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**COMMERCIAL AND BUSINESS APPLICATION FOR THE
TPA MINICOMPUTER FAMILY***

by

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1. Introduction

Our institute, the Research Institute for Measurement and Computing Techniques is a member of the KFKI research center located in Budapest. The main task of our institute is the research and development of minicomputer-based systems since 10 years. We developed the TPA mini computer family and minicomputer-based pilot solutions for different problems in the industrial field and in the scientific laboratories. The recent field of our attention is now the use of minicomputer systems in commercial and business applications especially in national wide governmental institutions. We cooperate with the Hungarian Ministry of Finance, the Central Office for Statistics and other central governmental offices in order

- to widen the computerisation of these large organisations with the help of minicomputers
- to extract the typical tasks which can be solved by such computers and

- to develop pilot solutions for them.

This paper presents some results. It deals with the following typical commercial applications:

- data entry and validity check
- decentralization of data processing
- integration of the computer systems into computer networks.

The paper presents the tools to fulfill these needs. It summarizes the systems engineering solutions for the problems arising with the implementation and operation of small computer systems in a national wide network.

2. Distributed Processing

The problems arising from the increasing amount of data processing load in big administrative or governmental institution had been met by computer centers equipped with large-scale mainframe computers. Organizations with large geographical extension are still faced with the problems of data entry, and data validation. In order to increase the speed of data collection the use of minicomputers in regional and local centres started to spread. This trend brought the computer-power just to the sources of data.

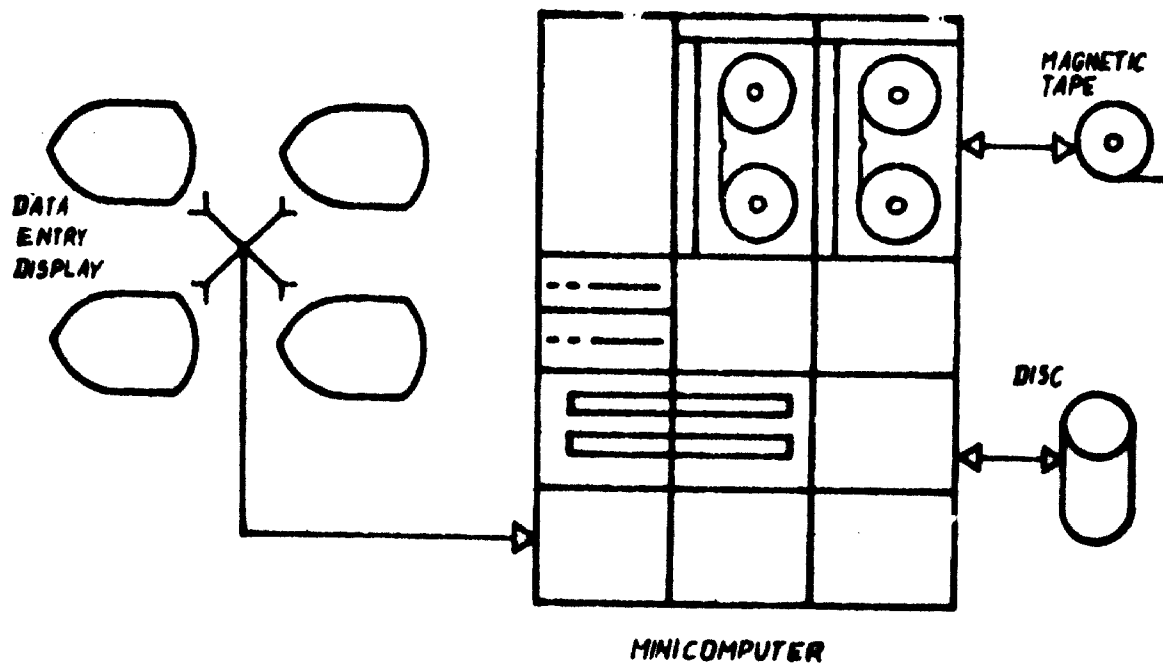
For such decentralized tasks the minicomputers have been used worldwide because only this computer-range meets the performance demands economically. The main functions of minicomputers

in this environment are: data entry, local processing and communication with mainframes, which are solved with sophisticated, problem-oriented operating systems.

