject;

--supervises and evaluates the implementation of tasks undertaken in the contracts.

(9) It is the task of the main department to cooperate in examining the scientific foundations of major national investments (reconstruction projects), and to submit opinions to the secretary general.

(10) The tasks of the Main Department of Natural Sciences in implementing the supervision of the academy's research facilities, are:

--in a manner regulated by special directives, handles the preparation of medium-range research plans of the academy's research facilities (institutions and the supported university research groups), and organizes a reasonable reporting procedure;

--together with the other affected main departments, cooperates in developing the plans for modernizing the research base, and in preparing proposals for establishing new, or closing down research facilities;

--cooperates with the functional main departments (primarily with the financial, personnel, research planning, and international contacts main departments) in analyzing and evaluating the economic, personnel, planning, and foreign relations work of the institutions connected with research activity; and in examining the justifications for major research expenditures (investments), and the extent of utilization of certain expensive equipment (machinery, instruments, computers, accelerators, etc.);

--forms a position in connection with the proposals of the functional main departments affecting research facilities (institutions and supported research locations), and also initiates, cooperates with, renders opinions on and, in certain matters, makes the decision about the system of conditions necessary to fulfill the research plans (budget, employment, investment, international and domestic scientific and science-production cooperation, etc.);

--continuously keeps informed about the more significant research activities conducted at research facilities and takes care of supporting the initiatives which increase the level of success; also cooperates in eliminating factors which hinder the work;

--involves the leading experts of research facilities in developing the presentations to be prepared by the academy, and in evaluating the proposals prepared by other organs and sent to the academy for opinion;

--organizes the exchange of ideas about scientific-policy proposals in the development phase and regularly informs the directors of research facilities with the cooperation of its leading workers about the most important scientific-policy decisions;

--develops working relationships with the social organs of the research facilities and with their supervisory organs, and follows with attention the cooperation of the national administration with the social organs of the institutions.

(11) The Main Department of Natural Sciences maintains regular contact with the research and development organizations of the ministries and organs of nationwide authority which supervise activities conducted in its areas of specialty, and with the appropriate organizational units of the National Technical Development Commission.

Paragraph 28

Tasks of the Main Department of Social Sciences

(1) The main task of the Main Department of Social Sciences is to contribute to increasing the level of success of domestic, and especially the academy's, research in the social sciences, increase the standards of its quality and its social usefulness, by performing organizing, coordinating, supporting, analyzing, supervisory, etc. activities.

(2) In this connection, it helps implement the coordinative tasks related to the planning, supervising the execution of the plans, and comparing the socioeconomic results, in close cooperation with the other main departments, particularly with the Main Department of Research Planning.

(3) Cooperates with the scientific and scientific policy making organizations of the ministries and organs of nationwide authority which supervise activities conducted in its speciality areas, and with the party institutions and regional party organs which do social science research.

(4) In the interest of laying down the foundations for research tasks to be announced

--in cooperation with the academy's corporate organs and research facilities--initiates in its speciality areas the preparation of studies (prognoses) to show the expected development of scientific and technological growth, and its social, economic, and political effects.

(5) Assists and supports the multilateral relationships between the academy's research facilities and the universities, public collections and party institutions operating in its speciality areas, promotes the development of various formats of association which serve the practical utilization of research results, and the organized cooperation between institutions of the academy and of the universities.

(6) Follows with attention the situation of the more significant research projects which directly or indirectly serve the long-range needs of its speciality areas in the academy's research facilities, and initiates measures in the interest of appropriate support for basic research projects which are important from the viewpoint of the future.

(7) Regularly reviews and analyzes the foreign initiatives, research-policy decisions and economic-policy actions which affect its speciality areas, and takes care of periodically publishing these analyses.

(8) Helps improve the (bi- and multilateral) social scientific relationships developed with the socialist countries, cooperates in solving the contentual tasks of the conference of the Hungarian-Soviet Social Scientific Cooperation Commission and the social science vice presidents of the socialist academies.

(9) With respect to guidance of the emphasized research tasks and research competition announcements, as well as of the institutions, the Main Department of Social Sciences handles the tasks contained in Paragraph 27.

