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East Europe Report

SCIENTIFIC AFFAIRS

No. 788

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CONTENTS

BRIEFS

NEW MICROPROCESSING MODULES SYSTEM--Sofia, 23 Aug (BTA)--The system of integrated microprocessor modules for automatization and control--with initials SYMMAK--is attracting the attention of engineers. It makes it possible to design precise devices for the processing of data, control and automatization of continuous and discreet production processes and of scientific experiments. For the time being the devices of the SYMMAK family are twelve. All of them, as well as the very set of standardized modules for transformation, data processing and the formation of various algorithms have been invented at the higher mechanical and electrical engineering institute of "Lenin" in Sofia. The devices control the operation of high-temperature diffusion furnaces, of machines making plastic folio, of conveyor belts in open-cast pits, etc. SYMMAK-12 has been made on orders from the Novosibirsk metallurgical works. Automatically it measures the parameters characterizing the qualities of electric coils. Labour efficiency is rising nearly 60-fold. If a qualified operator carries a measurement in 25 minutes, SYMMAK-12 manages the job in 27 seconds. [Text] [AU231108 Sofia BTA in English 0805 GMT 23 Aug 83]

CSO: 2202/117

IMKO-2: BULGARIAN MICROCOMPUTER INTRODUCED

Budapest SZAMITASTECHNIKA in Hungarian Feb 83 p 3

/Text/ The initiative of the Janos Neumann Computer Sciences Society (NJSZT) was a success--it organized a national introductory tour for the new Bulgarian microcomputer. Petko Magevskiy, chief adviser to the Scientific and Technical Committee, introduced the IMKO-2 first at the NJSZT headquarters as guest of the NJSZT.

The name IMKO-2 derives from the Bulgarian equivalent of individual microcomputer. Its basic configuration is: keyboard, 64 K bytes operational memory and connections for external peripherals.

The IMKO-2 is built only of parts manufactured in Bulgaria and the socialist countries and it corresponds functionally to the Apple II. This means that every program product prepared for the Apple II can be run on this machine too. The read only memory in it contains a floating point BASIC interpreter which calculates with a precision of 9 decimal characters.

One can connect to it a black and white or color picture screen; on the latter one can display 16 colors. In the event of textual information the screen can handle 24 by 40 characters and if the information is graphic the resolution of the screen is 192 by 280.

An ordinary household cassette tape recorder can be connected to it, with a transmission speed of 1,500 bits per second. There is a printer connection and connecting a 160 K byte mini-floppy disk unit expands the utility of the computer extraordinarily. In this case the computer operates under a disk operating system which makes possible data base management as well. From disk one can call Pascal, Fortran and PILOT translation programs and a graphic target language developed by them has been prepared for the computer also. With the aid of the floppy disk it is possible to run about 3,000 to 5,000 program products prepared for the Apple II, but additional program products were prepared for the computer in Bulgaria also. A teaching configureation is in operation already; for the time being this has 20 student machines (this can be expanded to 64) connected with one teacher's IMKO-2. Attached to the latter are magnetic disk and magnetic tape background storage and a printer. The students can write on

and read from these peripherals through the teacher's machine. In addition one can "observe" from the teacher's machine what any student is dealing with at a given moment and there is also a possibility of intervention by the teacher.

The IMKO-2 was developed in the Technical Cybernetics and Robotics Institute of the Bulgarian Academy of Sciences and is being manufactured in series in two places, in Sofia under the name IMKO-2 and in Pravec under the name PRAVEC-82.

At the exhibit at the NJSZT we could see, among other things, a program for teaching arithmetic to kindergarteners; with a self-instruction introduction and making good use of color and sound effects it teaches as if playing. This was followed by more and more interesting game programs.

The next day the IMKO-2 was shown in Eger and then it figured with great success at an exhibit held by the Borsod Megye Organization of the NJSZT. The members of the Home Computer Club of the NJSZT studied it with great interest also.

9094
CSO: 2502/55

MICROPRINTER FOR LOCALLY PRODUCED PERSONAL COMPUTER

Budapest SZAMITASTECHNIKA in Hungarian Mar 83 p 1

[Text] SZKI [Computer Technology Research Institute] introduced the prototype of its M08X professional personal computer in March 1982. The computer was designed by staff members of Budapest Technical University's Department of Automation. The machine was a success at the NJSZT [Janos Neumann Society of Computer Technology] exhibition and at the BNV [Budapest International Fair] in spring of 1982. Production of the zero series began in autumn of 1982, and 28 units were sold by the end of the year.

The PC is intended for the maintenance of personnel records, payroll accounting, technical and economic computations, and administrative data processing at small and medium enterprises. Its series production began in January 1983. Plans call for producing between 250 and 400 units this year. The documentation, training, production and the development of applicantions programs are being solved through extensive cooperation among BME [Budapest Technical University], Labor MIM [expansion unknown], SZKUBT [Szamitastechnikai Kiserleti Uzem Beteti Tarsulas; Computer Technology Pilot Plant Limited Association], ORION [Orion Radio and Electric Enterprise], HIKI [Telecommunications Industry Research Institute], MOM [Hungarian Optical Works] and several small businesses. The price of a typical configuration will be around 440,000 forints.

Simultaneously work is underway on developing a 16-bit version. To expand the computer's usefulness and in the interest of its greater success on the market, it has been necessary to solve also the addition of a printer to the computer.

The absence of reliable low-cost printers was a problem. Due to our paucity of foreign exchange, import from capitalist countries could not come into consideration. In autumn of 1982, therefore, SZKI and MOM jointly developed a printer. SZKI is producing the first 25 printers in the first half of 1983, and from then on MOM will produce 400 to 500 more. A series of 2000 to 3000 printers is being planned for 1984. The price of the P08 printer will foreseeably be between 60,000 and 80,000 forints.

1014
CSO: 2502/57

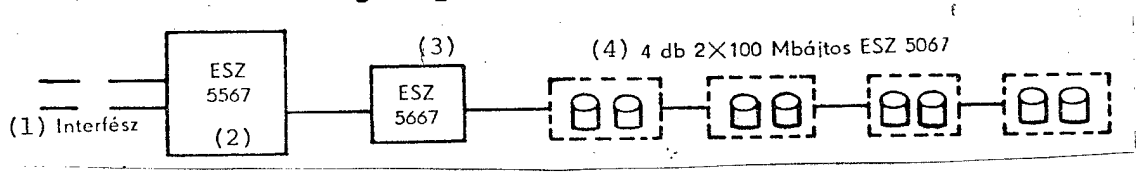
EXPERIENCE WITH THE ES 5067 DISK PACK

Budapest SZAMITASTECHNIKA in Hungarian Mar 83 p 9

[Article by Andras Agoston and Jozsef Bacskai of SZAMALK [Computer Technology Applications Enterprise]: "Experience With the 100-Mbyte Bulgarian-Made Disk Packs"]

> [Text] The 100-Mbyte ES [Unified System] 5067 disk packs have been operating with the ES 1035 computer of SZAMKI [Computer Technology Research Institute] (SZAMALK as of 1982) since 18 June 1981. We wish to share with other current and future users the experience we have gained in not quite two years. Since only a few such units are in operation in Hungary, it seemes advisable to review the principal technical characteristics of the disk pack units before presenting our experience.