2.1. Interactive multi-terminal data entry

In interactive data entry systems the data are entered through CRT display-station programmed and driven by the minicomputer. The way of work is much similar to the traditional filling of forms; the forms appear on the display-screen and are filled with the attached keyboard. A large set of different schemas may be stored in the computer so the one corresponding with the current data type to be entered can be used. After this, data is stored in the computer and is available for further processing. The increase of the throughput of advanced minicomputers accompanied with the decrease of costs for central processor units and memories renders possible increasing volumes of data to be processed in local or regional centres. The multiplying of data volume is served by multi-terminal data entry stations. Multiple data entry terminals attached to a single minicomputer make possible to serve multiple independent data collection tasks by running different data entry forms on the different display stations. Independent use of different forms is possible and to each form a different data validation check is pre-programmed respectively executed by the computer.

Figure 1. Shows a typical minicomputer configuration for multi-terminal data entry tasks.



2.2. Immediate data validity check

The distributed minicomputer power eliminates much of the time consumption and the high costs of data error correction in the traditional centralized data processing environment. The task of data validity check is removed from the mainframe computer and is done immediately and at substantially lower cost by the minis. The data validity and error check procedure is programmed together with the data entry forms and

stored together with them. Data are controlled upon entry into the computer and the errors are immediately displayed. The data entry program facilitates the data correction, and stores only the correct data. Collected datafiles can be processed on mainframe computers without vasting time.