Paragraph 29

Tasks and Operation of the Main Department of Personnel

(1) The primary task of the Main Department of Personnel is general supervision of the personnel work performed at the academy and in its institutions, on the basis of direct guidance by the secretary general. By supervising the personnel activity of the academy's institutions and of the Central Office--relying on the cooperation of the other main departments--it must ensure uniform implementation of the cadre-policy principles, and through its comprehensive analyses keep the secretary general informed of the most important data characterizing the academy's personnel inventory.

(2) The main department's special tasks are to:

--prepare the secretary general's orders in personnel matters which affect the academy as a whole, personnel development and replacement plans, submitting these for approval, and organizing their implementation, and preparation of reports to the secretary general about experience gained during the course of implementing the measures;

--prepare proposals for appointment, assignment, relief, transfer, decoration, discipline and reward within the secretary general's sphere of authority--or in case of delegated authorities, of the deputy secretaries general, the office manager, and the main department heads--submission of these to the appropriate leaders according to the order of spheres of authority for decisionmaking, and handling the other necessary tasks prior to the decisionmaking (announcement of competitions, rendering opinions on them, and handling the necessary coordination, etc.);

--prepare theoretical and methodological guides for personal qualification of those workers employed by the academy who are required to be qualified, supervising and controlling the qualifying activity;

--participate in the personnel qualification of workers within the appointment authority of the secretary general--and in case of delegated authority, of the deputy secretaries general, the office manager, and of the main department heads--and of the Central Office, who must be qualified, safekeeping the qualifications and keeping record of them;

--keep record of the academy's regular and corresponding members, doctors of sciences, and of the workers of the academy's institutions and research facilities who are in the secretary general's (deputy secretaries general, office manager's) sphere of appointment authority, as well as of the workers of the Central Office;

--take care of implementing the tasks of the branches related to the advance training of leaders and researchers; initiating the further training of leaders and researchers and of their reporting to training seminars, with the cooperation of the leaders of the academy's institutions and with their participation in organizing advanced training for the academy's leaders;

--render opinions on proposals concerning official trips abroad by workers of the Central Office under the rank of main department head;

--prepare proposals for using the academy's educator scholarship funds in cooperation with the main departments of the scientific branch;

--render opinions on proposals concerning titled university professorships and lecturerships involving the academy's workers;

--initiate the necessary procedures in case of a crime or disciplinary offense;

--obtain the data necessary for appointments into important and confidential work assignments and requesting approval from the proper organs;

--keep record of the workers of the Central Office, and of other research facilities as necessary, who have military obligations, and handle the matters of obtaining postponements of military service;

--handle the tasks of preparation for decisions concerning the State Prize and the Kossuth Prize, the Academy's Prize, and of electing to membership.

Paragraph 30

Tasks of the Main Department of Research Planning

(1) The primary task of the main department is to prepare decisions, conduct coordinating activity, and provide information in handling tasks falling upon the Central Office in connection with laying down the scientific foundations for the national economic plans, long- and medium-range planning of research, implementation and control of the plans, development of the research network, and research management and organization, as well as maintaining contact within its authority with the affected ministries and organs of nationwide authority. The main department handles these tasks in cooperation with the other main departments and in the manner regulated by Para 17.

(2) It is the task of the main department to prepare positions, guiding principles, and decisions in connection with:

--setting down the scientific foundations for the long- and medium-range national economic plan;

--relaying the mutual effects between national economic planning and research planning;

--developing the long- and medium-range national research plans, coordinating and supervising their implementation;

--developing the general principles and methods of the research plans of the academy and its institutions, supervising their implementation, and ensuring harmony between financial and investment plans.

(3) In addition, the tasks of the main department are to develop decisions, positions and recommendations to be taken by the academy's leadership to serve:

--modernization of the national and the academy's research base, developing its general principles and methods and its long- and medium-range development plans;

--further development of the methods of research management and organization, and of financing;

--the objective evaluation of research activity, increasing the efficiency of research, promote the socioeconomic utilization of research results; and

--the development and efficient operation of an information system related to the research projects and their management.

