

the need to operate with a totally merged data base is minimal. Therefore, each functional area such as a plant location or a department can be considered as an entity. The processing would encompass only source data collected during a recent interval from this contained environment. The existence of historical data and events would also be necessary, and the centralized processing center would still have to merge the data from all environments to produce periodic reports.

Once a specific operating environment is defined and functional allocations assigned, the determination may be made as to whether the communications facility between the centralized processing center and contained environments warrants the use of leased or switched communications. Ideally, the various functions should be assigned so that a switched communications facility could be employed. The inherent redundancy with switched facilities should offset the lower data rate. The centralized processing center should access each of its contained environments several times each day to collect current source data and update any historical parameters. This center must also be capable of a demand access request from a contained environment.

Control and intelligence residing in a contained environment are the local interactive concentrators that communicate directly with the centralized processing center. Basically, a local interactive concentrator consists of a mini or microcomputer-controlled storage. Concentrators must have high speed data transmission capability for communications with a centralized processing center, and multiple low speed data access for communications with the environment's management terminals. A multiplicity of concentrators could be placed at a single location, with each one dedicated to a specific application

area, such as accounting, personnel, inventory, manufacturing, sales, customer service, and office management.

The interactive concentrator's role would be to collect its application's source data from within its associated environment, store them, and then use them for processing of pre-established parameters, limited status, and exception reports. The concentrator must respond to inquiry and demand access, data modification entries, and specialized processing requests from a management terminal. If the requested processing was beyond the capability of the interactive processor or if it required data from other locations or applications, a request for access to the centralized processing center would be generated. The centralized processing center would perform the actual processing and return it to the concentrator, which would deliver it to the requesting management terminal. The majority of the terminal's interaction should involve only a concentrator.

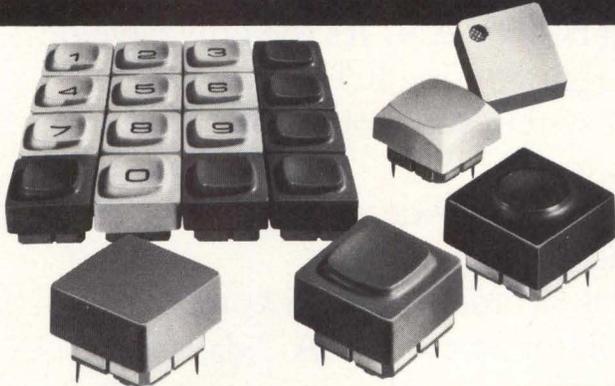
For a true management automation system, the local data communications network must be controlled by a CBX ("Office Automation," *Computer Design*, Nov 1977, pp 14, 20). The CBX would recognize the type of transaction desired by a management terminal and select the associated interactive processors that should be accessed. Feasibly, the CBX could also recognize whether the transaction involved more than one concentrator, and could obtain and assimilate the various application information from the different concentrators into a combined response to the requesting management terminal. A concentrator requesting access to the centralized processing center would notify the CBX to accomplish the access. Conversely, if the centralized processing center performed data collection and updating with the remote concentrators, the processing center would interrogate only the associated CBX.

The management terminal would replace the primary telephone instrument associated with the CBX. During nondata activities, this terminal would be used to place and receive normal telephone calls; in the data environment, primary input capability would be keyboard entry with a display output. An additional output advancement would be to have an audio response capability associated with the CBX. Digital response from an interactive concentrator could then be converted into an audio response by the CBX for delivery to the management terminal. Peripheral devices such as media readers, printers, displays, and expanded keyboards could also be connected to the management terminal, further adapting the terminal to its operating environment.

Application development of products directed to management automation systems is necessary. Although the CBX was introduced to the marketplace less than four years ago, there are now estimated to be over 6000 in operation. In addition, interactive concentrators in the form of microcomputer disc systems driven by p/ROMs are available from several manufacturers. Such a system with a 256k-byte disc has a list price of less than \$2200; a larger disc capacity system from another manufacturer lists at under \$3000. The missing link has been the management terminal. Such a terminal was presented by a West German manufacturer at the May 1977 Hanover Fair in Hanover, West Germany; and a U. S. manufacturer of computerized telephone systems recently announced an electronic telephone set that encompasses a microprocessor, RAM, and p/ROM-operated display, comparable in price to a traditional 10-button telephone set.

As with all new applications, both technological and user maturity must occur. The technological component is available. With meaningful examples of management automation being implemented, the users' desire can be expected to develop rapidly.

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