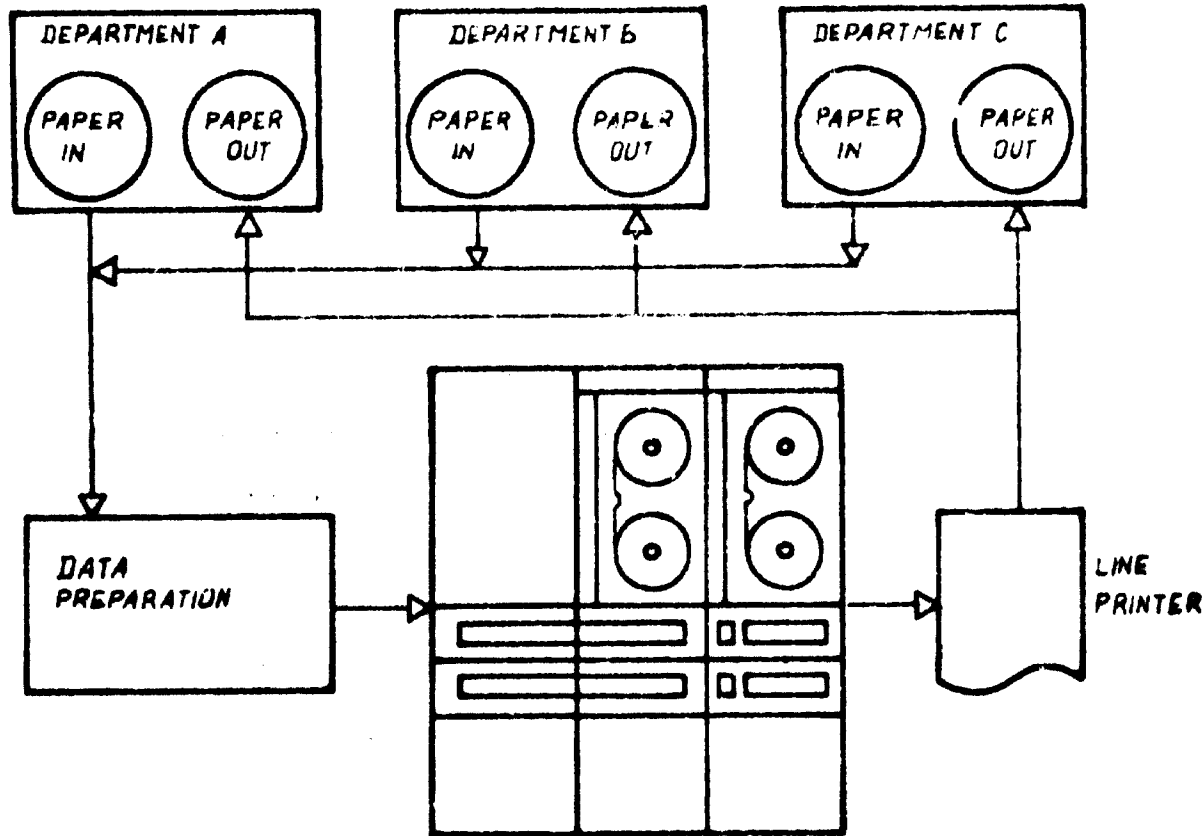
2.3. Decentralized data processing

The use of decentralized minicomputers unloads the central processing mainframes by doing pre-processing work for them and extends the range of data processing tasks solved by computers.

Regional data processing needs can be much better solved by local computers as with a central one, work which is mainly connected with regional centres can be solved there together with advantageous pre-processing. This speeds up mainframe processing.

Beside decentralized processing decentralized minicomputer centers bring also the advantage of decentralized data bases. Regional data bases unload the costly data store capacity of central sites. The data pre-processed in regional centres significantly decrease the amount of data to be processed by mainframes. Decentralized data bases make possible to meet much better the regional needs by choosing a suitable data structure and by storing information where they are needed. The selection and unifying is part of pre-processing for central summarization.

Figure 2. Shows a typical regional computer centre in a traditional batch processing environment.



