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All About Small Accounting Computers

It is estimated that in the United States there are currently more than half a million businesses or other organizations employing fewer than 150 employees. These are the primary marketing targets of the small accounting computer manufacturers. These firms, in rough alphabetical order by industry group, include:

- 5,000 accountant firms, with applications for client billing and preparation of balance sheets and income statements.
- 22,500 automobile dealers, with applications such as monitoring parts sales, new and used car sales, dealer trades, service and repair accounting, and vehicle inventory.
- 4,500 bakeries and bottling companies, for handling route settlement, computing driver commissions, compiling data sales reports, and performing vending machine accounting.
- 11,500 commercial banks and savings banks, for processing savings accounts and mortgage and trust accounting.
- 9,000 savings and loan associations, for savings and mortgage accounting, escrow analysis, and dividend processing.
- 80,000 building and other types of contractors, in such applications as estimating, job costing, maintaining equipment records, and daily labor reporting.
- 14,500 educational institutions, which must maintain student records and handle appropriations accounting.
- 1,500 hospitals, for maintaining in-patient records, insurance billing, revenue analysis, and census reporting.
- 14,000 hotels and motels, for keeping track of departmental costs and maintaining the city ledger.
- 12,000 insurance agencies, for such applications as premium billing and computing agents' commissions.
- 6,000 law firms, for maintaining time records and performing client accounting.
- 13,000 labor unions, in such applications as membership accounting.
- 125,000 manufacturing companies, for job costing, keeping track of work in process, and work center loading.

This report presents a comprehensive listing of the characteristics and prices of 118 low-cost business data processing systems supplied by 38 vendors. You'll also find clear-cut guidelines for selecting and applying these systems, plus an analysis of the experience of 80 users.

- 8,500 municipal, state, and county government offices, for tax billing, utility billing, and appropriations accounting.
- 15,000 printing and publishing companies, for advertising and circulation billing.
- 200,000 retail firms, for cycle-billing operations and inventory control.
- 2,500 stock brokerage firms, for computing sales commissions, maintaining position records, and preparing purchase and sale confirmations.
- 46,000 transportation companies, for revenue analysis and compiling freight bill statistics.
- 115,000 wholesaling firms, for order billing and sales analysis.

Qantel's Systems 1100 and 1200, introduced in November 1973, come in standard configurations that include a 20K-byte processor, 6-million-byte disc drive, CRT console, and 60-to-100-lpm printer, all for $29,500. Each system integrates all but the printer into a desk-size unit with a convenient drawer mounting for the disc. The 1100 supports two interactive terminals, and the 1200 supports up to six.

All About Small Accounting Computers

In the price and performance range between conventional accounting machines and full-fledged computer systems, there is a class of data processing equipment that is currently filling the needs of thousands of these small businesses. Though these machines employ a wide variety of programming and storage techniques, they are typically characterized by purchase prices in the $5,000 to $75,000 range, modest internal processing capabilities, and a strong emphasis upon direct keyboard input and low-speed printed output.

These low-cost business data processing systems are designated by various names, such as electronic accounting machines, office computers, electronic billing computers, or magnetic record computers. To simplify matters, we have chosen to use the generic term "small accounting computers" throughout this report.

WHO MAKES THEM

The leading U.S. suppliers of small accounting computers have long been Burroughs Corporation and the National Cash Register Company. It is no coincidence that Burroughs and NCR are also the leading suppliers of conventional adding and accounting machines and of the paper supplies for such machines. Both companies have huge marketing and service organizations and have done an outstanding job of trading their customers up to progressively more powerful equipment as their data processing requirements expand in volume and complexity. Early in 1974 NCR announced an impressive new model – the NCR 299 – that goes head to head with the widely used Burroughs L 2000, L 4000, and L 5000. No official statistics are available as to the size or distribution of the small accounting computer market, but it is estimated that Burroughs and NCR together command roughly 60 percent of a $1 billion worldwide market for accounting machines and small accounting computers, with Burroughs the clear leader at this time.

IBM, the dominant supplier of both larger computer systems and punched-card tabulating equipment, has only begun to achieve proportionate success in the small accounting computer market. The principal vehicle for IBM's recent penetration is the System/3 Models 6, 10, and 15, which are strong entries at the upper end of this market segment.

Other major suppliers of American-made small accounting computers include the Automated Business Systems Division of Litton Industries, the Business Machines Division of the Singer Company, and Digital Equipment Corporation. About a dozen smaller companies, including Basic Four, Custom Computer, Eldorado Computer, Qantel, and Ultimacc, offer small business data processing systems based upon minicomputers with comparatively powerful internal processing capabilities.

European-made equipment is making a much greater impact upon the small accounting computer market than in any other segment of the U.S. computer market. Honeywell, Olivetti, Philips, and Nixdorf are marketing equipment which they manufacture in France, Italy, the Netherlands, and Germany, respectively.

A significant development during the past year has been the emergence of packaged systems from the small firms, such as Qantel's 1100 and 1200 Series. Also, small accounting machines have moved into the fourth generation of computer technology by adopting MOS/LSI technology, control-storage microprogramming, and increased emphasis on total system reliability. However, possibly the most significant recent development was IBM's establishment of a single marketing, manufacturing, and service organization for all its small business systems: i.e., the System/3, System/7, System/360 Model 20, 1130, 1800, and 3740. This move is the one to follow in the small accounting computer sector for the next year, since IBM will now be providing direct, formidable competition for all the other manufacturers through its newly reorganized General Systems Division.

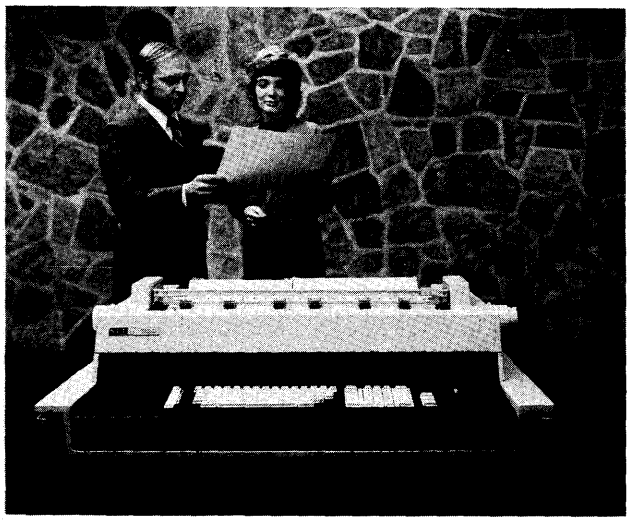
Finally, the past year has seen the discontinuance of Cascade Data's activities by parent Apeco Corporation, and the assimilation of the Focus IV and Clary Datacomp products. Focus IV is now being sold by GRI, the firm that provided the Model 99 minicomputer on which the Focus IV system is based. Clary Datacomp systems are now being sold by the Addmaster Specialties division of Clary Corporation.

WHO NEEDS THEM

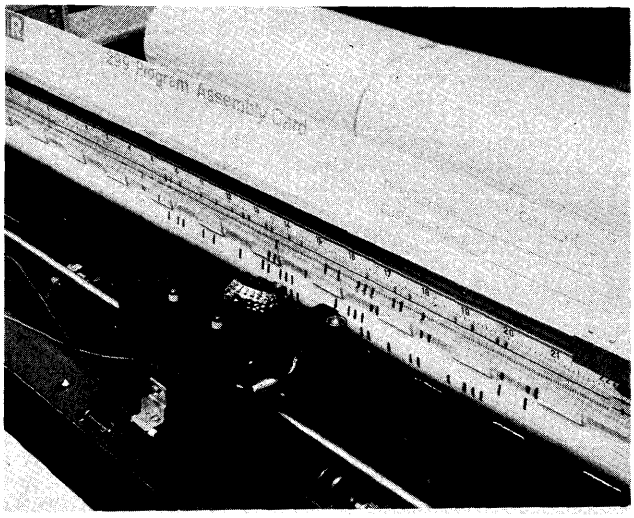
The small accounting computers are, of course, designed primarily to serve the business data processing needs of small companies. The principal sales targets are the more than 500,000 small U.S. business and government organizations, as analyzed at the beginning of this report.

For many of these small companies, a computer—when properly selected, installed, programmed, and operated—can lead to far smoother operations and higher profits. In addition to processing routine transactions, a computer can provide reports that give management the information it needs to achieve improved customer service, reduced inventories, tighter cost control, and increased production efficiency. But in far too many cases, computers are poorly chosen, misused, and misunderstood, so that they actually become liabilities rather than assets. The best way to guard against this type of disaster is through a thorough management training program in the principles of EDP. But, since few small-company executives have the time or desire for such training, the best alternative is to seek competent outside advice in the selection and installation of an appropriate

All About Small Accounting Computers



The new NCR 299 Accounting Computer features a unique optical-scanning program entry technique. The minicomputer-based system is oriented toward multi-purpose, low-volume data processing applications in small businesses. Its automatic features and simplicity of programming and operation are designed to make the machine productive within hours after installation. System prices start at $7,250.



With the covering panel open, the simplicity of the NCR 299's design is apparent. A single unit contains the snap-in ribbon cartridge and both the spherical printer assembly and optical scanner; the latter is shown in reading position at the right. Within the scanner head are both a light-emitting diode and a light-sensing transistor. The latter reads the intensity of the reflected light and converts it to electrical impulses which are then amplified and sent to the computer's memory.

computer system. An excellent starting point for obtaining effective outside help is likely to be your own industry, trade, or professional association.

In addition to their use, mainly in small companies, low-cost small accounting computers are also being productively used in some of the nation's largest corporations in a variety of specialized applications such as:

- Local processing of some or all of the data generated in branch offices, divisions, and/or small subsidiaries.
- Individual, "dedicated" applications that involve extensive keyboard input and printed output, such as the preparation of accounts payable checks, insurance claim checks, and stock transfer certificates.
- "Intelligent terminal" applications, in which the small computers perform both local data processing functions and communications control functions in company-wide data communications networks.

