Prof. KONTIC MILAN

Deputy Director of Electronic Computation Centre Energoinvest Sarajevo

The Training of Informative Personnel in Yugoslavia*)

Today in Yugoslavia there are 342 sets of calculating machines in use, among which there are 170 or about 50% computers with internal programming. The others are the so called classical sets that had been produced before the system with internal programming appeared.

Besides the above mentioned sets, there are about 100 various smaller calculating and accounting machines i.e. mini-computers.

With the regard to the different kinds of calculating machines the personnel for them should also have various types, what to a considerable degree makes the programme and methods of training complex.

At first, while the EDP (Electronic Data Processing) started penetrating on the Yugoslav market, the training of personnel depended exclusively on the machine producers i.e. on their representatives in Yugoslavia. The programme and methods of training were adjusted to the concrete type of products) (computers) which means that in such circumstances the personnel were given only the essential knowledge necessary for the operation of the machine. Since at that time (50 ies and 60 ies of this century) the main supplier of Yugoslav market for EDP was the American firm IBM, the training which was completely in their hands, was rather short and was developing in due of seminars. As the examples of practical application of computers, they organized the introduction of personal registration system, which besides improving this less important branch also should serve as the evidence of the IBM sets efficiency in businesslike actions.

Yugoslav market was in a way also influenced besides IBM by the firm Ramington Rand. This influence was far less, since the mentioned firm did not give the computers on lease, it just sold them. The firm IBM on the other

*) Paper presented at the Session regarding the training of informative personnel from the 17—19 February 1971, Bucharest.

hand mostly gave the sets on lease. For Yugoslav possibilities of that time taking on lease was more acceptable, so, it is not strange that the firm IBM had almost the complete predominance in training the personnel.

However, when the new Yugoslav law for commercial jobs with foreign countries came into force it caused some important changes on Yugoslav market. The possibility of taking sets on lease was completely annuled and the situation was very unpleasant since the firm IBM threatened to withdraw all the sets of computers given on lease in Yugoslavia. In such a vacuum that suddenly appeared, the other firms such as CDC, Bull, Honeywell, NCR, ARITMA also penetrated on Yugoslav market. After that the firm IBM, faced with a strong competition, changed its decision i.e. it remained on Yugoslav market, strenghtened its activities and opened a special School for the IBM machine users. The same is done by the other competitors which causes a considerable development of computerization in Yugoslavia.

This society from the very beginning of its existence put all its forces to the further development of its activities, both in solving the mentioned dispute, engaging the other producers in appearing on Yugoslav market and including the corresponding themes and subjects into the Yugoslav system of education and finally, giving initiatives for opening the special schools for EDP. While working on the realization of the last mentioned task it had considerable difficulties, since it was the time of appearing of the so called second generation on the world computer systems market, the time when the training of the future personnel started to obtain certain profite. These efforts were made by the users themselves. This means that the necessity of training personnel for EDP had to pass a long and difficult period before it reached its proper place in the general personnel training system in Yugoslavia. In course of that period of intensive utilization of the third generation system, the type of personnel and accordingly also the programmes and training methods were determined. The training organized by the producers achieves in this way an additional character, being connected exclusively with the producers and its products. The training organized by the users or computer centres on their expense could also be considered to be of the additional character since it is also connected with the system on which the user is developing its activity. Still there is a considerable difference between these two additional trainings although they have the same sense. First with regard to the producers it has a mere commercial character i.e. to show the quality and wide application of their computers, while on the other hand, having on mind the users, the training has the meaning of the utmost possible software utilization on the disposable hardware with the explicit aim for the soonest possible and entire including of computerization into the management and decision system.

We are building by a methodical training in frames of regular schooling system in Yugoslavia existing today a base for the profound professional improving either through special schools with adequate subjects or through specialization in the University third degree. In the higher classes of Economic schools there are already subjects in specialized branches and special schools are also established exclusively for the EDP personnel. In higher schools the seminar works are written on EDP, special subjects are intro-

duced, and even special departments at the faculties such as Department for informatics at the Electro-technical Faculty — Sarajevo.

Many faculties have their own computers for teaching students or have arrangements with some other institutions with the same intention of training students. Today 12 faculties in our country have their computers or they utilize other users'computers.