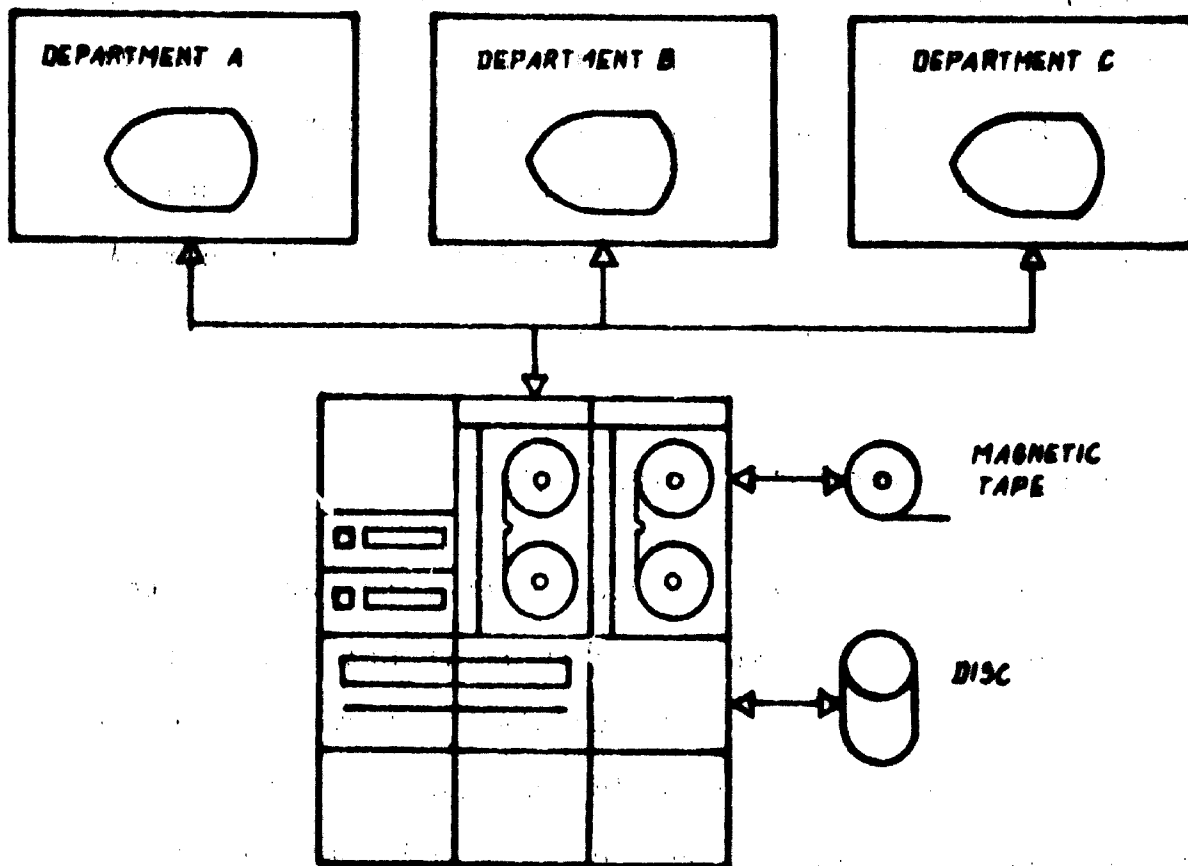
2.4. Interactive processing

Interactive data processing is a new advantage introduced by minicomputers, interactive data processing eliminates the tedious data preparation job and puts computer power just on the desk of the user.

Building, updating, extending or changing of data is supported by software of the minis and is done immediately from the display stations. The inquiry feature of such systems is of great importance facilitating the selection of infor-

mation, the printing of statistics and summarizations of data files by asking the computer simple questions or giving straight forward commands. The different data files can be stored on exchangeable mass storage devices giving access to fairly large local data bases.

Figure 3. Shows a computer centre with interactive display stations.



3. Telecommunication

The telecommunication capability is a tool of growing importance for connecting the mainframe computer with decentralized minicomputers. It serves also for building up regional computer networks and multilevel hierarchical networks.

3.1. Remote batch transmission

Telecommunication between computers eliminates the need of conventional data transmission and accelerates its speed by an order of magnitude. Collected datafiles travel on leased telephon lines under supervision of computer from one geographical point to another. The standards of telecommunication algorithm allows to connect minicomputers and mainframe machines of different architecture.

3.2. Interactive information display terminals

Minicomputers connected to mainframe computers can operate display terminals which use the software support and data base of the central computer. These display terminals behave just like the mainframe computer's own display stations. They open possibilities to use the collected data, allow for inquiries, information selection, statistics and other use of the central data base.

3.3. Hierarchical computer networks

Beside point-to-point links - which allow the connection of two computers - multidrop telecommunication lines are used to build up hierarchical computer networks. Such networks can operate with or without mainframe computers.

Hierarchical computer networks adapt very well to the data processing requirements of hierarchically structured organisations. Regional computer networks can be installed with a master computer in the region centre controlling the local computers distributed in his area. The regional master computer is able to collect data via the telecommunication facilities into one regional data base. Regional data bases can be accessed by the central data base via their connections to the mainframe. This schema integrates the benefits of decentralized computing with that of centralized and uniform systems. Finally, interactive display stations while using the results of the whole network, assure feed back of information through the network.

Figure 4 Shows a typical hierarchical computer network.