APPLICATIONS

In their basic configurations, most of the small accounting computers consist of a processing unit, a keyboard for data entry, and a serial (typewriter-style) printer or low-cost line printer for data output. All variable data for each transaction is entered by the operator through the on-line keyboard. The "master file" or ledger data required to process each transaction may also have to be entered through the keyboard. In systems equipped with appropriate input/output capabilities, however, the master file data can be read directly into the processor from magnetic ledger cards, punched cards, paper tape, magnetic tape, or magnetic disc, leading to greatly increased processing speeds and flexibility.

For most small accounting computers in most applications, the overall processing speed will be governed by the speed at which the operator can key in the data for each transaction. Wherever on-line keyboard entries are involved, the overall throughput of a system will rarely exceed a few transactions per minute.

Many of the systems can be optionally equipped with sufficient input/output capabilities to handle conventional batch-mode data processing, where the variable transaction data is recorded on cards or tape so that it can be read into the computer at higher speeds. This mode of operation is particularly suitable for the recently developed systems that are built around a minicomputer.

As their name implies, the small accounting computers are designed and used predominantly for applications of the accounting type. A much smaller (albeit growing) number of systems are also suitable for applications in the scientific, engineering, management sciences, or information storage and retrieval categories.

In fact, in recent years it has become steadily less clear where the dividing line should be placed between the minicomputer-based small accounting computers with general-purpose operating systems and the truly general-purpose small computing systems with full-scale batch ▷

All About Small Accounting Computers

USERS' RATINGS OF SMALL ACCOUNTING COMPUTERS

Manufacturer and Model	No. of User Replies	No. of Computers	Users' Ratings*																									
			Overall Performance				Ease of Programming				Ease of Operation				Hardware Reliability				Maintenance Service				Technical Support				Manufacturer's Software			
			E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P	E	G	F	P
Burroughs L 2000	7	13	1	5	0	0	1	1	2	2	5	2	0	0	3	3	0	1	1	3	3	0	0	2	2	3	1	3	0	3
Burroughs L 4000	1	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0
Burroughs L 5000	2	5	1	1	0	0	0	0	1	1	0	2	0	0	0	2	0	0	0	2	0	0	0	0	2	0	0	2	0	0
Burroughs L 8500	1	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
Burroughs B 500	1	2	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0
Burroughs B 700	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Burroughs B 1700	2	16	1	1	0	0	2	0	0	0	2	0	0	0	1	1	0	0	0	2	0	0	0	0	2	0	1	1	0	0
Burroughs TC 500	1	10	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0
Burroughs Totals	16	49	4	10	1	0	4	4	4	3	10	6	0	0	6	8	0	1	2	9	4	0	0	2	10	4	4	7	1	4
Cogar C4	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0
Data General 1220	1	1	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0
General Automation 18/30	1	1	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	0
Honeywell 115	1	1	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
IBM System/360 Model 20	1	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0
IBM System/3 Model 6	6	7	3	2	1	0	3	3	0	0	4	2	0	0	5	0	1	0	2	3	1	0	1	3	1	1	1	3	2	0
IBM System/3 Model 10	32	44	15	16	0	1	13	17	2	0	18	13	1	0	18	9	5	0	17	14	1	0	7	17	5	3	5	17	8	2
IBM 1130	1	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	1
IBM Totals	40	54	19	18	2	1	17	20	3	0	23	16	1	0	24	10	6	0	20	18	2	0	8	21	7	4	6	21	10	3
Interdata Model 70	1	2	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Litton ABS 1200	3	3	2	1	0	0	1	2	0	0	3	0	0	0	0	3	0	0	1	2	0	0	0	2	1	0	3	0	0	0
Mohawk 2400	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0
NCR 399	3	4	1	2	0	0	1	1	0	0	2	0	1	0	0	2	1	0	0	3	0	0	2	0	0	1	1	1	1	0
NCR 400	1	1	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	1	0	0
NCR 500	1	2	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0
NCR Century 100	1	1	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1
NCR Century 200	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0
NCR Totals	7	9	2	4	1	0	2	1	2	1	3	3	1	0	0	6	1	0	1	6	0	0	2	2	1	2	2	2	1	1
Olivetti 770	1	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0
Philips P350	3	6	0	2	1	0	0	2	0	0	0	2	0	1	1	0	2	0	1	0	2	0	1	0	2	0	0	1	1	0
Singer 5800	1	7	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0
Singer System Ten	1	1	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0
UNIVAC 9200	1	1	0	1	0	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	0	0
Wang Labs 720C	1	1	0	1	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	1
Totals	80	139	30	42	5	2	27	33	12	4	44	32	3	1	35	31	11	2	26	40	12	1	13	30	26	11	17	33	17	9

* Ratings are expressed in terms of number of user responses. Where individual columns do not equal number of responses, a user has chosen not to rate a given area. The legend is E for Excellent, G for Good, F for Fair, and P for Poor.

processing (i.e. job stream) capabilities. Into this latter category must fall systems such as the IBM System/3 Models 10 and 15, the Burroughs 1700, and the NCR Century 50, to name only a few. The differentiating criteria used for purposes of this report include not only the system's hardware characteristics and the generality of its operating systems design, but also the stress placed upon standard business applications software, the vendor's market strategy, etc. The popular general-purpose small computing systems, such as the ones mentioned above, are individually covered in the Computers section of DATAPRO 70.

All About Small Accounting Computers

At the other end of the spectrum, applications software and/or the facilities provided to aid in developing such software play a key role in distinguishing between a minicomputer and a small accounting computer system. While the former is often packaged and marketed as hardware only, the latter have extensive applications-oriented facilities and tend to be available on a "turnkey" basis for end-user installation.

Within the accounting realm, billing is by far the most common application for the small accounting computer systems. The order entry, invoicing, and accounts receivable functions constitute the lifeblood of many small businesses, as well as the functions that require the most clerical effort to process manually. As a result, the billing application alone frequently justifies the installation of a computer. Indeed, several of the systems included in our survey are officially designated as "Billing Computers," although they are suitable for other applications as well.

Payroll is the next most important application for the small accounting computers, with general ledger accounting, accounts receivable, accounts payable, inventory management, and sales analysis also ranking high on the list. In addition to these broad general classes of applications, the small accounting computers are capable of effectively handling many of the specialized data processing needs of manufacturing, wholesaling, retailing, financial, educational, government, and service organizations.

USER EXPERIENCE

To assess the current level of user satisfaction with small accounting computers, and to determine what business applications are being successfully implemented with them, Datapro Research Corporation conducted a survey of users of such systems in December 1973. A Small Accounting Computer Reader Survey Form was included in the December supplement to DATAPRO 70 and mailed to all subscribers. By February 15, usable responses had been received from 80 users of small accounting computers with a total of 139 installed systems. In virtually every case where more than one system was installed, all of the systems were from the same vendor. This approach is readily understandable, since it spreads the program development and training costs over as wide a base of compatible systems as possible.

Seven questions were asked in the survey to assess the level of user satisfaction: "How would you rate the overall performance of the system?", "How would you rate its ease of programming?", "How would you rate its ease of operation?", "How would you rate the system's reliability?", "How would you rate the maintenance service provided for the equipment?", "How would you rate the manufacturer's technical support?" and "How would you rate the manufacturer's software?". The responses to these questions from users of 30 different systems are shown in the table. Prospective buyers should carefully note that the very small sample sizes for many of these machines make it unwise to attach undue significance to the indicated ratings; some of the unsatisfactory experiences reported by individual users may represent isolated instances of poor local support.

Totaling the responses to all seven of Datapro's questions for all systems, the results were as follows:

Rating	No. of Responses	% of Total
Excellent	192	35
Good	241	44
Fair	86	16
Unsatisfactory	30	5

Thus, the survey indicates a fairly high level of satisfaction among the users of small accounting computers, with 79 percent rating their systems generally good or excellent. It is clear, however, that the users are considerably less happy with the software and technical support for these systems than with their overall performance, reliability, and maintenance.

Among the specific strengths and weaknesses noted by two or more users were the following: Burroughs L Series–ease of use and relatively low cost (6 mentions each), slow operation or low throughput (4 mentions); IBM System/3–relatively low cost (3 mentions), ease of operation (8 mentions), inefficient or poor systems software (4 mentions), and incompatibility with other systems (2 mentions). In general, most users stressed low cost and ease of use of their systems, while users of the more powerful minicomputer-based systems frequently revealed their transitory status as upward-migrating installations by grumbling about system throughput limitations and lack of system flexibility.

The applications for which small accounting computers are being used fall within the general business category, with several special-purpose applications sprinkled among them:

Applications	No. of Users	% of Total
Payroll	29	17
Accounts receivable	28	16
Invoicing/billing	15	9
General financial administration, including cash receipts journal, accounts payable	18	11
General ledger	23	13
Inventory management	18	11

All About Small Accounting Computers

Applications	No. of Users	% of Total
Special industry applications, including securities/ banking, distribution, medical/dental, sales analysis	17	10
Miscellaneous (costing, remote job entry)	11	6
Order entry	12	7

Payroll, accounts receivable/payable, and general ledger were most often combined as principal applications by the users replying.

The users were asked who wrote the programs for their applications, with the following results:

Programming Done By:	No. of Users	% of Total
In-house personnel	45	58
Manufacturer personnel	11	12
Ready-made programs	2	–
Other (consultants)	1	–
Combination (two or more of above)	18	30

In reply to the question, "Our annual budget for salaries, administration, and maintenance (exclusive of hardware costs) for *each* of our small accounting computer systems is approximately:", the 53 users who responded supplied the following data:

Lowest figure:	$ 2,000
Average figure:	$ 59,532
Highest figure:	$350,000

In response to the question, "During 1974, we expect to acquire these additional small accounting computers:", 20 respondents (a full 25 percent) indicated they would be obtaining more such systems. Of these respondents, five out of six current Burroughs users are continuing with Burroughs equipment, and all but one IBM user (i.e., nine of ten) are continuing with IBM equipment. Litton, NCR, Philips, and Singer users also plan to continue to buy from their present suppliers. All of this can be viewed as a tribute to both user satisfaction and manufacturer salesmanship.

BUYING ADVICE

As with all categories of data processing equipment, the watchword in selecting a small accounting computer is "Buyer beware." These machines come in a wide range of types, sizes, and capabilities–with price tags to match–and there's a great deal to be gained through systematic selection of the most appropriate system for your particular needs.