The ES numbers and names of the items of equipment are as follows: ES 5567 (controller), ES 5667 (control module), and 5067 (disk drive). The disk drives are connected to the computer through the control module and controller, as shown in the following diagram:



Key:

1. Interface
2. ES 5567 controller
3. ES 5667 control module
4. Four sets of 2 x 100-Megabyte ES 5067 drives

The disk pack unit consists of two separate drives. Each drive has its own control panel and indicators that give detailed information about the drive's state and faults.

To a control module (ES 5667) it is possible to connect 4 disk pack units, which is 8 drives. Changeable "address codes" (0 to 7 bits, and a service bit) are used for (logical) addressing.

The type of disk pack is IZOT 5266E, or a type with an identical servo surface.

Technical Parameters

Number of cylinders, 411. Number of heads, 19. Transmission rate between control module and controller, 806 kbytes/second. Start-stop time, 20 seconds. Rpm, 3600. Distance between heads and disk surface, 1.1 microns. Mode of recording: three-frequency MFM. Access time cylinder-to-cylinder, 10 msec (average). Average positioning time, 30 msec. Maximum positioning time, 55 msec. Waiting time, maximum 16.7 msec, average 8.4 msec.

Physical Dimensions

Controller, 140 x 80 x 160 cm (W x D x H). Control module, 75 x 82 x 115 cm. Dual drive, 119 x 82 x 115 cm.

Due to bugs in the processor, we regard our experience as indicative only from December 1981 on.

About 2 months were needed to get the 100-Mbyte subsystem running properly. During this period we primarily had to replace magnetic heads, and we also checked and adjusted the heads frequently, practically every week. During these two months we replaced 22 heads. A few electronic components (integrated circuits, transistors, etc.) also had to be replaced, but their number was negligible. Already then a problem cropped up that we called the BASF-Scotch problem. The drive's microdiagnostic test indicated an error at address 3410 in the case of a Scotch disk, but ran smoothly with a BASF disk. The cause of this is still unknown. (According to other users, this problem does not occur in equipment supplied more recently.)

Here it should be noted that the serial numbers of our units are between 0020 and 0085. Thus it seems probable that even the manufacturer did not then have much operating experience with this type of equipment.

The controller (ES 5567) has practically been operating faultlessly since its installation. According to our experience, however, it is not possible to connect to the No 1 selector channel both 100-Mbyte and 29-Mbyte equipment simultaneously.

In the control module (ES 5667) we found only one fault. If in the case of system change, for example, six to eight of the drives were stopped simultaneously, the braking current blew the ground wires. We replaced these wires with ones of larger cross section, and we also sent the manufacturer a detailed description of the fault

Failures Causing System Down Time

In January 1982, 14 failures (28.2 hours); in February, 13 failures (24.7 hours), in March, 7 failures (13.3 hours); in April, 3 failures (2.7 hours); in May, 3 failures (2.9 hours); in June, 5 failures (16.5 hours); in July, 5 failures (11.1 hours); in August, 9 failures (9.2 hours); in September, 14 failures (12.8 hours); in October, 3 failures (2.2 hours), in November, 9 failures (5.7 hours); and in December, 5 failures (7.2) hours.

The eight drives averaged 600 disk hours per month. From May through December, however, this figure dropped to between 200 and 300 disk hours.

COMPORGAN: COMPUTER TECHNOLOGY ORGANIZING ENTERPRISE

Budapest SZAMITASTECHNIKA in Hungarian Mar 83 p 10

[Text] The Computer Technology and Organizing Center of the Hungarian Telecommunications Equipment Industry (MHE SZSZK; Magyar Hiradasipari Egyesules Szamitastechnikai es Szervezesi Kozpontja) has been functioning for over ten years as a joint service enterprise in the field of computer technology applications and organization. The enterprise's name is to change soon into COMPORGAN Systems House (COMPORGAN Rendszerhaz). Its activity has developed and expanded in many directions. During the past decade, the enterprise's work and assignments have exceeded the telecommunications equipment industry's needs. Today its activity extends to engineering and many other branches as well (health care, foreign trade, the export of various studies and software, etc.).

The following are outstanding and significant in the activity of this entrepreneurial institution for the introduction, application and organization of computer technology: solution of specific enterprise tasks; standard systems that can be used at several locations or in general; so-called standard solutions and procedures that enhance realization of national economic and branch objectives; and various studies and software.

Output of Computer Technology Products

Custom-made products (new systems), and the modification and further development of existing ones; systems products (acceptance, installation and adaptation); solution of the further development, acceptance and installation of (own or third-party) software.

Operating Tasks

Follow-up service (modernization of existing software and systems) and special services (application and use of the INKA [demand and capacity matching], balance-sheet analysis, and ADEL [data analysis] methods).

Export Tasks

Assignments in the nature of custom processing; fixed-price contracting; and development of software and software packages. Warranty service (in relation to the operation of software) in conjunction with the aforementioned tasks.

Organizing Tasks

The organizing tasks to ensure the conditions for application are closely related to the computer applications tasks:

--A summary of the given enterprise's activity, and of the means and conditions of its operation, an "X-ray" of the enterprise.

--Comprehensive and detailed situation analysis, a specific survey of the structure and functions of the enterprise's management, economic activity and operations.

--Definition of the organizational tasks in conjunction with introducing computer technology or "computerizing the enterprise," and the elaboration of proposed organization programs for implementation.

--Participation in the implementation of the adopted organization program.

--Performance of specific application-oriented organizing tasks.

--Guidance and coordination of "computerized" enterprise-organizing activity.

--Professional consulting on the organizing tasks, equipment and conditions of the enterprise's all computer applications programs.

All this characterizes in general outlines the activity of MHE SZSZK that has a staff of more than 300 and annual sales of services between 170 and 200 million forints.

Special Procedures, Methods and Software Packages

Within the structure of the enterprise's activity, special attention should be called to several procedures, methods and software packages for widescale application, based predominantly on the ESZR [Unified Computer System].

The computerized management and data processing system for industrial enterprises (SIVA) provides management support for industrial enterprises, using a given enterprise's own computer or custom processing on an outside computer.

The ADEL [Data Analysis] system evaluates and calculates time series, forecasts and trends. It is especially useful for calculating and analyzing balance sheets.

A nationwide record-keeping system that matches demand and capacities (INKA) in terms of equipment, tools, technologies and services. Its purpose is to aid the better utilization of capacities, improvement of the rhythmicity of production, reduction of the demand for new investment, and capitalist import substitution.

Noteworthy are the programs for the utilization and running of computers, such as the parameter-controlled printing program, a sorting program for the Unified Computer System's computers, and a file rearrangement program.

New special software includes a hospital information system, and an arithmetic microprogram package that satisfies the latest special requirements.

Directly related to data processing is a software system that accounts the performances and proceeds in batch data processing.