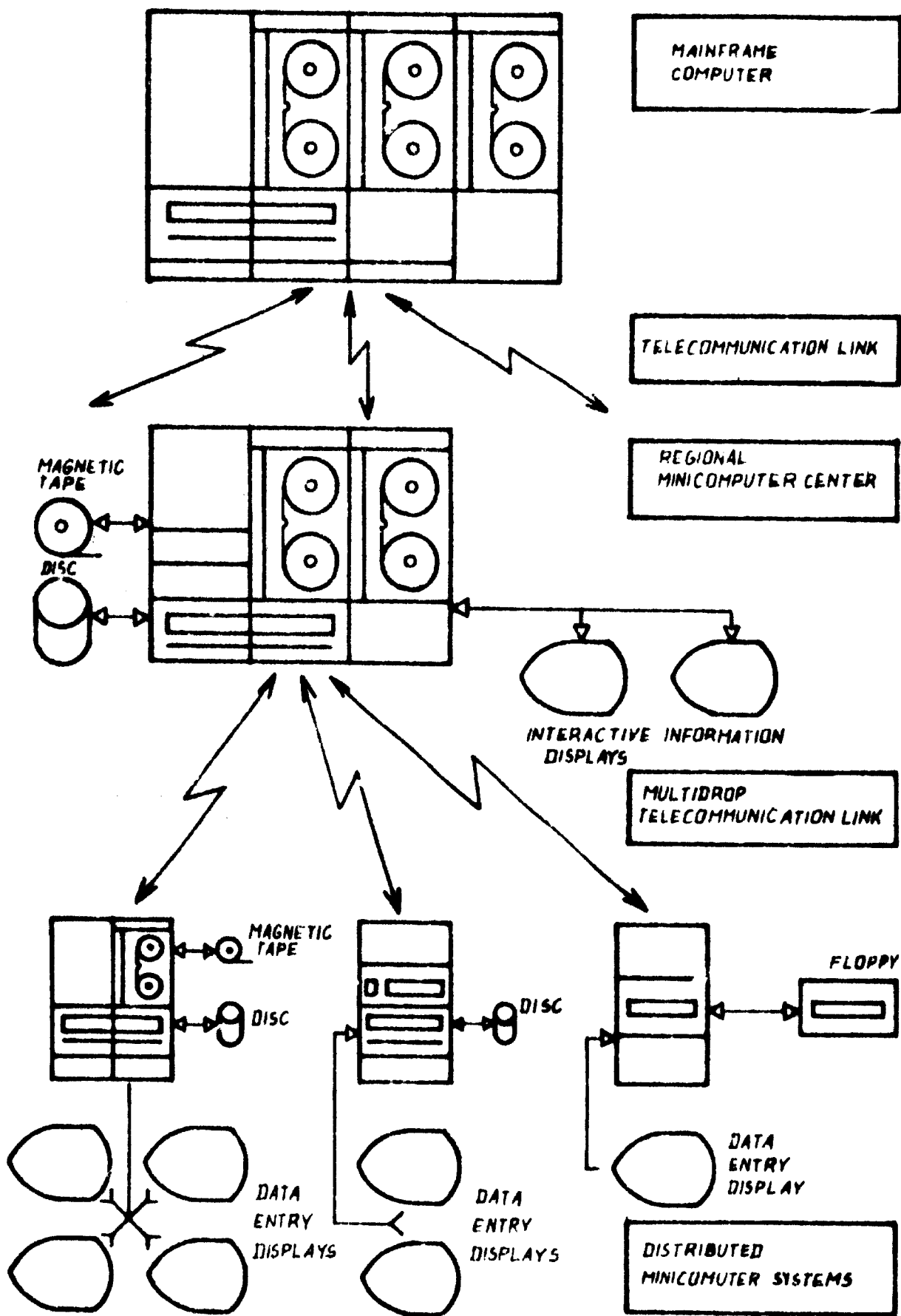


Figure 4

4. Systems engineering conditions

The described goals can be met only with hardware and software tools which fulfill a number of requirements. First of all there is a need for a system software package; i.e. a commercial operating system which integrates in one system the features for