But all too often, the buyers of this class of equipment have little or no understanding of data processing principles and are likely to buy the wares of the salesman who arrives first or sells hardest.

No company should *ever* buy a computer from the first salesman who comes through the door. It's always far wiser to check out the offerings of at least a few of the other major suppliers, and you shouldn't hesitate to play one vendor against another in an effort to get the most for your money. Just remember that all promises of extra software, technical support, or other concessions should be specifically included in the final contract.

Prospective users who make a sincere effort to select the most appropriate equipment for their needs are likely to encounter a number of frustrations. Many of the small accounting computers are very poorly documented. The sales brochures and even the technical manuals often seem to be artfully contrived to conceal more than they reveal about the equipment's true characteristics and capabilities. The salesmen aren't likely to be much more helpful; typically, they've been trained to sell "instant solutions" to data processing problems rather than specific hardware or software. Clearly, the assumption is that the buyers of these machines are unsophisticated souls who have no reason to know or care what the basic product specifications are.

Before seriously considering the acquisition of any small accounting computer, you should demand:

- Detailed specifications of all the pertinent hardware and software.
- A full-scale demonstration of the equipment on at least one of your own principal applications–or, if that's not practical, on a demonstration program whose functions are similar enough to your own needs so that you can draw realistic conclusions about the system's processing speed and ease of programming and operation.
- A detailed proposal that spells out exactly what equipment, software, and *technical support* will be supplied, estimated processing times for each of your applications, all responsibilities of both the vendor and buyer, and the total purchase price or monthly rental price.
- A list of users in your geographical area who are employing the system for applications similar to yours. Talk to several of these users and find out as much as you can about their experiences. While they may not be able to give you much help in developing a sophisticated comparison to other alternative systems, they *can* give you a good idea of what pitfalls to watch out for in installing and using that particular system.

All About Small Accounting Computers

If all this sounds like too much trouble, or just plain incomprehensible, your company (like hundreds of others) could be heading for serious losses of time and money through installation of an unsuitable computer system. In that case, you should seek help from responsible user associations with problems similar to your own and/or from a qualified independent condulting firm.

THE COMPARISON CHARTS

The characteristics of 118 small accounting computers from 38 different manufacturers are presented in the accompanying comparison charts. All of these systems are currently being commercially marketed in the United States. The information in the charts was supplied and/or verified by the manufacturers or U.S. suppliers during December 1973 and January 1974; their close cooperation with the Datapro Research staff in the preparation of these charts is gratefully acknowledged.

The comparison chart entries and their significance to potential users of small accounting computers are explained in the following paragraphs, together with some useful guidelines for selecting the equipment that will most effectively meet your needs.

Data Formats

This section of the comparison charts describes the formats used to store and process data within each system.

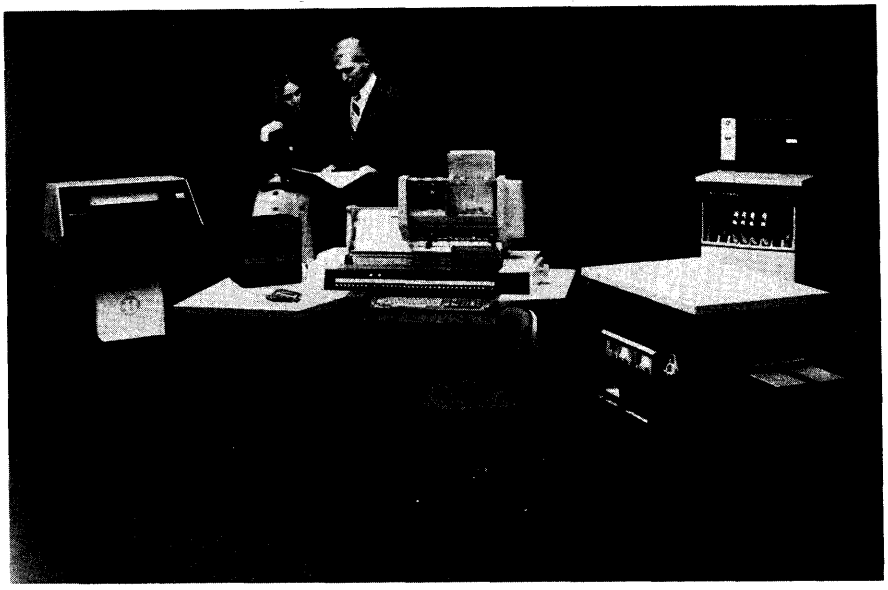
Word length is the number of bits (binary digits) of data that can be stored in or retrieved from the internal storage unit during a single cycle. Some small accounting computers have a "fixed word length," meaning that each machine word or operand always has the same number of bits, digits, or characters. Others have a "variable word length," meaning that their operands may consist of a variable number of bits, digits, or characters. In the latter case, the "word length" entry shows the number of data bits used to represent each byte or character within the variable-length operands.

Digits per word is the number of decimal digits that can be represented within each machine word as defined above. At least four binary bits are required to represent each decimal digit, and in some systems six or eight bits are used.

Characters per word is the number of alphanumeric characters that can be represented within each machine word as defined above. Most systems use either six or eight bits to represent each character. Some small accounting computers are incapable of processing or storing alphanumeric information, in which case this entry is blank.

Operand length is the length of each data element upon which such basic internal processing operations as addition and subtraction are performed. Fixed word-length computers usually have an operand length of one word. For variable word-length computers, the ranges of permissible operand lengths for addition and subtraction are shown.

Instruction length is the number of words (or bits) used to specify each operation to be performed by the system. This entry is relevant only for systems with internally stored programs. In general, each instruction indicates the specific operation to be executed (add, multiply, move, print, etc.) and the storage locations of one or more of the operands involved. Since some small accounting computers store their data and their programs in separate storage units, the instruction length may be unrelated to the data word length.



The Burroughs L 8500 Magnetic Record Computer is the most powerful member of the broad and extremely popular L Series line of small accounting computers. This confituration includes (from left) a line printer, the L 8500 console with a 4-drive cassette tape subsystem and automatic magnetic-stripe forms handler, a free-standing magnetic record reader, and a computer-compatible magnetic tape unit.

All About Small Accounting Computers

Internal Storage

One of the principal characteristics that distinguishes computers from adding machines and conventional accounting machines is the provision of an internal storage unit capable of holding and selectively retrieving a significant quantity of data and/or instructions. This section of the comparison charts describes each system's internal storage facilities.

Type of storage. As in large computers, magnetic cores are the most commonly used internal storage medium. Magnetic core storage has been widely used for more than a decade, and has proved to be fast, flexible, and reliable. Unfortunately, core storage is also rather expensive, so the designers of some small accounting computers have elected to use other storage media, including rotating magnetic discs and drums, delay lines, and magnetic tape cartridges. All of these alternative media are inherently slower and less reliable than magnetic cores, yet their lower cost gives them considerable appeal to both manufacturers and buyers of small accounting computers. Semiconductor storage, which is expected to gradually supersede core storage as the principal storage medium for larger computers, is beginning to make its appearance on the small accounting computer scene.

Storage capacity. The amount of internal storage is one of the most significant characteristics in appraising the power of any computer. The amount of productive processing that a computer can perform during any one run is largely determined by the number of instructions and/or operands it can hold. Computers that store their programs externally (on plugboards, punched tape, etc.) can get by with correspondingly less internal storage, since only the data needs to be stored internally—but the externally programmed computers are inherently limited in processing power and flexibility.

The charts indicate the number of words of internal storage available for each computer. Where a range of storage capacities is offered, the minimum and maximum capacities are shown. Some of the small accounting computers have two or more distinct internal storage units, and in these cases the situation is further explained in the "Comments" entry at the bottom of the comparison charts.

Cycle time. This is the minimum time interval that must elapse between the starts of two successive accesses to any one storage location. The storage cycle time normally ranks with word length as one of the most significant individual indicators of a computer's performance potential. However, the throughput of the equipment covered in this report is usually determined by the operator's keying speed or an I/O device's speed rather than by the machine's internal performance. Therefore, the storage cycle time is of considerably less importance—as long as the machine is fast enough so that the operator seldom has to wait for it to finish processing one transaction before she can key in the data for the next transaction. Several manufacturers actually refuse to specify the storage cycle times of their machines—and Datapro believes every prospective buyer has a right to know all the basic specifications of every computer, even in cases where the data's relevance may ultimately prove to be of minor significance for a specific application environment.

Storage usable for data/programs. These two chart entries tell whether each computer's internal storage can be used to store data and/or programs. Data can be stored internally for rapid retrieval in all of the computers covered in our survey, but a number of the systems use external media to hold their programs.

Processing

This section of the comparison charts describes each computer's capabilities for internal processing of the data that is presented to it. "Processing" is a general term for the various arithmetic and logical operations that must be performed to solve a particular problem or achieve a desired result. Virtually all of the computers covered in this survey are equipped, through either machine instructions or standard software, to perform all the basic arithmetic and logical operations upon decimal operands; the usual complement of operations includes add, subtract, multiply, divide, compare, test, branch, print, etc.

Programming technique. A computer program is a set of instructions that cause a computer to perform a particular sequence of operations. Most current computers use *internally stored* programs, meaning that their instructions can be stored, retrieved, and altered as if they were data. This capability to modify their own programs gives stored-program computers great flexibility and enables them to respond to changing problem conditions.

Some small accounting computers, however, are *externally programmed.* The instructions which constitute their programs may be stored on punched tape loops or magnetic tape cartridges, or wired into plugboards. Plugboards, usually called "control panels" by the equipment manufacturers, are perforated boards whose holes (called "hubs") are manually interconnected by means of wires terminating in plugs (called "patchcords"). The specific interconnections determine the sequence of operations which the machine will perform. Control bars or rods on the printers constitute another external programming technique that is sometimes used to control the format of printed output.

Although externally programmed computers are inherently less flexible and powerful than their stored-program counterparts, their use can frequently be justified on the basis of lower equipment costs, lower programming costs,

All About Small Accounting Computers

and/or less retraining for employees who are familiar with conventional accounting machines or tabulating equipment. But the trend is clearly toward ever-increasing use of stored-program computers for all types and volumes of applications, and it is likely that most of the externally programmed models will disappear from the market within the next few years.