(4) In connection with the tasks detailed in secs (2) and (3), it is the duty of the main department to initiate, prepare, or have prepared, and render opinions about analyses, prognoses, concepts, presentations, guiding principles and action plans, and further, the organization and internal and external coordination of activities related to this, as well as maintaining contacts at the main departmental level.

(5) It is the task of the main department to:

--coordinate the rendering of opinions about major investments, develop the academy's opinion, reduce it to writing and ensure representation at possible coordinating conferences;

--follow with attention and analyze the international experiences of scientific and technological political and especially research management and research organization, and to develop proposals for the domestic utilization of such experience;

--handle the tasks which fall onto the academy in connection with the performance of administrative statistical activity;

--handle the direct professional supervision of the Patent Group operating within the framework of the Research Supply Service.

Paragraph 31

Tasks of the Main Department for International Contacts

(1) The Main Department for International Contacts performs preparatory, coordinating, organizing and implementing activities related to establishing, improving and operating international scientific relationships which serve the academy's goals.

(2) The main department's tasks are in general to:

--study the role of the academy's international scientific relationships and fit it into the country's foreign-policy and foreign-trade activities;

--analyze the social, economic and cultural usefulness of the academy's international scientific relationships, and examine the contributions expected to increase the level of success of scientific research;

--develop short- and medium-range strategic ideas and proposals for designating the focal points of cooperation;

--prepare analyses and information on the basis of continuously following international scientific relationships with attention;

--handle the statistical reporting obligation connected with international scientific relationships.

(3) The main department's special tasks are to:

--prepare the academy's international cooperative agreements according to guidance from the secretary general and in cooperation with the main departments of the scientific branch, or from the supervising deputy secretary general, help in their implementation and initiate further developments;

--according to special regulations, to manage economically the budgetary funds serving to foster the academy's international relationships, and taking care that it is used in a planned manner and in the way it was intended;

--maintain contact with the foreign academies and with the corresponding organs of the institutions which direct science;

--handle the official contacts (travel, reception, negotiations, etc.) of the academy's leadership (chairman, secretary general, vice chairman, deputy secretaries general) in the order corresponding to the regulations and under the necessary protocol conditions;

--prepare, coordinate and implement travel into and out of the country connected with the academy's international relationships;

--prepare the plans for scientific events to be organized within the academy's framework, submitting them to the secretary general for approval, and organizing the plan's implementation;

--prepare and conduct the academy's centrally organized international scientific events;

--handle the matters of international organizations which belong within the academy's circle of authority;

--in multilateral cooperative projects set up among the socialist academies, handle the tasks deriving from the academy's participation in cooperation with the appropriate main departments of the scientific branch;

--handle the tasks which fall upon the academy from the scientific cooperation conducted within the framework of CEMA, and from the bilateral imter-governmental scientific-technological agreements, with the cooperation of the main departments of the scientific branch;

--coordinate and organize nationwide those international scientific cooperative projects which affect institutions outside the academy, and use the monetary funds available for this purpose according to the approved plan;

--organize recordkeeping and use of foreign trip reports with the cooperation of the main departments of the scientific branch;

--supervise the international relationships of institutions supervised by the academy;

--supervise the international relationships of the academy's scientific associations and societies;

--handle the preparatory and coordinative activity connected with the election of the academy's honorary members, and with the election of Hungarian scientists to honorary memberships of foreign academies, on the basis of guidance from the academy's appropriate leader;

--handle the organizing work connected with bilateral joint commissions and magazines;

--make proposals to the secretary general with the cooperation of the main departments of the scientific branch for official trips abroad by heads of the academy's institutions, and preparation and implementation of the authorized trips.

Paragraph 32

Tasks of the Financial Main Department

(1) The primary task of the Financial Main Department is to plan the financial and manpower needs of the academy's research in harmony with the scientific goals and with the cooperation of all interested main departments, and to promote the effective utilization of the resources made available on the basis of the resolution of the Council of Ministers by assisting in the regulation, coordination, organization, regrouping, control, etc. built on interest relationships.

In this connection, among other things it

--also performs wage management, manpower management, manpower protection, accounting, control, and other duties referred to its authority;

--supervises these types of activities of the institutions and also performs general supervision of the academy's enterprises, and economic supervision of service organs and of the academy's centers in the regional districts;

--initiates and supports the research undertakings of the academy's institutions which provide economic results;

--cooperates in the development of various new and flexible formats of activity;

--promotes the national economic and institutional success of contractual research activity.