1014
CSO: 2502/57

BRIEFS

HUNGARIAN EQUIPMENT FOR SOVIET TOKAMAK--The KFKI [Central Physics Research Institute] is supplying the complete data processing and control equipment for the Tokamak T-15 fusion reactor that is being built in the Soviet Union, the first trial startup of which is scheduled for 1984. The KFKI is building also plasma diagnostic equipment for the T-15, within the framework of Hungarian-Soviet scientific cooperation. Thus Hungary too is able to participate in research and development pertaining to fusion reactors. To this end, KFKI too is operating a Soviet-made "Small Tokamak," for plasma physics experiments. [Text] [Budapest SZAMITASTECHNIKA in Hungarian Mar 83 p 14] 1014

SOVIET ELECTRONIC INSTRUMENTS--The Microelectronics Program recently elaborated in the Soviet Union contains 165 tasks for the development and production of instruments used in various fields. Twenty ministries and other central agencies, and 69 institutes are participating in the program's realization. Development is being coordinated by the Ministry of Instrument Making, Automation Equipment and Control Systems. The work is expected to produce a decisive change in the precision and service life of the instruments. By 1985 the service life of the individual categories of instruments is expected to increase from between 10,000 and 25,000 hours to 50,000 hours, and their margin of error is expected to drop from between 0.5 and 1 percent to between 0.05 and 0.1 percent. The instruments will be 30 to 50 percent lighter. According to preliminary estimates, the program will yield an economic return of 85 million rubles in 1985, and 215 million in 1990. [Text] [Budapest SZAMITASTECHNIKA in Hungarian Mar 83 p 14] 1014

CSO: 2502/57

DEVELOPMENT OF INDUSTRIAL ROBOTS OUTLINED

Warsaw POLISH ENGINEERING in English No 1, Jan 83 pp 16-18

[Article by Andrzej Wozniak, M.S.C.(Eng.).]

[Text]

The advantages of the application of industrial robots and manipulators are already widely known. Despite comparatively high prices the profitability of industrial robots application at their proper utilization remains unquestioned. To the basic advantages resulting from the application of robots belong:

- bettering and humanizing of work conditions by freeing the worker from stress[redacted] and monotonous jobs often carried out under health endangering conditions
- improvement of the production process by its rhythmical proceeding of unaltered quality (considerable repeatability accuracy of carried out operations) and increase productivity.

In the seventies, in the Polish machine industry, a range of interesting and successful solutions of industrial robots and manipulators and their applications has been developed.

The technical equipment installed in the leading institutes and production works makes possible not only the continuation of the existing production but also its further expansion and the export possibility of industrial robots.

Numerous elements applied in the production of robots originate from imports from highly developed countries. At the present economic difficulties of Poland the need arises to finance the purchase of components by advance payments from the buyer would have to supply those elements to its own account. This is, of course, a temporary situation and normal trade conditions will be restored by us as soon as it will be possible. Our partners from the CMEA countries have shown us great understanding in this respect. As a result our sales to that group of countries are growing fast. We also hope to increase swiftly the number of buyers from the western countries. We are, thereby, offering to the prospective buyers cooperation ventures, adaptation of products to the market needs and requirements, and convenient terms of deliveries.

The construction of robots is handled in Poland by four scientific-technical back-up units: the CBKO Research-Construction Centre for Machine Tools at Pruszków, the Institute of Fine Mechanics in Warsaw, the TEKOMA Research and Development Centre for Machine Technology and Construction Fundamentals in Warsaw and the MERA-PIAP Industrial Automation and Measurement Institute in Warsaw.

In 1978, as the result of construction work carried out by the CBKO Centre, the series production of PRO 30 robots, designed for operational and interoperational transportation of workpieces in machine tools and other process equipment, has been started.

From 1980, this robot is exported to the German Democratic Republic in the standard execution and as an additional equipment of a machining production centre.

The PRO 30 in a standard version is a stationary robot of rated lifting capacity 300 N at full operation speed and up to 600 N at a speed reduced to 70%. The robot has four axles whereof the three main ones are numerically controlled. The fourth auxiliary axle is on-off controlled.

The drives of main axles are based on machine tool solutions made by the home machine industry. For driving the auxiliary axle and loosening of grip hydraulics are used made in Poland under REXROTH licence. The robot is controlled by means of the NUMS 406R system which forms a version of the machine tool system NUMS. This system has a computer structure with separate elements of small and medium integration scale.

In its standard make the PRO 30 robot is delivered for cooperation with a single or double grip or type CT-30 grip for such objects like, for instance, a disc of 150 to 350 mm diameter or type CW-30 for shafts of 16 to 160 mm diameter. The above system can be wholly or partly used for driving and steering other grips for definite applications. The module construction system, applied and checked in production centres fitted out with industrial robots, allows to set up lines or work centres of different machine tool structure and number. It is in each case adapted to the requirements of buyer within which the application of PRO 30 robots can be widened in the line of transport arrangements with shifting along guideways, along a ground-based or suspended track. In order to widen the applicability of the PRO 30 robot the production has been prepared of its versions with five axles:

- PRO 30R – with manual travel along guideways
- PRO 30N – with numerical travel along guideways
- PRO 30NP – with travel on suspended guideways.

Work is also well under way on a microprocessor control system and small-size drive system to save the production area needed by the robot. Parallel to development work on the PRO 30 robot the CBKO has elaborated the RPA 80 robot of a module structure with up to eight controlled axles, including six numerically controlled ones.

The rated lifting capacity of this robot amounts to 800 N and the maximum capacity reaches up to 1200 N. The construction solutions of robot assemblies make possible the economical production of its versions in the stationary and mobile, ground-based or suspended configurations, of various freedom degrees.

The prototype of the RPA 80 standard robot in a stationary version with six numerically controlled axles has been completed in the beginning of 1981. Currently work is going on its successive versions, i.e. the RPA 80R, RPA 80N and

RPA 80NP as well as RPA 160 and RPA 315 with rated lifting capacity of 1600 and 3150 N respectively.

The MERA-PIAP Industrial Automation and Measurements Institute manufactures to own constructional developments industrial robots type IRb under ASEA licence and the PR 02 robots. The IRb are universal robots of five freedom degrees. In some applications the handling part can be supplemented with the sixth degree.

IRb 6 and IRb 60 robots are made of a lifting capacity 60 and 600 N respectively. The separation of the handling part from the control system permits to use the robot under difficult environment conditions. The control system is based on the microcomputer technique. The IRb robots can be used on various production stations which is ensured by such qualities like: the rich collection of orders, great number of inputs and outputs, easy introduction of changes in the work programme and also the possibility of forming utility programmes. Attention must be paid also to the possibility of work of IRb robots with great accuracy and without brakes. The motions repeatability of the IRb 6 robot amounts to ± 0.2 mm and for the IRb 60 robot to ± 0.4 mm.

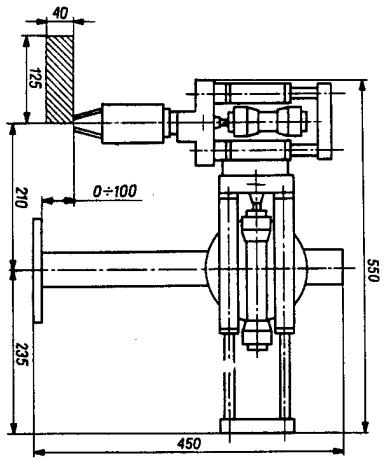
The IRb robots are mainly used in production processes requiring the manipulation of details, primarily in the machine industry. Robots of that type can be used, for example, for the following work:

- servicing of foundry machines
- servicing of machines for metal forming
- welding
- servicing of machine tools
- grinding and grating jobs
- placing of details on a pallet.