Operational registers. A register is a device that stores a small quantity of data (usually one word) and serves some special purpose. Most computers have one or more accumulators (in which arithmetic operations are performed), an instruction register, and a sequence counter. Multiple registers can facilitate programming and increase program execution speeds. In many small computers, reserved locations in internal storage, rather than special hardware elements, serve as registers in order to keep the cost down. The comparison charts show the number of operational registers and their capacities in all cases where the manufacturers have released this information.

Add time. The time required to develop the arithmetic sum of two operands is another widely used measure of computer performance—and another figure that turns out to be of comparatively little importance in the selection of a small accounting computer. Once again, the reason is that the overall speed of these systems in most applications is largely determined by the operator's keying speed. Add times for the systems covered in our survey span the range from a few microseconds to more than half a second—yet the key question is still whether the operator can "beat the machine." If not, the machine is probably as fast as it needs to be for these keyboard-oriented accounting applications. (It should be noted that for larger equipment configurations, in applications where the transaction data is prerecorded on cards or tape, add times—and internal speeds in general—become highly significant considerations.)

Keyboard Input

The principal source of input to most small accounting computers is data keyed in by a human operator. Therefore, the keyboard facilities for on-line data entry deserve careful consideration.

Alphanumeric (typewriter) keyboard. Virtually all of the systems covered in our survey include a keyboard, arranged in the conventional typewriter format, that permits direct entry of both alphabetic and numeric information.

10-key numeric keyboard. A 10-key adding-machine-style keyboard, standard in many of the systems and optional in others, permits all-numeric data to be entered at considerably higher speeds than via a typewriter-style keyboard. The numeric keys are usually accompanied by control keys which activate various machine functions.

Full accounting keyboard. Most "classic" accounting machines have multiple columns of keys, with each column consisting of the digits 0 (or 1) through 9. Though used in only a few of the current small computers, these full keyboards have the advantage of being familiar to most accounting machine operators.

Printed Output

Printed documents and reports represent the principal form—and frequently the only form—of output from most small accounting computers. Therefore, printing and document-handling capabilities receive strong emphasis in the comparison charts.

Printing speed. The computers in this class generally use typewriter-style printing elements that print one character at a time. Thus, their printing speeds are usually in the range of 7 to 40 characters per second. A few systems offer line printers with considerably higher speeds. Rated printing speed is of little significance if most of the data to be printed is keyed in by the operator. But if a high proportion of the printing is done from the computer's memory, under program control, then higher printing speeds can yield major improvements in throughput.

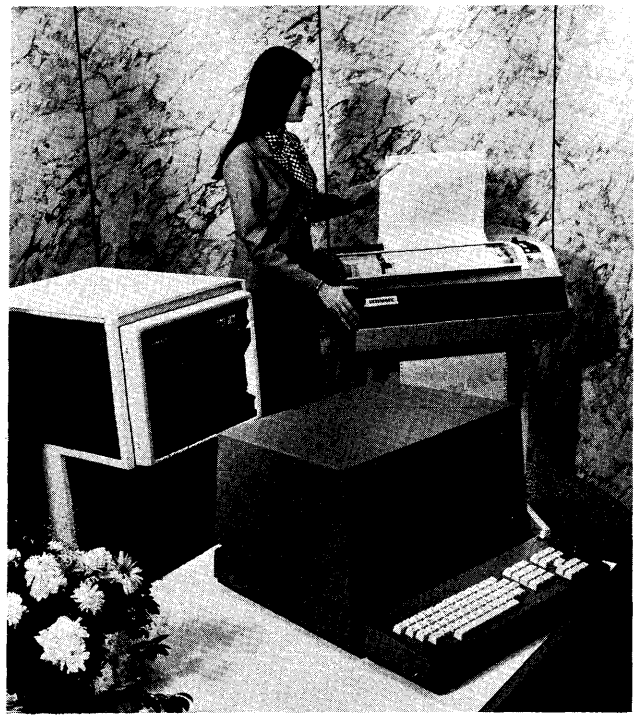
Carriage width. The width of the printer's carriage naturally determines the maximum width of the forms it can handle. Carriage widths of 15 to 26 inches are common in this class of equipment, permitting two or more separate forms to be inserted and printed upon in side-by-side fashion.

Split platen. This useful feature, standard in some printers and optional in others, permits two (or occasionally three) separate forms to be inserted and advanced independently of one another. Thus, in payroll applications, suitably equipped machines can produce a journal, earnings ledger, and payroll checks with earnings statements in a single operation. Machines that lack the split platen capability will frequently require two or more runs (or multiple on-line printers) to produce the printed outputs that can be prepared in a single run by a split platen printer.

Pin-feed forms handling. For efficient feeding of continuous, fanfold printer forms, pin-feed forms-handling facilities are a virtual necessity. Drive sprockets or "tractors" on the printer engage holes punched into the margins of the forms, permitting positive feeding with little chance of misalignment or jamming.

Friction-feed forms handling. When printing on individual documents, such as ledger cards, a conventional friction feed mechanism (as on a typewriter) is preferable because the documents can be inserted more easily than into a pin-feed mechanism. Therefore, most of the small accounting computers can (and should) be equipped with both pin-feed and friction-feed facilities. An additional useful feature of some machines is the ability to insert and align individual friction-fed documents, such as ledger cards, from the front by simply dropping them into a "chute."

All About Small Accounting Computers



This Ultimacc Disc System features a Data General 1200 minicomputer, a Centronics line printer, and 5 million bytes of disc storage (expandable to as much as 126 million bytes). Ultimacc supplies the hardware interfaces, standard software, and custom programming, and sells the system on a turnkey basis for accounting applications in small businesses.

Journal roll handling. Some machines can be equipped to handle continuous rolls of paper tape of the type used on adding machines. This facility can be useful for maintaining a journal record of each transaction.

Magnetic Ledger Cards

Magnetic ledger cards are among the most popular input/output media for small accounting computers. Their principal attraction is that they enable small businesses to retain the individual, hard-copy ledger records they have long been accustomed to using. In addition, machine-readable data can be recorded on the cards, usually on one or more vertical magnetic "stripes." Identity and status information about each account can be recorded on the appropriate card in both printed and magnetically encoded form, and the encoded data can be re-read and updated whenever necessary.

Thus, magnetic ledger cards combine many of the advantages of both traditional visible records and machine-readable media such as punched cards or magnetic tape. Their chief disadvantage is that the low speed of most of the available card-handling equipment precludes the use of magnetic ledger cards in high-volume data processing applications.

Data capacity. This entry specifies the maximum number of digits of information that can be recorded on each magnetic ledger card.

Automatic card alignment. Processing speed is considerably enhanced if the magnetic ledger cards can simply be inserted into a chute by the operator and automatically advanced to the first blank line on the card, ready for posting. This entry states whether the automatic alignment facility is standard, optional, or not available.

Automatic card feeding and stacking. In most systems, the magnetic ledger card for each account to be processed must be selected by the operator and manually inserted into the machine. A few manufacturers offer automatic ledger-card readers, which feed, read, and stack the cards sequentially at substantially higher speeds. Most of these high-speed ledger card readers, however, lack the capability to record updated information on the cards. Thus, their usefulness is largely limited to the preparation of reports from data previously recorded on the cards; transaction processing and ledger-card updating must still be performed on the console printer, with manual insertion of one card at a time.

Magnetic Disc I/O

The inclusion of magnetic disc units can greatly increase the data storage and processing capabilities of a business data processing system. Disc units enable millions of characters of information to be constantly accessible to the computer. Moreover, any desired record can be retrieved, updated, and re-recorded on the disc, usually within a fraction of a second.

By replacing or augmenting slower, less flexible file storage media such as punched cards, paper tape, or magnetic ledger cards, disc units can enable small accounting computers to handle applications and processing volumes that would otherwise be impossible. The principal disadvantages of disc units are their comparatively high costs and the software complexities that are encountered by users who attempt to harness their full potential. One or both of these considerations will make disc units impractical for many small computer buyers, despite the obvious appeal of disc-oriented data processing.

Maximum on-line disc capacity. This entry specifies the maximum quantity of disc-stored information that is directly accessible to the computer at any one time. The indicated figure may be the capacity of a single disc drive or the total capacity of two or more drives that can be connected.

Disc I/O speed. This is the rate at which data is transferred between the disc unit and the computer's internal storage during either a disc read or write operation.

All About Small Accounting Computers

Interchangeable discs. Most of the current disc-oriented computers use removable cartridges or "disc packs," which can be easily removed from the drive units and interchanged in much the same manner as magnetic tape reels. Interchangeable discs provide great flexibility and make it practical to use a computer for both sequential and random data processing applications. In sequential applications, files of virtually unlimited size can be handled through the use of multiple disc packs or cartridges.

Other I/O Units

Many of the small accounting computers can be equipped with optional input/output devices such as card readers and punches, paper tape readers and punches, line printers, magnetic tape units, and data communications interfaces. The comparison charts indicate the availability and rated speed of each type of device. These I/O units, when judiciously selected and matched to your requirements, can greatly increase a system's versatility and power.

Punched cards, paper tape, and magnetic tape can be used either to store master-file records or to accumulate previously recorded transaction data. For a detailed comparison of the advantages and disadvantages of each medium, please refer to DATAPRO 70 Report 70D-010-70, "How to Select and Use Data Entry Devices." It's worth noting that many of the paper tape readers and punches employed in these systems can also accommodate edge-punched cards, which represent an effective unit-record storage medium for many applications.

Line printers can be added to some small accounting computers to provide printed output at far higher speeds than the standard typewriter-style printers. But the line printers generally have much higher price tags and lack the flexible forms-handling capabilities of the slower standard printers.

Communications interfaces enable some of the small accounting computers to function as "intelligent terminals" in data communications networks. The interface equips the small computer to send and receive data over a common-carrier communications link, usually to a larger central computer installation. The small computer's internal processing and storage capabilities enable it to do some data processing locally and to handle a variety of code translation, editing, and control functions in connection with the data communications activities.