(2) Its special tasks are to

--prepare the academy's investment plans in harmony with research and development plans and submit them for the secretary general's approval; to carry out the plan approved by a higher organ; to organize this and handle the top-level authority's tasks in connection with this; technological and economic examination of the preparation of investments listed under the central decisionmaking authority, plan and ensure the financial conditions of, and also organize and supervise the implementation of, investments;

--perform the measures related to the implementation of higher level orders and regulations connected with investments, and supervise the implementation of the measures issued;

--prepare the academy's budget plan proposal in conformance with the research policy goals, then prepare detailed budget plans within the established budgetary limits, submitting it to the secretary general for approval and, based on the approved budget plan, take the necessary measures for economic operation to produce scientific results;

--within the limitations of the annual budget established for the academy, see to it that the budgets of the academy's institutions are prepared and, based on this, compile and publish a budget brochure;

--ensure the financial supplies of the economic operating organs supervised and supported by the academy, supervising and keeping records of the accounting work of the economic operating organs;

--prepare the academy's medium-range and annual renewal plans, submit the medium-range plan for the secretary general's approval, operate economically with the renewal financial means and the budget based on the approval, and supervise the renewal work done;

--handle the financial tools of the Central Research Fund, and ensure compliance with the financial specifications connected with the use of the fund;

--cooperate in the review of the economic chapter contained in the research plans of the academy's institutions, as well as in the evaluation of the financial chapter of the reports dealing with the operation of the institutions and their research activities;

--supervise the economic activity of the academy's institutions and supported economic operating organs with the cooperation of the main departments of the science branch; the supervisory function includes supervision [to insure] that the economic operation follow the rules and the law, protection of society's property, investigation of the activity of the institutions aimed at the utilization of idle supplies, etc.;

--comprehensively direct the academy's service institutions included in the budget, improving the level of services, and increasing the economy of operation;

--handle the directing and supervisory tasks related to supervising the academy's enterprises; multifaceted support to the successful operation and modernization of these enterprises;

--prepare the directives and measures related to the implementation of the wage and labor statutes in force, and supervising their implementation;

--keep records of the wage and labor statistics related to the assignment and appointment of the institute leaders under the appointment and assignment authorities of the academy's leaders;

--determine the support payments for relatives of deceased persons with scientific grades;

--keep records of the academy's expense and income projections, and handle ledger bookkeeping tasks;

--conduct the comprehensive implementation of the tasks defined in the budget, and the budgetary supervision aimed at implementing the rules (goal, topic and followup studies);

--regularly supply data to the secretary general, deputy secretaries general and office manager about the development of the academy's most important financial and employment indicators;

--handle the tasks related to labor protection and accident prevention within the framework of the labor-protection organization; and also the top-level authoritative tasks related to energy management;

--handle the tasks related to the relationship of the academy's institutions with the authorities;

--handle automobile matters by portfolio rules.

Paragraph 33

Tasks of the Administrative and Legal Main Department

(1) The Administrative and Legal Main Department handles general decision preparation, coordinating, controlling, information supplying, codification and other special legal, administrative and economic operating tasks.

(2) The main department's special tasks are:

--preparation of presentations and reports to be submitted by the academy to higher organs;

--preparation of the coordinating conference, the research policy council, the secretary general's conference, and the office manager's conference in the manner regulated by its special procedures, assemble the necessary records and reminders, and cooperate in the implementation of the decisions made;

--preparation of the legal remedy petitions for decision submitted against the resolution of the Scientific Qualifying Commission;

--development of the secretary general's directives and of the academy's orders issued in statute form, and publication of these after approval;

--handling the tasks related to state supervision and central recordkeeping of the scientific associations (societies);

--implementing portfolio-level youth-policy tasks;

--implementing the tasks which affect the Central Office in connection with economic mobilization, fire prevention and civil defense, and supervisory tasks;

--representing the academy in lawsuits and nonlawsuit procedures before the courts;

--cooperating in disciplinary and damage compensation matters and initiate penal procedures in case of a crime;