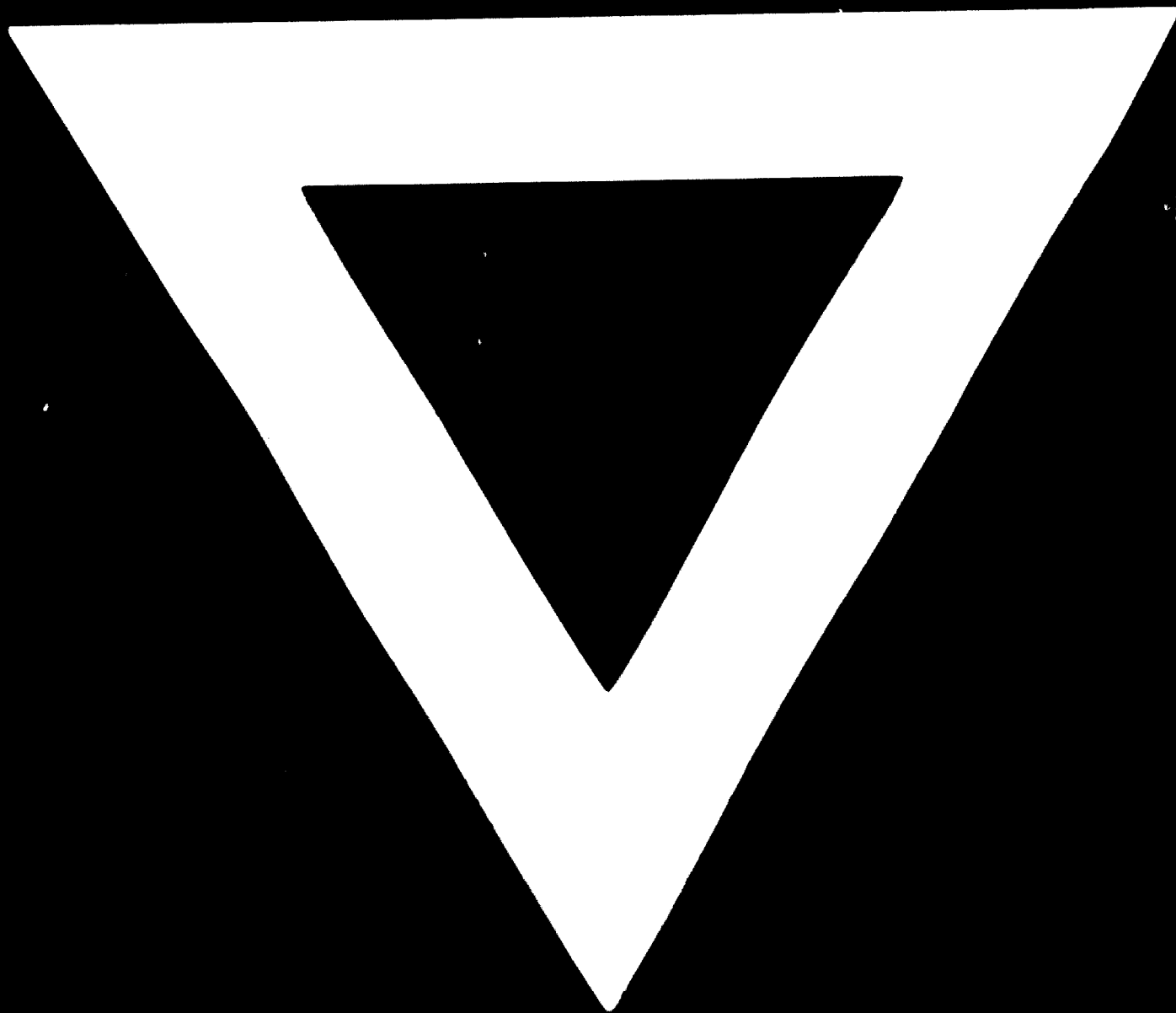
- multi-terminal data entry,
- local data processing abilities and
- telecommunication capability.

The different user requirements should easily be implemented through high-level languages and software packages, for data entry, and data processing. Telecommunication links should be accessible from user programs. There is a need for mini-computer-family with scaled performance characteristics in order to present economical solutions for a big range of data processing loads. (For details see table 1.) These different computers should be upward compatible regarding to their functionality, i.e. the operating systems, and the high-level languages. Just this family of hardware and software tools is the family of the TPA minicomputer systems.

	Number of attachable displays	Data Entry Package	Data Processing Language	Tele communication	Memory size in Kbyte	Addition time in usec	mass storage
TPA/1 micro machine	1-3	YES	MIDIBOL	YES	16-64	5	floppy
TPA/1 mini machine	4-12	YES	MIDIBOL	YES	32-64	3-3,5	fix/ cartridge disc
TPA 1140 system machine	4-16	YES	MIDIBOL COBOL	YES	32-256	1	cartridge disc/ magnetic tape

Table 1.

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