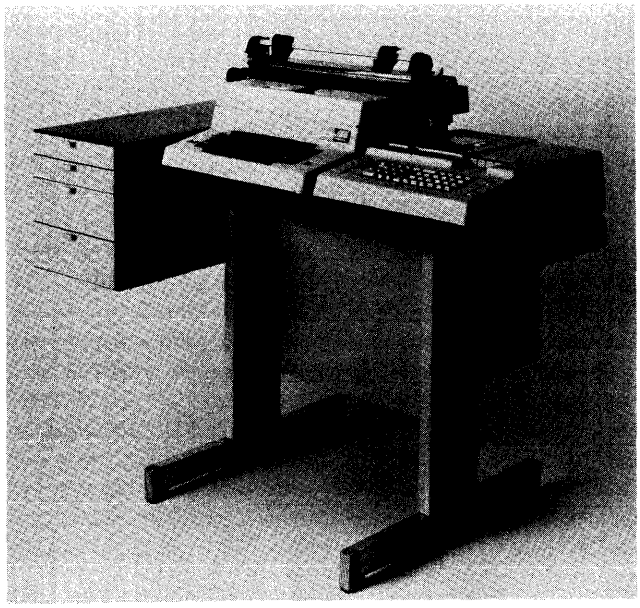
Software and Support

Virtually as important as the computer hardware are the software and technical support each manufacturer furnishes to aid the user in utilizing the hardware effectively. The available software (if any), together with the pricing policies for both software and support, are summarized in this section of the comparison charts.

Assemblers. An assembler is a special-purpose program that uses the computer's power to facilitate the preparation of other programs. It enables the programmer to write his programs in a simplified format that uses mnemonic operation codes and symbolic operand addresses. The assembler program then converts these symbolic instructions into their machine-language equivalents, producing computer programs ready for loading and execution.

Compilers. A compiler is another type of software designed to shift part of the program preparation task from the user to the computer itself. A compiler converts programs written in a simplified, procedure-oriented language such as COBOL into machine-language object programs. Compilers are now being used in virtually all large and medium-scale computer installations because of their demonstrated ability to slash programming costs–and they are becoming increasingly available for the small accounting computers. This trend is possible because of the more powerful minicomputers now being used, since compilation is an intricate process that requires more storage space and processing power than the earlier versions of this type of system provided. Where compilers are offered, however, they frequently limit the programmer to restricted subsets of the standard programming languages and/or require the use of a larger computer to perform the compilation process.

Application programs. Some of the small computer manufacturers offer libraries of ready-made programs designed to handle commonly encountered data processing applica-



The P603 from Olivetti includes a processor, paper tape printout unit, and electric typewriter in a single unit about half the size of a standard desk. Its basic price is about $6,300. Programs are loaded from magnetic cards that can hold 384 instructions. The basic delay-line storage capacity of sixteen 32-digit words can be expanded to a maximum of 3,584 words.

All About Small Accounting Computers

Singer Business Machines' new 6800 general accounting system can be configured with a printing workstation terminal (as shown) that accompanies the desk-size processor. The basic system includes the processor with up to 30,000 characters of storage, a disc drive with resident and removable disc packs totaling 8 million characters, and the typewriter-like workstation terminal to prepare forms and reports; as such, it sells for approximately $33,500. A CRT display terminal and a 70-lpm printer are optional.

tions. If suitable programs are available, the user can sometimes save thousands of dollars worth of programming effort. But no two companies have exactly the same data processing requirements, so some modification of the standard packages, by either the user or the manufacturer, will be required in nearly every case. Even so, a library of application programs can be an important asset to consider when choosing a computer. Space precludes a complete listing of available application programs in the charts, so the entries attempt to summarize the size and scope of each system's program library, if any. The entry "standard business applications" indicates that programs are available to handle the most common business functions: billing, payroll, inventory control, etc.

Software separately priced. This entry tells whether the software described in the preceding entries, and any other available software, is included in the equipment price or offered at some additional cost. Separate pricing of software was virtually unheard of in the computer field until June 1969, when IBM "unbundled" by placing separate price tags on many of its software products and professional services. Since then, the various manufacturers have adopted a wide range of software pricing policies. Separate pricing of software, of itself, is neither good nor bad; the buyer must carefully assess the cost of the total package consisting of the equipment and all the software and support his installation will require. One of the major "unbundled" manufacturers states that the total software bill for a typical small accounting computer installation usually falls within the $1,500 to $2,000 range.

Technical help separately priced. This entry tells whether the services of the manufacturer's technical support staff are included in the equipment cost or separately priced. Nearly every company that is installing a computer for the first time will need a good deal of help from the equipment maker's systems analysts, programmers, and/or instructors (or, alternatively, from an independent consulting firm). In fact, the manufacturer does *all* the programming for the great majority of small accounting computer installations (more than 90 percent, according to one major supplier). The additional cost of these services, if any, should be carefully estimated and considered in all equipment comparisons.

Pricing and Availability

Purchase price of basic system. For each computer, this entry shows the minimum purchase price of a system equipped to perform basic business data processing functions. All of the facilities identified as "standard" in the charts (but none of the "optional" ones) are included in the listed prices. The addition of expanded storage capacities or optional input/output capabilities can lead to large price increases in nearly every case. For detailed pricing information, the manufacturers should be contacted directly.

Monthly rental of basic system. This entry shows the monthly rental for the basic configuration of each system, as described above. All rental prices are based on a one-year lease and include equipment maintenance unless otherwise indicated.

Date of first U.S. delivery. This entry tells when the first production models of each system were delivered (or are scheduled to be delivered) to customers in the United States.

Number installed in U.S. to date. This entry shows how many systems of each type had been delivered to U.S. customers as of approximately January 1, 1974. All figures were supplied by the manufacturers themselves, and the entry "not specified" appears in all cases where the manufacturers chose not to release this information.

All About Small Accounting Computers

Comments

This final entry on the comparison charts is used to explain or amplify the preceding entries and to provide other pertinent information about each system's hardware, software, pricing, or applications.

SUPPLIERS

Listed below, for your convenience in obtaining additional information, are the full names and addresses of the 38 suppliers whose products are summarized in the comparison charts that follow.

Basic/Four Corporation, subsidiary of MAI, 18552 MacArthur Boulevard, Santa Ana, California 92707. Telephone (714) 533-0200.

Berg-Haus Corporation, wholly owned subsidiary of The Systems Corporation of Honolulu, Hawaii, 770 Washington Street, Holliston, Massachusetts 01746. Telephone (617) 429-6836.

Burroughs Corporation, Business Machines Group, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-7000.

Clary Corporation, 320 West Clary Avenue, San Gabriel, California 91776. Telephone (714) 833-0934.

CNA/Systems, 310 South Michigan Avenue, Chicago, Illinois 60604. Telephone (312) 822-5178.

Codon Corporation, 11 DeAngelo Drive, Bedford, Massachusetts 01730. Telephone (617) 275-2000.

Computer Interactions, Inc., 425 Northern Boulevard, Great Neck, New York 11021. Telephone (516) 487-9810.

Custom Computer Systems, 40 South Mall, Plainview, Long Island, New York 11803. Telephone (516) 293-5353.

Data Systems and Installation Corporation (DASY), 1505 East 17th Street, Suite 230-234, Santa Ana, California 92701. Telephone (714) 547-5471.

Datapoint Corporation, 9725 Datapoint Drive, San Antonio, Texas 78284. Telephone (512) 696-4520.

Digital Equipment Corporation, 146 Main Street, Maynard, Massachusetts 01754. Telephone (617) 897-5111.

Eldorado Computer Corporation, 2975 Treat Boulevard, Concord, California 94518. Telephone (415) 825-9313.

GRI Business Systems, 320 Needham Street, Newton, Massachusetts 02164. Telephone (617) 969-0800.

Hermes Products, Inc., 1900 Lower Road, Linden, New Jersey 07036. Telephone (201) 574-0300.

Honeywell Information Systems Inc., 200 Smith Street, Waltham, Massachusetts 02154. Telephone (617) 890-8400.

International Business Machines Corporation, Data Processing Division, 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

International Computing Company, 7316 Wisconsin Avenue, Bethesda, Maryland 20014. Telephone (301) 654-9120.

Linolex Systems, Inc., 5 Esquire Road, North Billerica, Massachusetts 01862. Telephone (617) 667-4151.

Digital Equipment Corporation, king of the scientific minicomputer builders, entered the small accounting computer market in June 1972 with its family of DEC Datasystems. The Model 340 system shown here is built on DEC's most popular minicomputer, the 12-bit PDP-8/E, and includes two removable-cartridge disk drives, CRT display console, and printer.

All About Small Accounting Computers

Litton ABS, Inc., Automated Business Systems Division, 34 Maple Avenue, Pine Brook, New Jersey 07057. Telephone (201) 575-8100.

Litton Industries, Inc., Monroe Division, 550 Central Avenue, Orange, New Jersey 07051. Telephone (201) 673-6600.

Martin, Wolfe Inc., 8369 Vickers Street, San Diego, California 92111. Telephone (714) 277-3700.

Micro Computer Machines Inc., 4 Lansing Square, Willowdale, Ontario, Canada M2J 1T1. Telephone (416) 492-1693.

Microline Corporation, 1751 Langley Avenue, Irvine, California 92705. Telephone (714) 557-9378.

Mini-Computer Systems, 525 Executive Boulevard, Elmsford, New York 10523 Telephone (914) 592-8812.

Mobydata, Inc., 93 NE 13th Street, Miami, Florida 33132. Telephone (305) 932-1481.

The National Cash Register Company, Main & K Streets, Dayton, Ohio 45409. Telephone (513) 449-2000.

Nixdorf Computer, Inc., 5725 East River Road, Chicago, Illinois 60631. Telephone (312) 693-6600.

Olivetti Corporation of America, 500 Park Avenue, New York, New York 10022. Telephone (212) 371-5500.

Paillard Incorporated, see Hermes Products, Inc.

Philips Business Systems, Inc., 100 East 42nd Street, New York, New York 10017. Telephone (212) 697-3600.

Qantel Corporation, 3474 Investment Boulevard, Hayward, California 94545. Telephone (415) 781-3410.

Q1 Corporation, 605 Third Avenue, New York, New York 10016. Telephone (212) 661-3355.

RPG Data Systems, 1317 West Olympic Boulevard, Los Angeles, California 90015. Telephone (213) 381-3716.

Scidata, Inc., 4126 Pleasantdale Road., Atlanta, Georgia 30340. Telephone (404) 325-3100.