--preparing periodic publication of the collection of the secretary general's directives and of the academy's regulations;

--preparing the academy's (Central Office's) semiannual work plans according to the secretary general's guidance;

--handling the tasks of confidential case handling within the office, and perform the supervisory activity in the academy's institutions;

--ensuring the copying of case documents and of various other documents;

--regulating and supervising document-handling in the Central Office; organizing the safekeeping, recordkeeping, and destruction of documents according to specifications;

--organizing inside and outside delivery, and arrange for special delivery service for the academy's leaders;

--operating the welfare and social institutions and the academy's vacation homes and handle vacation matters; handle assignments into the Guest House; handle the memorial service matters of academicians; direct supervision of the Automobile Service and of the Scientist Club.

(3) The tasks of the Administrative and Legal Main Department in the immediate supervision of the organization which handles the economic (head bookkeeping) tasks of the Central Office, are:

--preparing the Central Office's budget, as well as handling the economic, wage payment and labor-related tasks connected with this;

--planning and satisfying the Central Office's needs for technical equipment and materials, and handle investments;

--operating the buildings and, within this, particularly ensure maintenance, heating, cleaning, etc.;

--handling labor safety tasks;

--providing the conditions for office work (administrative equipment, supplies, etc.).

Paragraph 34

Tasks of the Interkosmos Council Secretariat

(1) The Interkosmos Council Secretariat handles the preparatory, operative case-handling, and analytical tasks necessary to the activity of the inter-portfolio commission (Interkosmos Council) operating under the direct guidance of the adademy's secretary general, as an independent department of the Central Office.

(2) The secretariat's special tasks are to:

--prepare the council's sessions, develop the presentations and resolution drafts of the sessions, and conduct the sessions;

--prepare records of the council's sessions, keep records of the materials and resolutions of the sessions, supervise the implementation of the resolutions;

--coordinate the activities of the special commissions, follow their work with attention and regularly report to the chairman;

--take care that the use of the financial means provided for the operation of the special commissions is done in the authorized manner and in conformance with regulations, in cooperation with the Financial Main Department;

--in cooperation with the council's members, follow with continuous attention the domestic needs related to space-exploration results which can be used in the national economy;

--follow with attention the latest foreign results of space exploration, the directions of research, and regularly inform the affected organs about this;

--in the interest of providing public opinion with the proper information, extend assistance to scientific information-dissemination and mass-information institutions;

--participate in conducting events which serve the high-level scientific and political propagation of space-exploration activity;

--in harmony with the appropriate organs of the Foreign Ministry, maintain direct contact with the national coordinating organs of the countries which participate in the Interkosmos Program, as well as with the other national and international organs affected by the work of the Interkosmos Program;

--follow domestic space-exploration activity with continuous attention, and prepare information for the international organizations, coordinating it with the Foreign Ministry.

Paragraph 35

Tasks of the Scientific Corporate Secretariat

(1) Under contentual guidance by the academy's chairman and vice-chairmen--and with respect to the scientific departments, of the department chairmen--the Scientific Corporate Secretariat handles the preparatory, organizing and administrative work needed for the operation of the scientific bodies (the general assembly, the presidium, the scientific departments, scientific commissions, regional academic and other presidential commissions).

(2) The special tasks of the Scientific Corporate Secretariat are to:

--Take care of preparing and conducting the general assembly, the presidium's sessions, departmental meetings and other corporate events, reduce their resolution drafts into writing, and organize the implementation of the resolutions;

--cooperate in the preparation of corporate positions related to the national scientific research plans and to other concepts which serve the fulfillment of the country's socioeconomic needs;

--take care that the financial tools furnished to implement the corporate tasks are used in the authorized manner and according to the rules;

--prepare and organize the operation of permanent and ad hoc corporate committees;

--cooperate in familiarization with domestic and foreign scientific results, in the development of new scientific directions, preparation of opinion-search work related to domestic scientific research, in the development of corporate positions, in the preparation of scientific position evaluations and prognoses, and in the development of proposals for introducing new scientific results into practice;

--participate in the preparation of rendering opinions about dissertations submitted to win the doctor of sciences degree, and in defining the corporate position;