Recently in the MERA-PIAP Institute a station for cleaning castings by means of the adaptation robot IRb 60 has been elaborated. The weight of details placed in the grip amounts to 150–200 kg, the cleaning tool is carried by the robot.

An extremely interesting solution trained into production is the module-based flexibly programmed PR 02 robot. It can be applied for the automation of manipulations at the servicing of machines and process tooling, and especially for:

- charging and discharging of cutting machine tools and plastic working machines



Assembly manipulator NM6

- unloading of casting machines and injectors
- transporting of details between belt, roller and other conveyors
- assembly of subassemblies
- servicing of production work centres composed of two or three machine tools.

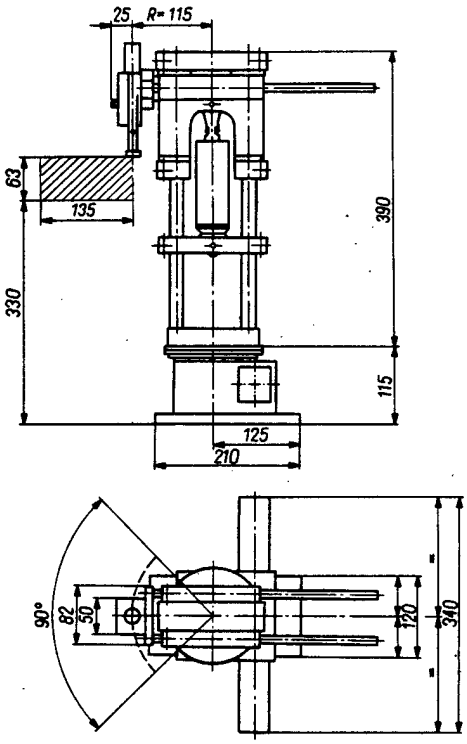
From the PR 02 modules specialistic feeding-charging, discharging and transport equipment can be built integrated with the serviced machine tools.

Successful technological-construction solutions represent industrial

robots type RIMP 401, RIMP 402 and RIMP 1000 made by the Institute of Fine Mechanics.
The first four RIMP 401 robots designed for cooperation with presses have been purchased by the German Democratic Republic in 1981.
The recently offered RIMP 1000 is a first generation robot provided with a data storage and operating in the polar coordinates system.
The construction of the RIMP 1000 robot allows for the following applications:

- welding and cutting
- pressure welding
- discharging and loading of transport arrangements
- injection casting
- processing of plastics
- painting and depositing of special coatings
- near transport
- simple assembly jobs.

A none the less interesting export proposition form the assembly manipulators NM6 and NM7 made by the Research and Development Centre for Machine Technology and Construction Fundamentals in Warsaw. They serve for the continuous or controlled transporting and placing of elements on assembly stands or lines. These manipulators are driven pneumatically and as a rule have their own control system.
The control functions can be taken over by the control system of the assembly line or station in which the manipulator works. The module construction of the manipulator ensures a wide range of mutual setting positions required at its installation on the assembly stand or line. The adaptation of equipment for the assembly of various parts is done by the replacement of clamping ends of the grip, whose shape is to be adapted to the geometry of transported elements.
The maximum lifting capacity of the NM6 manipulator amounts to 10 N at a positioning accuracy ±0.1 mm and of the NM7 – 50 N and ±0.2 mm respectively.
It seems that the above wide and interesting offer of Polish manufacturers of industrial robots and manipulators should awake the interest of even the most exacting buyers of such equipment. The more so as each of the presented versions of robots and manipulators can be adapted to the individual requirements of clients.



Assembly manipulator NM7

CSO: 2020/61

DESIGN, APPLICATION OF AVIA RADAR SYSTEMS DESCRIBED

Warsaw POLISH ENGINEERING in English No 1, Jan 83 pp 28-29

[Article by Anna Losiewicz]

[Text]

On the turn of June and July 1982 the air traffic control radar AVIA C has started its operation as a part of a radar complex located in Czechoslovakia. The complex was constructed by Polish, Russian and Czechoslovak specialists.

The air surveillance radar AVIA C and airport area surveillance radar AVIA D are constructed using solid state devices with large application of integrated circuits. Magnetrons (used as transmitter tubes) and CRT (used in indicators are only representatives of vacuum techniques.

The two-channel AVIA D is equipped with an antenna system with 12 × 4 m reflector and allows to control air traffic within range up to 100 or 150 km (optional according to customer application). Its equipment is similar to that of the AVIA C radar. All equipment was built using Polish, Soviet and Czechoslovak made components and subassemblies and a very few components from other countries.

The AVIA C radar is provided with a parabolic reflector (13 × 9 m) and its detection range is up to 300 km.

The main features of the AVIA C and AVIA D radars are:

— operation in the L frequency band,

— operation in the "frequency diversity" mode,

— variable polarization for cancellation of atmospheric clutter (from clouds and precipitations),

— application of MTI system eliminating disturbing returns from ground configuration,

— application of additional passive beam in antenna improves considerably visibility of airplanes on the background of interference signals (returns from terrain configuration and "radar angels"),

— application of digital signal processing with digital periodic filters in quadrature, double cancellation, feedback and staggered repetition frequency,

— application of a system gating off interferences which may be switched to selected regions of controlled space with possibility of application of suitable modes of operation,

— possibility of assembling transmitting/ /receiving equipment in containers provided with a cooling and heating system,

— remote control and command system ensures operation of the transmitting/ /receiving equipment without supervising personel,

— system of radar signals transmission makes possible location of the radar transmitting/receiving equipment at a distance up to 3 km from the operator (controller) room (system uses cable transmission),

— application of large reflector antenna on a tower approximately 20 m high,

— interface with the secondary radar KOREN,

— radar may operate in systems of automatic air traffic control.

The French company THOMSON-CSF bought the antenna assembly of the AVIA C radar.

It all started many years ago (in 1958) when PIT — Industrial Telecommunication Institute now a subsidiary of the CNPEP — Scientific and Productional Center of Professional Electronics developed and installed the area surveillance radar AVIA A (radar of the first generation) at the Warsaw International Airport — OKĘCIE.

On the turn of sixties and seventies a new type of radar called AVIA B was developed. Two of these radars were installed in Poland and two in German Democratic Republic.

In the mid seventies a fundamental quality breakthrough took place. Then the PIT designed the air surveillance radar AVIA C and the airport area surveillance radar AVIA D (both belonging to radars of third generation). Already very advanced Polish — Soviet cooperation allowed to both countries to undertake specialized production. At the same time construction of the airport area surveillance radar AVIA D began at the Berlin airport — Schönefeld in the German Democratic Republic under a contract signed by the Foreign Trade Enterprise UNITRA. Normal exploitation service of the radar has started in 1978.

The AVIA D-KOREN complex was realized by Polish and Soviet specialists with cooperation of representants of the German Democratic Republic. The Polish party supplied the primary radar, system for processing and displaying radar information and the computer Odra 1305 (Polish make). The USSR delivered the secondary radar KOREN and the extractor while the specialists from the GDR elaborated the detailed air traffic control programme. Technical and exploitation parameters of the whole radar complex obtained very good ratings.