Search Computer Systems, 111 Ash Street, East Hartford, Connecticut 06108. Telephone (203) 677-9707. (No longer actively marketing Search Systems.)

The Singer Company, Business Machines Division, 2350 Washington Avenue, San Leandro, California 94577. Telephone (415) 357-6800.

Sperry Univac Computer Systems, division of Sperry Rand Corporation, Post Office Box 500, Blue Bell, Pennsylvania 19422. Telephone (215) 542-4011.

Synectics Incorporated, Post Office Box 7165 Country Club Station, Kansas City, Missouri 64113. Telephone (816) 483-7848.

Ultimacc Systems, Inc., 9 Brook Avenue, Maywood, New Jersey 07607. Telephone (201) 845-0500.

Xerox Corporation, 701 South Aviation Boulevard, El Segundo, California 90245. Telephone (213) 679-4511. □

All About Small Accounting Computers

MANUFACTURER & MODEL	Basic/Four Model 350	Basic/Four Model 400	Basic/Four Model 500	Berg-Haus Corporation TSC-1000	Burroughs B 706
DATA FORMATS					
Word length, bits	8-bit byte	8-bit byte	8 bit-byte	16	64
Digits per word	1 per byte	1 per byte	1 per byte	4	15
Characters per word	1 per byte	1 per byte	1 per byte	2	8
Operand length, words	Variable	Variable	Variable	Variable	Variable
Instruction length, words	Variable	Variable	Variable	Variable	Variable
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	Core
Storage capacity, words	8K-48K	8K-48K	8K-48K	4K-32K	32K-40K
Cycle time, microseconds/word	1.0	1.0	1.1	0.9	2.0
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No of operational registers	6	6	6	8	4
Capacity of each register	Variable	Variable	Variable	1 word	1 word
Add time, milliseconds/word	0.00528	0.00528	0.00528	0.005	0.500
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	1 per system std.	1 per system std.	1 per system std.	Up to 16 std.	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	Optional	No
PRINTED OUTPUT					
Printing speed, chars/sec	165	165	165	30/165	20
Carriage width, inches	132 char./14 in.	132 char./14 in.	132 char./14 in.	132 char.	15.5 or 26
Split platen	No	No	No	Optional	Optional
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	No	No	No	No	Standard
Journal roll handling	No	No	No	Optional	Standard
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	Standard
Max. on-line disc capacity, chars	16,800,000	16,800,000	16,800,000	20,000,000	4,600,000
Disc I/O speed, chars/sec	195,000	195,000	195,000	400,000	193,000
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	400	400	400	300	300
Punched card output speed, cols/sec	No	No	No	No	60
Paper tape input speed chars/sec	300	300	300	600	40
Paper tape output speed, chars/sec	75	75	75	No	40
Line printer output speed, lines/min	200	200	200	600	400
Magnetic tape I/O speed, chars/sec	10,000	10,000	10,000	10,000	10,000
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	No	No	No	Yes	No
Compilers	BASIC	BASIC	BASIC	Proprietary lang.	COBOL, RPG
Application programs	Std. business applications	Std. business applications	Std. business applications	Std. business applications	Many available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	No	No	No	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$32,400	$34,900	$37,900	$23,500	$43,350
Monthly rental of basic system	$928	$989	$1,061	$680	$1,061
Date of first U.S. delivery	September 1971	August 1971	May 1972	February 1971	May 1973
Number installed in U.S. to date	See Comments	See Comments	See Comments	Not specified	Not specified
COMMENTS	Systems based upon Microdata 1600 minicomputer. More than 900 systems of all models installed. Model 300 can have one accounting maching terminal per system; Models 350, 400, and 500 can have one, four, or eight video display terminals per system, respectively. Maximum core capacity is 64K words, but a maximum of 48K is accessible to the user.			Minicomputer-based system. Applications include manufacturing control. Merged with the Systems Corp. of Honolulu, Hawaii.	See Comments on next page.

All About Small Accounting Computers

MANUFACTURER & MODEL	Burroughs B 707	Burroughs B 708	Burroughs B 716	Burroughs B 717	Burroughs B 718
DATA FORMATS					
Word length, bits	64	64	64	64	64
Digits per word	15	15	15	15	15
Characters per word	8	8	8	8	8
Operand length, words	Variable	Variable	Variable	Variable	Variable
Instruction length, words	Variable	Variable	Variable	Variable	Variable
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	Core
Storage capacity, words	32K-40K bytes	32K-40K bytes	32K-48K bytes	32K-48K bytes	32K-48K bytes
Cycle time, microseconds/word	2.0	2.0	1.0	1.0	1.0
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No of operational registers	4	4	4	4	4
Capacity of each register	1 word	1 word	1 word	1 word	1 word
Add time, milliseconds/word	0.500	0.500	0.430	0.430	0.430
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	20	20	20	20	20
Carriage width, inches	15.5 or 26	15.5 or 26	15.5 or 26	15.5 or 26	15.5 or 26
Split platen	Optional	Optional	Optional	Optional	Optional
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	Standard	Standard	Standard	Standard	Standard
Journal roll handling	Standard	Standard	Standard	Standard	Standard
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	Standard
Max. on-line disc capacity, chars	4,600,000	4,600,000	4,600,000	4,600,000	4,600,000
Disc I/O speed, chars/sec	193,000	193,000	193,000	193,000	193,000
Interchangeable disc	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	300	300	300	300	300
Punched card output speed, cols/sec	60	60	60	60	60
Paper tape input speed chars/sec	40	40	40	40	40
Paper tape output speed, chars/sec	40	40	40	40	40
Line printer output speed, lines/min	400	400	400	400	400
Magnetic tape I/O speed, chars/sec	10,000	10,000	10,000	10,000	10,000
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	No	No	No	No	No
Compilers	COBOL, RPG	COBOL, RPG	COBOL, RPG	COBOL, RPG	COBOL, RPG
Application programs	Many available	Many available	Many available	Many available	Many available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$66,065	$70,865	$48,575	$71,090	$76,090
Monthly rental of basic system	$1,820	$1,745	$1,241	$2,000	$1,925
Date of first U.S. delivery	May 1973	May 1973	May 1973	May 1973	May 1973
Number installed in U.S. to date	Not specified	Not specified	Not specified	Not specified	Not specified
COMMENTS	B 706, 707, 708 systems based upon Model 705 processor; B 716, 717, 718 systems correspond and are based upon faster Model 711 processor. B 708/718 are card systems with 96-column capability. Other B 700's are Audit Entry Systems with cassette capability. Off-line AE 301 cassette-based data entry computer available as optional subsystem. In October 1973 Burroughs announced the B 771, the first in a series of communications 700's; it will replace the DC 1100; purchase price ranges from $40,485 to $98,935.				

All About Small Accounting Computers

MANUFACTURER & MODEL	Burroughs B 1712	Burroughs B 1714	Burroughs B 1726	Burroughs B 1728	Burroughs E 4000
DATA FORMATS					
Word length, bits	8	8	8	8	–
Digits per word	2	2	2	2	12 + sign
Characters per word	1	1	1	1	6
Operand length, words	Variable	Variable	Variable	Variable	1
Instruction length, words	Variable	Variable	Variable	Variable	3 Instr./word
INTERNAL STORAGE					
Type of storage	MOS	MOS	MOS	MOS	Core
Storage capacity, words	16K-40K bytes	16K-64K bytes	24K-96K bytes	65K-256K bytes	200 max.
Cycle time, microseconds/word	3.0	1.5	1.0	1.0	12
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	–	–	–	–	–
Capacity of each register	–	–	–	–	–
Add time, milliseconds/word	–	–	–	–	1.596
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Optional
10-key numeric keyboard	Standard	Standard	Standard	Standard	No
Full accounting keyboard	–	–	–	–	Standard
PRINTED OUTPUT					
Printed speed, chars/sec	–	–	–	–	7
Carriage width, inches	–	–	–	–	22
Split platen	–	–	–	–	Standard
Pin-feed forms handling	–	–	–	–	Optional
Friction-feed forms handling	–	–	–	–	Standard
Journal roll handling	–	–	–	–	Standard
MAGNETIC LEDGER CARDS	No	No	No	No	Optional
Data capacity, digits per card	–	–	–	–	120 or 240
Automatic card alignment	–	–	–	–	Optional
Automatic card feeding & stacking	–	–	–	–	Optional
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	No
Max. on-line disc capacity, chars	18,400,000	18,400,000	18,400,000	525,600,000	–
Disc I/O speed, chars/sec	193,000	193,000	193,000	625,000	–
Interchangeable discs	Yes	Yes	Yes	Yes	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	300	600	1400	1400	132
Punched card output speed, cols/sec	100	100	300	300	22
Paper tape input speed chars/sec	1000	1000	1000	1000	No
Paper tape output speed, chars/sec	100	100	100	100	25
Line printer output speed, lines/min	300	750	1040	1040	No
Magnetic tape I/O speed, chars/sec	10,000	36,000	96,000	96,000	No
Communications interface	No	No	Optional	Optional	No
SOFTWARE / SUPPORT					
Assembler	No	No	No	No	No
Compilers	COBOL, FORTRAN, BASIC, RPG	COBOL, FORTRAN, BASIC, RPG	COBOL, FORTRAN, BASIC, RPG	COBOL, FORTRAN, BASIC, RPG	No
Application programs	Many available	Many available	Many available	Many available	Std. business applications
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$27,225	$34,225	$78,300	$181,688	$17,500-$26,000
Monthly rental of basic system	$560	$780	$1,740	$3,825	$425-665
Date of first U.S. delivery	Not specified	Not specified	Not specified	Not specified	1967
Number installed in U.S. to date	Not specified	Not specified	Not specified	Not specified	4,500
COMMENTS	The Burroughs B 1700 systems provide a powerful range of processing capabilities between the B 700's and the medium-scale B 2700, 3700, 4700 systems. Business Management Systems (BMS) software packages are available.				External "Program Control Center" complements stored program by controlling print format, etc.