--cooperate in the preparation of opinions on submissions for university professorships and lecturerships, as well as for college professorships, and in defining the corporate position;

--cooperate in the preparation of the academy's annual and medium-range book and magazine publishing plans and in solving the problems which occur during the course of the publishing activity;

--cooperate in preparing and conducting the reelection of the corporate organs;

--handle the support of scientific societies with respect to the content of scientific and opinion-rendering work;

--cooperate in the preparation and implementation of the tasks falling onto the scientific areas from international cooperation;

--take care of conducting the competitions announced by the corporations and by their leaders;

--take care of assembling the corporate proposals concerning decorations awarded by the state;

--follow with continuous attention the implementation of higher level regulations to which the corporations are subject;

--handle all those tasks which the leaders of the corporations or the academy assign to it.

(3) Within the organization of the Scientific Corporate Secretariat, there are departmental secretariats which correspond to the scientific departments; these perform the necessary organizing and administrative work for the corporate activities of the corresponding scientific departments.

(4) The appropriate workers of the main departments of the scientific branches participate in the secretary's conferences held within the framework of the Scientific Corporate Secretariat.

(5) The departmental secretariats operating within the Scientific Corporate Secretariat are:

Secretariat of the Language and Literary Sciences Department
Secretariat of the Department of Philosophical and Historical Sciences
Secretariat of the Department of Mathematical and Physical Sciences
Secretariat of the Department of Agricultural Sciences
Secretariat of the Department of Medical Sciences
Secretariat of the Department of Technological Sciences
Secretariat of the Department of Chemical Sciences
Secretariat of the Department of Biological Sciences
Secretariat of the Department of Economic and Legal Sciences
Secretariat of the Department of Geological and Mining Sciences.

Paragraph 36

Tasks of the Secretariat of the Scientific Qualifying Commission

(1) The organizational, economic operating and administrative activities of the Scientific Qualifying Commission [TMB] are handled by the Secretariat of the TMB (hereinafter: secretariat) operating within the framework of the Central Office.

(2) The tasks of the secretariat are scientific qualification: to follow with attention and analyze the domestic and foreign experiences of researcher training, and to initiate further developments in scientific qualification and researcher training.

(3) In matters connected with the training of foreign citizens and researcher training abroad, the secretariat maintains contact with the appropriate organs of the Foreign Ministry, and with the foreign representations.

(4) The secretariat's special tasks are to:

--prepare or to have prepared presentations, analytical reports, concepts, and information for the TMB's plenary session and for the higher organs;

--prepare the meetings of the TMB and of its corporate organs, and the cases for the sessions;

--implement the resolutions of the TMB and its corporate organs;

--submit appeals filed against the decisions of the TMB and its corporate organs to the academy's chairman or to the TMB, respectively;

--handle the affairs of the domestic and foreign postgraduate students doing research work for higher degrees, as well as those studying abroad, in academic, social, labor and other matters;

--develop the TMB's budget plan, operate economically within the budget and prepare the specified as well as the necessarily occurring economic reports, analyses and accountings;

--collect procedural and test fees, production costs of theses, pay scholarships, salary supplements, honoraria, assistances and benefits, and ensure the expenses for educational travel;

--issue the diploma attesting to scientific grades, and the final certificates of postgraduate students who earned higher degrees by doing research work;

--keep personnel records connected with scientific qualification and postgraduate research work leading to higher degrees, keep records of doctorates, candidature, and aspirants, and take care of the required statistical recordkeeping and data distribution.

Paragraph 37

Personal secretariats

Personal secretariats (offices) may operate under the immediate supervision of leaders of the academy (chairman, secretary general, vice chairmen and deputy secretaries general) in which the number of people working is determined by the secretary general on the basis of the proposal of the leader in question concerning the tasks of the job area and the order of operation.

Chapter VIII: Miscellaneous Orders

Paragraph 38

(1) Based on the Organizational and Operational Regulation, all main departments must prepare detailed regulations and the job descriptions of the main department's employees.

(2) Regulations of the main departments are approved by the appropriate deputy secretary general, or by the office manager.

(3) One copy of the approved regulations and of the job descriptions must be sent to the Administrative and Legal Main Department.

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