Radars from AVIA family operating in the German Democratic Republic were developed in the Industrial Telecommunication Institute (PIT) where they were checked on test posts before sending to the customer. The Engineering and Production Enterprise UNITRA-UNITECH acted as a general supplier and also supervised installation of ventillation equipment, adaptation work and assembly of the steel antenna tower.

As for the nearest future the Industrial Telecommunication Institute plans to continue research and implementation work on optimizing the radar construction and especially on improving receiver and indicator part of the radars.

Simultaneously, preparations are made for development of a new generation of radars which the Institute plans to undertake in cooperation with the USSR. Radars will be assembled of specialized functional blocks each equipped in micro- and macro-processors.

Digital technique is introduced more and more commonly into radar production technology as it can be seen on the example of synthetic panoramic indicators or analog-digital signal processors both applied in the AVIA C and AVIA D radars. They increase reliability of the radar, simplify control and supervision as well as adjustment procedure.

The AVIA C radar complex altogether with a system of narrow-band transmission of radar information over a large distance in presence of strong natural obstacles (like mountains and forests) and atmospheric precipitances is the first object of this type developed in the CMEA countries.

The radars AVIA C and AVIA D are a good visiting card and an excellent recommendation of the high level of the Polish technical know-how. They are also a good example of cooperation between Polish and Soviet specialists in the field of professional electronics and also they became the first successful attempts to enter jointly third markets.

BRIEFS

SPACE PHYSICS STUDIES--Poland will participate in a number of space experiments in the field of physics organized within the INTERKOSMOS socialist countries' space research organization. An experiment called ACTIVE will concentrate on studies of the ionosphere plasma disturbances induced artificially by electromagnetic waves. Studies of ionosphere plasma by a beam of electrons and a stream of plasma will be the main aim of an experiment called APEX. Polish scientists also plan to participate in an INTERBALL project, consisting of complex studies of physical effects in earth's space along the lines of magnetic field. Poland has considerable achievements in those kinds of studies. Polish scientists already conducted plasma experiments with the use of devices placed on satellites within the framework of international cooperation. Polish-made devices for studies of plasma were part of equipment placed on such satellites as INTERKOSMOS 9, KOPERNIK 500, INTERKOSMOS 19, IONOSOND and PROGNOZ 8 during previous experiments. [Text] [Warsaw PAP DAILY NEWS in English 5 Jul 83 p 3]

VEGA SPACE PROJECT--Poland will participate in international research of Halley's comet which is to appear near earth at the beginning of 1986. The VEGA space project is organized within the INTERCOSMOS Soviet space research organization. The project includes research of the comet combined with a flight to Venus. A space probe will first fly to Venus, lower a landing module containing scientific apparatus onto the surface of the planet and then will continue its flight to meet the comet. Polish participation in the experiment includes research of phenomena occurring in space plasma. The probe will be equipped with a Polish device--low frequency plasma wave analyser which has been designed and constructed by specialists from the Space Research Centre of the Polish Academy of Sciences and the Institute of Aviation. The VEGA probe is to be launched in a year and a half--in December 1984. It will be first direct research of a comet. [Text] [Warsaw PAP DAILY NEWS in English 29 Jul 83 p 1]

POLAR RESEARCH PROSPECTS--Poland has entered the second 50-year period of polar research having scored remarkable scientific attainments in this area in the previous period. The country also obtains measurable economic advantages from polar studies, chief coordinator of the program of polar studies at the Polish Academy of Sciences (PAN) Professor Roman Teisseyre told PAP reporter. Since

the first Polish polar expedition in 1932, several thousand scientific dissertations on polar questions have been published in Poland. Polish studies have considerably contributed to the world knowledge about polar areas. PAN attaches great weight to polar expeditions as they are important scientific and economic ventures. Big scientific parties have been organized by PAN since 1975 and work on the basis of permanent polar stations in the Antarctica and on Spitsbergen. Small specialized expeditions, organized by universities, have also been operating in the Arctic zones. Because of Poland's economic situation, expeditions were recently limited to the necessary minimum. In this situation, the Hornsund polar station in Spitsbergen and the Arctowski station on King George Island in the Antarctica do most of the research. Intensive studies are also conducted in Poland, using the material brought by the parties of Polish scientists in previous years. In the future, Polish polar research will rely chiefly on the work of permanent stations. Poland will also organize sea biological, oceanographic and geophysical expeditions, professor Roman Teisseyre said. [Text] [Warsaw PAP DAILY NEWS in English 1 Jul 83 p 5]

POLAR EXPEDITION TO SPITSBERGEN--Another Polish polar expedition left for Spitsbergen aboard the PERKUN vessel to arrive there in early August. The 10-man polar team, headed by doctor Jan Cisak of the Geodesy and Cartography Institute, will replace the present crew of the Hornsund polar station of the Polish Academy of Sciences (PAN) and spend a dozen or so months in Spitsbergen until next summer. The new polar party will conduct permanent meteorological, seismic and magnetic studies. Large-scale cartographic works are also envisaged, including the making of detailed maps of the area around the Hornsund Fiord and White Bear Bay, on which the Polish station is located. [Text] [Warsaw PAP DAILY NEWS in English 20 Jul 83 p 1]

ANTARCTICA'S ENVIRONMENT PROTECTION--"The Polish delegation has made a significant contribution to elaboration of the major components of Antarctica's environmental protection," said professor Krzysztof Birkenmajer, member of the delegation to the conference of Antarctic treaty countries recently held in the FRG. The meeting in Bonn was already the third one to concentrate on setting up general principles of the proposed convention on natural environmental protection of the Antarctica. "Results of biological, geological and geophysical studies obtained by Polish scientists during the recent years count in the world," underlined professor Birkenmajer, "they were used extensively in preparation of the convention on biological resources protection. "Poland will also take an active part in the work on a convention on protection and rational exploitation of mineral resources. Poland's contribution in Antarctic research and full membership in the Antarctic treaty entitles this country to co-decide about the utilization of natural resources of that region," professor Birkenmajer said. [Text] [Warsaw PAP DAILY NEWS in English 3 Aug 83 p 1]

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CEAUSESCU VISITS BUCHAREST SCIENTIFIC RESEARCH INSTITUTES

Bucharest SCINTEIA in Romanian 10 Jun 83 pp 1-3

[Article: "Working Visit of Comrade Nicolae Ceausescu and Comrade Elena Ceausescu to the Research Institutes of the Capital"]

[Excerpts] On 9 June, Nicolae Ceausescu, and Elena Ceausescu made a working visit to the research, design and technological engineering institutes of the Capital. Constantin Dascalescu, Gheorghe Oprea, Gheorghe Pana, Ion Patan, Ion Ursu, and Ion Nicolae participated in the visit.

The working visit began in the Institute for Chemical Research [ICECHIM]. Nicolae Ceausescu and Elena Ceausescu were greeted by Nicolae Barbulescu and Iustin Rogoz, deputy ministers of the chemical industry, by members of the management staff of ICECHIM and of other research, design, and technological development units from the entire country. The secretary general of the party was informed by Maria Ionescu, director general of the Central Institute of Chemistry, about the activity which is taking place in the 23 research, design and production units in the Central Institute--units which are a strong base for research and development in the field of chemistry.