All About Small Accounting Computers

MANUFACTURER & MODEL	Burroughs Series E 8000	Burroughs L 2000 & L 3000	Burroughs L 4000	Burroughs L 5000	Burroughs L 7300 & L 7400
DATA FORMATS					
Word length, bits	–	64	64	64	64
Digits per word	12 + sign	16	16	16	16
Characters per word	6	8	8	8	8
Operand length, words	1	1	1	1	1
Instruction length, words	3 Instr./word	4 Instr./word	4 Instr./word	4 Instr./word	4 Instr./word
INTERNAL STORAGE					
Type of storage	Core	Disc	Disc	Disc	Disc
Storage capacity, words	400	1280	1280	1280	10,000
Cycle time, microseconds/word	12	See Comments	See Comments	See Comments	See Comments
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No of operational registers	–	–	–	–	1-256
Capacity of each register	–	–	–	–	16 digits
Add time, milliseconds/word	1.596	40	40	40	25
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	No	Standard	Standard	Standard	Standard
Full accounting keyboard	Standard	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	7	20	20	20	20
Carriage width, inches	22	15	26	26	15-26
Split platen	Standard	Standard	Standard	Standard	Standard
Pin-feed forms handling	Optional	Standard	Standard	Standard	Standard
Friction-feed forms handling	Standard	Standard	Standard	Standard	Standard
Journal roll handling	Standard	Standard	Standard	Standard	Standard
MAGNETIC LEDGER CARDS	Standard	No	No	Standard	No
Data capacity, digits per card	240	–	–	349	–
Automatic card alignment	Standard	–	–	Standard	–
Automatic card feeding & stacking	Optional	–	–	Standard	–
MAGNETIC DISC I/O	No	No	No	No	No
Max. on-line disc capacity, chars	–	–	–	–	–
Disc I/O speed, chars/sec	–	–	–	–	–
Interchangeable discs	–	–	–	–	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	264	133	133	133	800
Punched card output speed, cols/sec	22	22	22	22	25
Paper tape input speed chars/sec	No	40	40	40	40
Paper tape output speed, chars/sec	25	40	40	40	40
Line printer output speed, lines/min	165	No	No	No	60
Magnetic tape I/O speed, chars/sec	No	10,000	10,000	No	No
Communications interface	No	Optional	Optional	No	No
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	Yes	No
Compilers	Yes	COBOL	COBOL	COBOL	COBOL
Application programs	Std. business applications	Many available	Many available	Many available	Many available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Punches price of basic system	$18,000-30,000	$6,990	$12,290	$19,990	$15,000-16,400
Monthly rental of basic system	$500-750	$184	$307	$500	$504-586
Date of first U.S. delivery	1970	Feb. 1969	May 1970	Oct. 1970	Nov. 1971
Number installed in U.S. to date	1,100	Over 6,500	Over 1,500	Over 4,000	Not specified
COMMENTS	COBOL programs can be compiled on a Burroughs B 3500 computer system.	Disc memory has 32 tracks, each served by a fixed read/write head, and 5-millisecond average access time. L 3000 accommodates front-inserted forms, while L 2000 does not. L 2000 with communications interface becomes TC 500.			Uses disc memory with average access time of 5 msec. All models accommodate front-inserted forms.

All About Small Accounting Computers

MANUFACTURER & MODEL	Burroughs L 7500	Burroughs L 8200 & L 8300	Burroughs L 8400	Burroughs L 8500	Clary Addmaster 404
DATA FORMATS					
Word length, bits	64	64	64	64	16
Digits per word	16	16	16	16	4
Characters per word	8	8	8	8	2
Operand length, words	1	1	1	1	1 to 4
Instruction length, words	4 instr./word	Variable	Variable	Variable	1 or 2
INTERNAL STORAGE					
Type of storage	Disc	Semiconductor	Semiconductor	Semiconductor	Core
Storage capacity, words	7104	4K-49K bytes	4K-49K bytes	6K-49K bytes	4K-65K
Cycle time, microseconds/word	See Comments	1.5	1.5	1.5	2.0
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No of operational registers	1-256	–	–	–	4
Capacity of each register	16 digits	–	–	–	1 word
Add time, milliseconds/word	25	1.8	1.8	1.8	0.09/15 digits
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Optional
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	20	20	20	20	15 to 165
Carriage width, inches	26	15.5	26	26	15
Split platen	Standard	Standard	Standard	Standard	Optional
Pid-feed forms handling	Standard	Optional	Optional	Optional	Standard
Friction-feed forms handling	Standard	Standard	Standard	Standard	Optional
Journal roll handling	Standard	Standard	Standard	Standard	Optional
MAGNETIC LEDGER CARDS	Standard	No	No	Standard	Optional
Data capacity, digits per card	349-699	–	–	349-699	720 or 2160
Automatic card alignment	Standard	–	–	Standard	Standard
Automatic card feeding & stacking	Standard	–	–	Standard	Standard
MAGNETIC DISC I/O	No	No	No	No	Optional
Max. on-line disc capacity, chars	–	–	–	–	30,000,000
Disc I/O speed, chars/sec	–	–	–	–	200,000
Interchangeable discs	–	–	–	–	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	800	480	480	480	400
Punched card output speed, cols/sec	25	96	96	96	80
Paper tape input speed chars/sec	40	40	40	40	500
Paper tape output speed, chars/sec	40	40	40	40	80
Line printer output speed, lines/min	60	90/180	90/180	90/180	600
Magnetic tape I/O speed, chars/sec	No	10,000	10,000	10,000	72,000
Communications interface	No	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	No	Yes	Yes	Yes	Yes
Compilers	COBOL	COBOL	COBOL	COBOL	COBOL, BASIC
Application programs	Many available	Many available	Many available	Many available	Accounting MIS
Software separately priced	Yes	Yes	Yes	Yes	Partially
Technical help separately priced	Yes	Yes	Yes	Yes	Partially
PRICING & AVAILABILITY					
Purchase price of basic system	$23,500	$12,990	$14,690	$20,990	$19,950
Monthly rental of basic system	$888	$394	$446	$667	$575 (5 year lease)
Date of first U.S. delivery	Dec. 1971	1st qtr. 1973	1st qtr. 1973	3rd qtr. 1973	Jan. 1970
Number installed in U.S. to date	Not specified	–	–	–	Over 10
COMMENTS	See Comments on preceding page.	Other I/O units include 1,000-cps tape cassette handler and both 80-col. and 96-col. card equipment. Card rates shown over for 96 cols. Note that L 8300 accommodates front-inserted forms while L 8200 does not.			Magnetic Card Unit reads and writes at up to 3000 chars/sec. Now sold by the Addmaster Specialties group of Clary Corp.

All About Small Accounting Computers

MANUFACTURER & MODEL	CNA/Systems SERVUS 100	Codon CB 100	Computer Interactions CI-2	Custom Computer Simplex-70	DASY System 24
DATA FORMATS					
Word length, bits	16	12	12	16	16
Digits per word	4	2	2 or 4	2 or 4	2
Characters per word	2	2	2	2	1
Operand length, words	Variable	Variable	Variable	1	1
Instruction length, words	Variable	1	Variable	1	1
INTERNAL STORAGE					
Type of storage	Core	Core	Core or MOS	Core	Core
Storage capacity, words	8K-32K	12K-32K	4K-32K	4K-128K	8K-16K
Cycle time, microseconds/word	1.0	1,2	1.2	1.2	0.75
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No of operational registers	7	8	9	4	2
Capacity of each register	16 bits	1 word	1 word	1 word	16 bits
Add time, milliseconds/word	0.00279	0.0026	0.0026	0.00135	0.0015
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	100	165	125 or 600 lpm	60-600 lpm	30 (CRT)
Carriage width, inches	16	14.5	80 or 132 positions	132 positions	–
Split platen	No	No	No	No	–
Pin-feed forms handling	Standard	Standard	Standard	Standard	–
Friction-feed forms handling	No	No	No	Optional	–
Journal roll handling	No	No	No	No	–
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	Standard
Max. on-line disc capacity, chars	20,000,000	51,200,000	320,000,000	464,000,000	10,000,000
Disc I/O speed, chars/sec	199,000	120,000	260,000	200,000	97,500
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	300	Optional	800	540	300,600, 1,000 cpm
Punched card output speed, cols/sec	No	No	Optional	130	35 or 100 cpm
Paper tape input speed chars/sec	No	300	10-300	10-300	300
Paper tape output speed, chars/sec	No	50	30-60	10-60	110
Line printer output speed, lines/min	300 or 600	60-1200	60-600	60-600	200
Magnetic tape I/O speed, chars/sec	No	36,000	8500-40,000	20,000	2.5K
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE/SUPPORT					
Assembler	Yes	Yes	Yes	Yes	Yes
Compilers	RPG-II	RPG-II	No	FORTRAN,BASIC	FORTRAN,BASIC
Application programs	Std. business applications	See Comments	Std. business applications	Std. business applications	Std. business applications
Software separately priced	No	Yes	No	Some	No
Technical help separately priced	No	Partially	See Comments	Some	No
PRICING & AVAILABILITY					
Purchase price of basic system	Lease only	$53,970	$40,000-60,000	$59,500	$50,000
Monthly rental of basic system	$1,000 (5-year lease)	$1,557 (5-year lease, incl maint)	$880-1,320 (5-yr. lease)	$1,150 (5-yr. lease)	–
Date of first U.S. delivery	September 1972	1972	1972	December 1969	1972
Number installed in U.S. to date	Not specified	21	Not specified	15	Over 20
COMMENTS	Turnkey MIS and service system for insurance agents.	Based upon DEC PDP-8. Can support up to 12 CRT's. It is a turnkey distribution management system. Also see DATAPRO 70 Report 70D-131-01.	Technical help separately priced after "start-up" Based on DEC minicomputer.	Based on Data General Nova minicomputer. Accommodates terminals.	Turnkey system based on Westinghouse 2500 minicomputer. RPG II compiler is also available.