Through this complex system of schools and schooling the following personnel are today educated:

— operators on the preparatory machines
— operators on the computer systems
— programmers of three types: application programmers, maintenance programmers and software programmers.
— analysts of two types: analysts and system analysts.

The informative training i.e. the schooling of managers who would more decisively introduce computerization in information system of the institutions and enterprises — should be treated as special category.

Duties and functions of the mentioned types of personnel would be by short, as follows:

— operators on the preparatory machines, who, besides their secondary school training also require a 1-year specialistic training. They are prepared to work on key-punch, key-tape and paper-tape machines,
— operators on computer systems, who, besides the essential secondary school training, require a 1-year additional training.

The training for all systems machines is done according to the uniform programme and with the regard to the success, they are given the tasks on the central or peripheral machines.

Programmers, because of their functions must have secondary school, higher school, or the faculty. Out of them the following types of programmers are selected:

— applications programmers whose duty is to do the programmes for the systems determined by the analysts,
— maintenance programmers whose duty is to up-to-date, supplement or partially change the existing programmes,
— software programmers for the study of assambler and compiler languages and operating systems with the purpose of their complete and universal utilization.

The analysts must be the graduates of the second or the third University degree. They are of two types:

— analyst is oriented primarily to the computer system software and its hardware and he also has a duty of taking part in defining the tasks to be done on the computer together with the system analyst who is the agent of computer service users,
— system analyst is the user's agent who together with his managers prepares the information system and defines the tasks on the system with the help of the computer centre analyst.

Out of the mentioned group of the faculty educated people the personnel for scientific work are selected. They are engaged in the information system as scientific branch and they also present an essential nucleus for spreading scientific knowledge and practical experience in the process of

personnel training. The mentioned groups of programmers and analy
are intended for the so called business systems while on the other hand
engineers, mathematicians and physicists who deal with the analysis a
programming besides their regular function, are intended for the scient
systems. The qualifying is performed through shorter courses that of
knowledge of programming by means of FORTRAN and ALGOL languag

One more type connected with computers has to be mentioned i.e.
technical personnel whose training is left over to the computer produc
and sellers. The existing experience indicates that this way of qualifying
completely adequate to the demands of the efficient technical maintena
system.

The aspirations of the computer users and the society as a whole ha
recently been directed towards the establishing of the uniform type of scho
with the task of exclusive computer personnel training (except the per
nnel with the university degree) in two directions: — for the enterprises a
for the public institutions.

L'INSTRUCTION DU PERSONNEL POUR L'INFORMATIQUE EN YOUGOSLAVIE

On présente l'instruction du peronnel pour l'informatique en Yougoslavie e
contribution importante de la firme américaine I.B.M. au développement de cette nouv
branche scientifique.

Lorsque PED (traitement électronique des données) était apparu, sur le mar
Yougoslave, la préparation des spécialistes dépendait exclusivement des producteurs
calculateurs et de leurs représentants en Yougoslavie.

Le programme et les méthodes de préparation étaient adaptés aux types des produ
respectivement des calculateurs.

En ce moment en Yougoslavie on construit, par une préparation systématique, la b
pour une profonde amélioration professionnelle, tant dans des écoles spéciales, que dans
universités.

Les aspirations de ceux qui utilisent les ordinateurs ont été récemment dirigées vers d
directions: préparation dans les entreprises et les institutions publics et la création d'un t
uniforme d'écoles ayant pour but la préparation des cadres professionnels pour l'utilisation
calculateurs.

ПОДГОТОВКА КАДРОВ В ОБЛАСТИ ИНФОРМАТИКИ В ЮГОСЛАВ

В настоящей статье излагаются подготовка кадров в области информатики в Ю
славии и существенный вклад американской фирмы ИБМ в дело развития этой новой об
сти науки.

Когда началось внедрение электронной переработки данных на югославском ры
подготовка кадров зависела исключительно от производителей машин и их представите
в Югославии.

Программа и методы подготовки кадров приспособлялись к конкретным типам ка
куляторов.

В настоящее время в Югославии путем методической подготовки в системах обуче
создается основа существенного профессионального улучшения как в специальных учили
с соответствующими дисциплинами, так и путем специализации в высших учебных з
дениях.

Удовлетворение потребностей специалистов, использующих калькуляторы, и общес
в целом получило недавно следующие два направления: на предприятиях и в обществен
учреждениях, а также путем создания училищ одинакового типа с целью подготовки кад
для использования калькуляторов.