The management cadres and the other specialists described the results of their work in devising modern technologies, assimilating new products, and finalizing investment projects in all sectors of the chemical industry. They said that, last year, the units of the Central Institute for Chemistry utilized more than 300 technologies and, during the 1983-1985 period, more than 2,000 products, with an annual production worth more than 5 billion lei, will be introduced into industrial production on the basis of the institute's own research. This will result in large savings of hard currency.

The successes of the elastomer sector, the sector in which Comrade Academician Doctor Engineer Elena Ceausescu carries on her activity, were presented. For the first time in the country, certain types of rubber and synthetic resins were produced and there was an increase in the production of tires and technical articles for the machine building and chemical industries and for other sectors of the national economy.

The secretary general of the party indicated that the activity of diversifying the production of rubber should be continued so that the need for imports

could be eliminated completely and high-value products could be achieved both for export and for domestic needs.

Attention was also given to numerous products of great importance for the economy and to highly-technical products such as those intended for electronics and microelectronics, nuclear energy, the drug industry, the microproduction and small tonnage activity of research units or collaboration with the production enterprises.

Learning about some of the latest achievements of research and microproduction in the field of biostimulators and of substances for combatting pests, Comrade Nicolae Ceausescu requested that the products which agriculture needs be produced so as to contribute to the increase of agricultural yields.

During the visit an important place was reserved for the concerns of specialists in the Institute for Chemical Research (ICECHIM). During 1982, this collective utilized a great number of technologies with applicability in different domains, resulting in more than 14 new products, great reductions in the import of products and licenses, and the expansion of the raw materials base. The specialists in the institute described the successes which have been achieved in the diversification of varieties of synthetic rubbers, plastic materials, dyes, and in research on the use of the biomass, the utilization of vegetable oils and in other sectors.

The specialists and researchers were asked to give increased attention to reducing consumption in the fertilizer industry, to develop the production of high value phosphorous salts so that the cost of fertilizers can be reduced. Also, they were asked to accelerate research and experimentation in the utilization of the biomass in order to move on to industrial production and to develop the production of dyes and auxiliary materials in order to eliminate the need for imports.

Comrade Nicolae Ceausescu and Comrade Elena Ceausescu visited some of the laboratories of the elastomer section of the Institute for Chemical Research. The secretary general of the party was informed about the research being carried out to increase the level of replacement of natural rubber with compositions of different products, the diversification of types of synthetic rubber, and the utilization of secondary products.

Then they visited the National Institute for Scientific and Technical Creation (INCREST) a unit which ensures the execution of research, design and experimentation for all development programs for the construction of aircraft in Romania. They were greeted by Ioan Avram, minister of the machine-building industry and by Teodor Zanfirescu, director general of the National Center for the Romanian Aeronautics Industry.

The director of the institute, Constantin Teodorescu, presented a number of electrical, electronic, mechanical, and hydraulic subassemblies and equipment produced in the institute in microproduction and delivered to the producing enterprise for installation on aircraft. Among the overall achievements of the institute, emphasis was given to the basic research in the field of

mathematics, the value of the studies carried out by the Department of Mathematics of the Institute, headed by Zoia Ceausescu, and their widescale applicability in various fields of science and of the national economy.

During the visit to the laboratory for experimental aerodynamics, attention was given to the especially high technical level of the equipment. This is one of the "key points" of the experimentation process to which the new models are submitted. It is equipped with complex installations in which experiments and tests are made on mock-ups in a subsonic, sonic, and supersonic atmosphere, for the purpose of checking and perfecting the form of the aircraft. The installation permits the execution of precise measurements under conditions similar to those of flight as well as the exact determination of the pressures, forces and all the demands to which the components are subjected. Comrade Nicolae Ceausescu and Comrade Elena Ceausescu were interested in an experiment vizualizing the action of the air on the model of a new type of aircraft which is in the assimilation phase.

The secretary general of the party cited the fact that the installation paid for itself in a short time and that currently it carries out research stipulated in the program for the development of aviation as well as research for foreign partners. It was directed to continue to work to improve the technological process and the effectiveness of the methods utilized.

In the laboratory for testing the resistance to aeronautical structures, the secretary general of the party was shown a modern installation for testing and verifying the behavior of various structures which ensure flight safety and high reliability of the apparatuses. The best solutions for designing new types of aircraft are selected on this basis.

Comrade Nicolae Ceausescu and Comrade Elena Ceausescu were greeted with special attention at the National Institute for Thermal Enginers [INMT] by the workers of this important research unit, created on the initiative of the secretary general of the party for the purpose of achieving a unitary conception, for the entire Romanian industry, of prototypes of thermal engines and equipment as well as of engines of special construction, one-of-a-kind and in small series. They were greeted by Ioan Avram, minister of the machine building industry, Gheorghe Vlad, minister of petroleum, by other specialists and a large number of workers. They visited the modern installation hall, where the director of the institute, Ion Buzescu, described development programs for piston and turbine engines--products in demand in numerous sectors of the Romanian machine building industry. They were shown stationary engines introduced into fabrication in the beneficiary enterprise, "Timpuri Noi" automobile engines with very low gasoline consumption and new Diesel engines for the ARO jeep. They were shown a wide range of engines using substitute energy sources. The electrogen group, driven by a biogas engine, is noted for its increased efficiency. The installation was executed in the mocroproduction sector of the institute and is already being used in a number of agricultural units of the country. The hosts told Comrade Nicolae Ceausescu about the constant concern of the institute with utilizing new materials in the construction of engines as well as new types of fuels and about efforts to improve the combustion processes, reduce pollution and reduce losses.

The exhibit, which included products devised by the institute, illustrated the close ties between the National Institute for Thermal Engines and the Romanian enterprises producing thermal engines and the teaching cadres in the Bucharest, Brasov, Timisoara and Iasi polytechnical institutes, thus ensuring good cooperation in the standardization of the construction of engines along with their diversification. The recent achievements of the specialists of the institute in this area were displayed: diesel engines for autos, tractors, and highway transport vehicles, introduced into fabrication in the "Timpuri Noi" and "23 August" plants.

Turbine engines are another important sphere of interest of the institute. The hosts displayed the AI-20 turboengine, adapted for operation on methane gas, a solution which permits a substantial reduction in imports. The autobiles with very low gasoline consumption--Egreta and Lastun--gave a demonstration of their technical performance.

The last part of the visit was devoted to the examination of results achieved in another important field of research--electronics. Alexandru Necula, minister of the machine tool, electrical engineering and electronics industry took part in the analysis. The director general of the Central Research Institute for Machine-Tools, Electrical Engineering and Electronics, Florin Tanasescu, presented some important information regarding the activity of the central institute. Some of the concerns and important successes of the central institute were concretely illustrated during the visit to its unit for scientific research and technological engineering for electronics. The director of this unit, Radu Nanu, said that the microproduction base was expanded in 1980 by the commissioning of a new and important capacity. Also, research activity was enriched, intensified and diversified. The hosts reported with satisfaction that the institute is producing one-of-a-kind items and small series items for the purpose of reducing imports. Among these products an important place is occupied by the system of equipment and installations for supervising and directing traffic on the Danube-Black Sea canal; the centralized control system, by radio, for the automation and perfecting of the petroleum extraction process; the system of control, by radio, and the perfecting of the petroleum extraction process; the system of control, by radio, and dispatching of traffic on lines 1 and 2 of the Bucharest metro; the radiocommunications system for underground mining operations, for the purpose of perfecting the loading, unloading and transporting of coal trucks; the command installation for vibro-seismic investigations in geological prospecting operations.

Comrade Nicolae Ceausescu asked that the unit continue its research in the area of electronics and applied electronics and that the tool shop capacities of the institute be developed so as to increase the performance level of the specific equipment produced by the institute.

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ACHIEVEMENTS IN VETERINARY MEDICINE DESCRIBED

Bucharest ERA SOCIALISTA in Romanian No 11, 10 Jun 83 pp 37-39

/Article by Victor Frinculescu: "Veterinary Research and Production in Support of Zootechnology"/

/Text/ Animal husbandry is one of the major sectors of the national economy, very important not only to further improvement of the public's living standard but also to development and diversification of some industrial sectors as well as expansion of exports of raw materials or finished products.

Animal health is vital to fulfillment of the complex tasks of zootechnology. A whole system has been created in Romania to prevent and control livestock diseases, including a number of central, county and regional units in addition to the Veterinary Health Directorate, the central specialized organ under the Ministry of Agriculture and Food Industry.

Provision for the efficiency of the veterinary health effort has been and is a constant concern of the party and state administrations. The Directives of the 12th Party Congress set the basic guidelines and methods for developing zootechnology, especially by protecting animal health. On his many visits to zootechnical production units, Nicolae Ceausescu repeatedly pointed out the vital importance of preventing livestock diseases by providing for all the necessary basic factors and strictly observing the veterinary-health principles. As he said, "We must realize that the veterinarian has a responsibility of his own and that the standards set by veterinary medicine and the veterinary rules are binding on everyone."

The first center for veterinary biological preparation in Romania, wherein research work was also expanded, was founded in the Bucharest Faculty for Veterinary Medicine thanks to the professor of international reputation, Paul Riegler. He laid the foundations of a laboratory to produce serums and vaccines for veterinary purposes in 1908, which year accordingly marked a major achievement of the veterinary-medical profession in Romania. Since then the modest laboratory employing a few veterinarians has steadily developed and diversified its activities.

The main building of the present Pasteur Institute for Veterinary Research and Biological Preparations was built in 1949-1950 with Nicolae Ceausescu's direct

support. Later on the institute's material base was intensively developed, especially by founding the laboratory for major viruses (now the Virology Laboratory) and the laboratory for tumoral viruses in birds (now the Center for Research and Biological Preparations for Poultry and Small Animals).

Today the Pasteur Institute includes a number of main units, such as the research and production laboratories on the main premises, the Research and Production Center for Poultry and Small Animals, the Central Diagnostic Veterinary-Health Laboratory, the institute's regional centers (collectives) in Arad, Brasov, Cluj-Napoca, Constanta and Iasi, and farms for quarantining control animals and for production.

In speaking primarily of the institute's research and production activities, it should be noted that the institute is organized with integrated research and production laboratories, giving it a number of advantages in uniform performance of research-development-production tasks in various fields. There is close collaboration between the institute's laboratories and sections (organized according to criteria like research and production, livestock species according to their economic importance, or output of biological preparations). The major problems are solved by multidisciplinary teams through both their specialists and their inventory of equipment. Accordingly the institute's work is done in highly stable laboratories and sections and also in collectives with greater flexibility depending on the content of the research programs and the results obtained in the various stages of their implementation.

The institute's chief tasks are entirely in keeping with the general effort to protect the animals' health. The whole effort emphasizes solution of immediate practical problems but also of the long-range ones, in the light of the evolution of animal pathology and the means of prevention and control of the various diseases. To this end the institute's specialists perform scientific research to produce biological preparations and drugs for veterinary purposes and help to improve the cadres of veterinary physicians throughout Romania.

Since the Pasteur Institute's performance of its tasks is supervised by the Ministry of Agriculture and Food Industry, while its research work and international scientific collaboration are coordinated by the Academy of Agricultural and Forestry Sciences, it cooperates regularly with many Romanian institutions and units (faculties of veterinary medicine, zootechnical research institutes, central veterinary laboratories, medical and other research institutes, county veterinary-health inspectorates, animal husbandry units and veterinary districts).

The institute's research work is constantly characterized by the tradition of advances recognized throughout the world combined with the creative spirit of the new generations of researchers, whose activity is directly involved in solving the current and long-range problems of the animal husbandry sector.

The Pasteur Institute's subject programs are included in the nationally integrated research plan, in which teachers in higher education participate as well as specialists in other central units and in industry. Of course the latter have a broad field for initiative so that the research work will be focused upon particular research objectives that are often of regional significance and of an applied as well as a basic theoretical nature.

The institute's research programs include several subjects grouped according to basic disciplines (virology, immunology, genetics, parasitology, chemotherapy and toxicology), integrated solution of problems of species pathology (hogs, cattle, sheep, poultry etc.), and improvement of production technologies and biological preparations. The studies made in the institute in recent years have permitted more intensive knowledge of some pathological processes as well as accumulation of results that have been applied to diagnosis, prevention and control of diseases. In the field of virology, for example, modern diagnostic methods and modern investigative techniques have been applied, and these studies include practically all the pathogenic viral agents encountered in Romania.

Studies have been made in bacteriology in order to characterize the pathogenic germs in animals, and diagnostic methods have been developed in the case of some bacterioses such as tuberculosis, paratuberculosis, brucellosis et al. Ways and means have also been developed for preventing diseases such as contagious pleuropneumonia in hogs, pasteurellosis in cattle, pasteurellosis and salmonellosis in birds by means of hyperimmune vaccines and serums. Similarly, the comprehensive studies of parasitic fauna are noteworthy in parasitology, as well as the development of diagnostic methods and especially the whole methodologies for treatment, prevention and control, including destruction of the biotopes in the external environment. Thanks to collaboration with the Chemical-Pharmaceutical Research Institute, manufacture has been introduced of many drugs to prevent parasitic diseases that have permitted a concerted effort to check the spread of those diseases.

Reproductive diseases in cattle, hogs and sheep as well as ailments of young livestock are fields of constant priority investigation in the activity of the institute's various collectives. The comprehensive approach to these fields had an important result in development of methodologies for diagnosis, prevention (especially by vaccinations) and control, largely by use of biological and pharmaceutical products made in the institute.

More emphasis has been placed in recent years on developing studies in "nonspecific" pathology (a broad field including the diseases not caused by bacteria, viruses or parasites but primarily by deficiencies and metabolic disorders). The study of these ailments has brought out their growing importance as the incidence of the infectious-contagious and parasitic diseases is considerably restricted.

The institute's researchers have obtained important results in such very urgent fields as genetics, hereditary pathology or immunology. In genetics methods have been developed for cytogenetic testing and study of the stability of the genome in sires, methods of cytogenetic characterization of some species of animals, etc. And in immunology the processes that protect the organism have been studied by applying modern methods and techniques to determine the functions of the cells participating in the immune reaction. Methods have also been applied to study and quantify the antibodies (variations of the immunodiffusion technique, the immunoenzymatic test, immunofluorescence, etc.).

The Pasteur Institute is regularly emphasizing development of biochemical and chemotherapeutic studies. The drugs obtained through its own studies or in collaboration with the Chemical-Pharmaceutical Research Institute are being further

diversified, and small series products are being made today in limited volumes for treatment of livestock with more serious pathological conditions. Development of biochemical studies was made possible by providing the laboratories with highly productive equipment and specialization of some researchers in fields like the biochemistry of metabolism, enzymology, pathological processes caused by pesticides, etc. Diagnostic methods for some diseases (especially in subclinical forms) caused by various nutritional deficiencies (hepatopathies, nephropathies, oligomineraloses, dehydration due to development of microbic diseases, etc.) were also developed in this connection.

Gnotobiology is a very novel and effective field wherein it is becoming possible to make studies on animals free of germs or with controlled microbic flora. The institute has obtained results of the greatest practical value in this field and has succeeded in making some purified reagents for diagnosis and in preparing the various vaccines.

The results obtained in the various fields of research are applied annually in methodologies, recommendations, biological and pharmaceutical products, and integrated veterinary-health technologies. In the last 3 years alone many elements have been made available for application in practice. Dozens of new biological preparations and pharmaceutical formulas have been approved and others are in course of approval.

The institute's researchers regularly lend the production units the technical aid needed to solve special problems by taking trips to determine diagnoses and the necessary measures for prevention and control. A great many diagnostic laboratory examinations are also performed every year.

The Pasteur Institute (including the Center for Poultry and Small Animals) is now producing all varieties of biological preparations needed for zootechnology, in the quantities required by the development of the livestock. The geographic conditions and the epizootological considerations have made it necessary to develop a strong biological preparations industry. Among the veterinary-health technologies, the immunoprophylactic actions take the place required by each unit's situation, while some programs of broader application are maintained such as vaccinations against the hog plague and the pseudoplague in birds, allergic diagnosis of tuberculosis, or serological monitoring of brucellosis.

The vaccines, hyperimmune serums and diagnostic reagents are the chief products delivered by the institute.

Many of the bacterial vaccines (against anthrax, pneumopathies in cattle and hogs, many bacterial infections in poultry, etc.) or antiviral vaccines (for prevention of widely diffused diseases of great economic significance) are the results of the institute's own research work. The introduction of modern, high-capacity manufacturing lines in the production of these vaccines makes it possible to produce series of homogeneous and much more effective preparations.

The hyperimmune serums, preparations highly effective in checking the evolution of serious infectious diseases in livestock, are now produced by the institute's regional farms and collectives and account for an increasing proportion of its total output. Practically all the necessary prophylactic and therapeutic serums

are being produced. Some multipurpose products are also being made (to control mixed infections), as well as highly effective and productive purified serums.

All the institute's laboratories are interested in further modernization of the production processes for biological preparations. Improved methods for control of product quality (especially through higher standards, introduction of production strains with better characteristics, and modernization of technologies) are objects of sustained effort in the studies in this field. As a result, over 80 percent of the total biological preparations manufactured in 1983 are new or perfected in the last 5-6 years.

The number of varieties of biological products for cattle, sheep and hogs is up 79.48 percent from 1970, and that for poultry is up more than 400 percent. The growth rate of the number of varieties of biological preparations is higher than that of the numbers of livestock, thanks to the introduction of new biological preparations and the expanded field of application of those products. The value of the total output accordingly increased by more than 240 percent in the same period. This progress was made by applying some new technological measures that made it possible to reduce the inputs of electric power and hydrocarbons by more than 60 percent in the 1975-1982 period.

In the last few years reduction of raw material imports has been a major concern of the specialists in the institute's production laboratories. Compared with 1977, 52 percent of the imported varieties were eliminated in 1982, having been replaced by comparable products assimilated in Romania.

The research, production and technical aid accomplished by the Pasteur Institute's specialists have major implications for the animal husbandry sector. In addition to the organizational and general preventive measures, the supply of immunoprophylactic products (serums and vaccines) and diagnostic biological preparations as well as the actions of the institute's researchers for purposes of specialized guidance in special situations are helping to reduce some major losses in zootechnical production.

Romania's geographic position is one of the reasons for the Pasteur Institute's regular and concerted involvement in the effort to protect the territory from epidemic diseases, exotic or otherwise, as a major obligation both to Romanian zootechnology and to that in other countries, especially European ones. In the last two decades important results have been obtained in this direction: Romania was not infested with foot-and-mouth disease, hog plague or African hog plague, and it succeeded in preventing the spread of other highly infectious diseases on its territory despite the sometimes extreme situations it had to face. Clearly Romania's favorable epizootological situation has had and has a good effect upon the zootechnical economy in Europe.

The Pasteur Institute's work also has an indirect but essential effect upon the veterinary-health network in general and upon public health protection. Eradication or reduction of the incidence of contagious diseases in animals helps to lower the disease and death rates of people.

In view of the highly important tasks facing Romanian zootechnology in this five-year plan, the Pasteur Institute has especially important problems to solve. The

institute's diversified activity, due to the complex aspects of pathology in the field, requires sustained qualitative growth. To this end the institute will duly emphasize development of its material base, thus providing for detailed study of a large number of pathological entities (bacterioses, viroses and parasitoses) while testing, in various respects, the modern ways and means of diagnosis, prevention and control of many other diseases in animals.

Since the institute is performing a peak activity in veterinary medicine, its results and experience must be integrated in veterinary-health practice as efficiently as possible. The fastest possible exploitation of the results is important here, as well as the effort toward professional improvement of the physicians in the veterinary-health network through periodic arrangement of exchanges of experience. It is also very important for the younger specialists in the unit's central establishment to serve as apprentices in regional collectives. In those units young personnel can perform an activity for training and general improvement, especially in production units as well as in laboratories, under the guidance of specialists with long experience. The activity of such regional collectives as those in Constanta, Iasi and Cluj is exemplary in this respect.

In view of the present state of zootechnology in Romania, especially as regards the creation of large animal husbandry units and complexes located in various areas and having distinctive features of their own regarding veterinary pathology, it is becoming necessary to develop the existing regional collectives more rapidly and to organize new ones in other areas of Romania. These regional collectives (centers) could contribute substantially both to decentralization of the institute's activity and to more rapid diagnostic operations and more prompt particular measures required by exceptional situations, in cooperation with the county veterinary-health inspectorates and the appropriate teams in units. To an equal extent they could also take up aspects characteristic of the area, from the research standpoint, and also contribute to output of autogenous vaccines and hyperimmune serums essential to the units in their areas, and in some cases it is also possible that they could take over the entire output of certain varieties of biological preparations.

All this could help to enhance the efficiency of the Pasteur Institute's activity as well as its veterinary-health aid as a whole throughout Romania thus increasing the contribution of the specialists in veterinary medicine to the rapid development of Romanian zootechnology.

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