All About Small Accounting Computers

MANUFACTURER & MODEL	Datapoint 1100	Datapoint 2200	DEC Datasystem 320	DEC Datasystem 330	DEC Datasystem 340
DATA FORMATS					
Word length, bits	8	8	12	12	12
Digits per word	1	1	2 or 4	2 or 4	2 or 4
Characters per word	1	1	2	2	2
Operand length, words	1	1	1 or 2	1 or 2	1 or 2
Instruction length, words	1, 2, or 3	1, 2, or 3	1	1	1
INTERNAL STORAGE					
Type of storage	MOS	MOS	Core	Core	Core
Storage capacity, words	4-8K	4-16K	8K-32K	8K-32K	8K-32K
Cycle time, microseconds/word	1.6	1.6	1.2	1.2	1.2
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	14	14	8	8	8
Capacity of each register	8 bits	8 bits	1 word	1 word	1 word
Add time, milliseconds/word	0.0048	0.0048	0.0026	0.0026	0.0026
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	30-60	30-60	165	165	165
Carriage width, inches	132 positions	132 positions	80 positions	80 positions	80 positions
Split platen	No	No	No	No	No
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	Standard	Standard	Optional	Optional	Optional
Journal roll handling	No	No	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	—	—	—	—	—
Automatic card alignment	—	—	—	—	—
Automatic card feeding & stacking	—	—	—	—	—
MAGNETIC DISC I/O	Optional	Optional	Optional	Optional	Standard
Max. on-line disc capacity, chars	10,000,000	10,000,000	13,000,000	13,000,000	13,000,000
Disc I/O speed, chars/sec	195,000	195,000	250,000	1,440,000	1,440,000
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	—	600	400	400	400
Punched card output speed, cols/sec	—	—	No	No	No
Paper tape input speed chars/sec	—	—	300	150	150
Paper tape output speed, chars/sec	—	—	50	75	75
Line printer output speed, lines/min	125	125	60-245	245-1110	245-1110
Magnetic tape I/O speed, chars/sec	—	10,000	36,000	36,000	36,000
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	Yes	Yes
Compilers	Dataform	BASIC, RPG II, Databus	DIBOL, FORTRAN, BASIC	DIBOL, FORTRAN, BASIC	DIBOL, FORTRAN, BASIC
Application programs	—	—	No	No	No
Software separately priced	No	No	Yes	Yes	Yes
Technical help separately priced	No	No	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$6,450 (Qty 3)	$10,003	$29,875	$33,530	$37,180
Monthly rental of basic system	$245	$315	$333	$268	$1,100 (5-year lease)
Date of first U.S. delivery	January 1974	May 1972	—	March 1972	—
Number installed in U.S. to date	—	4,000	See Comments	See Comments	See Comments
COMMENTS		5500, announced Nov. 1973, is 4 times faster than 2200 with capacity to 64K bytes; pricing not available	About 200 systems installed, each based upon specifically configured PDP-8/E's. Only the DDS 340 is actively marketed now; however, the 320 and 330 can be obtained from DEC.		

All About Small Accounting Computers

MANUFACTURER & MODEL	DEC Datasystem 530	DEC Datasystem 540	DEC Datasystem 550	DEC Datasystem 560	Eldorado Computer 150
DATA FORMATS					
Word length, bits	16	16	16	16	8-bit byte
Digits per word	4	4	4	4	1 per byte
Characters per word	2	2	2	2	1 per byte
Operand length, words	Variable	Variable	Variable	Variable	1 or 2 bytes
Instruction length, words	1, 2, or 3	1, 2, or 3	1, 2, or 3	1, 2, or 3	1-3 bytes
INTERNAL STORAGE					
Type of storage	Core	Core	Core or MOS	Core or MOS	Core
Storage capacity, words	16K-28K	16K-112K	16K-112K	16K-112K	8K-65K bytes
Cycle time, microseconds/word	1.0	1.0 or 0.45	1.0 or 0.45	1.0 or 0.45	1.2
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	8	8	16	16	128
Capacity of each register	1 word	1 word	1 word	1 word	2 bytes
Add time, milliseconds/word	0.0003	0.0003	0.00184	0.00101	0.004
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Optional	Optional	Optional	Optional	Optional
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	165	165	660	660	30 or 100
Carriage width, inches	80 positions	80 positions	80 positions	80 positions	15.5
Split platen	No	No	No	No	No
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	Optional	Optional	Optional	Optional	Standard
Journal roll handling	No	No	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	Optional
Max. on-line disc capacity, chars	320,000,000	320,000,000	320,000,000	320,000,000	40,000,000
Disc I/O speed, chars/sec	266,600	266,600	266,600	266,600	300,000
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	400-1600	400-1600	400-1600	400-1600	400
Punched card output speed, cols/sec	–	–	–	–	No
Paper tape input speed chars/sec	Optional	Optional	Optional	Optional	300
Paper tape output speed, chars/sec	Optional	Optional	Optional	Optional	75
Line printer output speed, lines/min	245-1100	300-1200	300-1200	300-1200	–
Magnetic tape I/O speed, chars/sec	36,000	36,000	36,000	36,000	500,20,000
Communications interface	Optional	Optional	Optional	Optional	Standard
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	Yes	Yes
Compilers	RPG II, BASIC-Plus, FORTRAN	RPG II, BASIC-Plus, FORTRAN	RPG II, BASIC-Plus, FORTRAN	RPG II, BASIC-Plus, FORTRAN	ESP, BASIC
Application programs	No	No	No	No	–
Software separately priced	Yes	Yes	Yes	Yes	Partially
Technical help separately priced	Yes	Yes	Yes	Yes	Partially
PRICING & AVAILABILITY					
Purchase price of basic system	$26,030	$31,540	$41,805	$50,605	$25,500
Monthly rental of basic system	$554	$672	$891	$1,078	$575
Date of first U.S. delivery	–	May 1972	–	–	January 1974
Number installed in U.S. to date	See Comments	See Comments	See Comments	See Comments	–
COMMENTS	About 300 DEC Datasystem 500's installed as of January 1974. DDS-530 and -540 are based upon PDP-11/40. DDS-550 and -560 based upon PDP-11/45. The DDS-500's supersede the DDS-700 and DDS-800 Series and are terminal-oriented systems.				Midrange system with CRT and character printer. CRT is from ADDS or Lear-Siegler; printer from Printec.

All About Small Accounting Computers

MANUFACTURER & MODEL	Eldorado Computer 140/140C	GRI Business System 10	GRI Business System 30/40	Hermes Data System F-4	Hermes Data System F-5
DATA FORMATS					
Word length, bits	8-bit byte	16	16	Variable	Variable
Digits per word	1 per byte	4 + sign	4 + sign	Variable	Variable
Characters per word	1 per byte	2	2	Variable	Variable
Operand length, words	1 or 2 bytes	1	1	Variable	Variable
Instruction length, words	1-3 bytes	1 or 2	1 or 2	Variable	Variable
INTERNAL STORAGE					
Type of storage	Core	Core	Core	IC Registers	Core
Storage capacity, words	8K-65K bytes	4K-32K	4K-32K	3, 7, 15	1,000
Cycle time, microseconds/word	1.2	1.76	1.76	Not specified	–
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	No	No
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Diode plugboard	Internally stored
No. of operational registers	128	18	18	3, 7, 15	64
Capacity of each register	2 bytes	16 bits	16 bits	11 digits	15 bytes
Add time, milliseconds/words	0.004	0.00176	0.00176	Not specified	–
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	15 cps to 600 lpm	165	165	17	17
Carriage width, inches	15.5	13.2	13.2	13	13, 15, 17, 18
Split platen	No	No	No	No	Optional
Pin-feed forms handling	Standard	Standard	Standard	Optional	Optional
Friction-feed forms handling	Standard	No	No	No	Standard
Journal roll handling	No	No	No	No	Optional
MAGNETIC LEDGER CARDS	No	No	No	No	Optional
Data capacity, digits per card	–	–	–	–	Optional
Automatic card alignment	–	–	–	–	Optional
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Optional	Optional	Standard	No	No
Max. on-line disc capacity, chars	40,000,000	1,600,000,000	1,600,000,000	–	–
Disc I/O speed, chars/sec	300,000	300,000	300,000	–	–
Interchangeable discs	Yes	Yes	Yes	–	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	400	480	480	No	No
Punched card output speed, cols/sec	No	96	96	No	No
Paper tape input speed chars/sec	300	33-500	33-500	No	No
Paper tape output speed, chars/sec	75	20	20	20	20
Line printer output speed, lines/min	100, 300, 600	100	100	No	No
Magnetic tape I/O speed, chars/sec	500, 20,000	160,000	160,000	No	No
Communications interface	Optional	Standard	Standard	No	No
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	No	No
Compilers	ESP, BASIC	RPG II	RPG II	–	–
Application programs	Std. business applications	Std. business applications	Std. business applications	Billing process application	Std. business applications
Software separately priced	Partially	Some	Some	No	No
Technical help separately priced	Partially	Yes	Yes	No	No
PRICING & AVAILABILITY					
Purchase price of basic system	$22,500	$59,300	$59,500/59,590	$4,195	$6,595
Monthly rental of basic system	$510 (1-yr.) lease)	–	–	–	–
Date of first U.S. delivery	1970	January 1973	December 1972	October 1969	–
Number installed in U.S. to date	250		Not specified	Over 700	–
COMMENTS	Model 140C is communications system costing $30,000 to 40,000. Designed and made by the firm itself.	Based on GRI 99 minicomputer system. Formerly Focus IV System. Series 10 has blank operator panel.	Based on GRI 99 minicomputer system. Series 40 has an advanced operator panel.	Custom programming performed by sales personnel	Formerly Paillard Hermes Systems

All About Small Accounting Computers

MANUFACTURER & MODEL	Hermes Data System 210	Honeywell Model 58	IBM System/3 Model 6	IBM System/3 Model 10	IBM System/3 Model 15
DATA FORMATS					
Word length, bits	Variable	8-bit byte	8-bit byte	8-bit byte	8-bit byte
Digits per word	Variable	1 or 2/byte	1 per byte	1 per byte	1 per byte
Characters per word	Variable	1/byte	1 per byte	1 per byte	1 per byte
Operand length, words	Variable	1 to 10 bytes	1-16 digits	1-16 digits	1-16 digits
Instruction length, words	Variable	1 to 8 bytes	4-6 bytes	4-6 bytes	4-6 bytes
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	MOS
Storage capacity, words	10,000	5K or 10K bytes	8K to 16K bytes	8K-131K	8K-131K
Cycle time, microseconds/word	–	1.2	1.52	1.52	1.52
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	1000	100	–	–	–
Capacity of each register	10 bytes	5 bytes	–	–	–
Add time, milliseconds/word	–	0.12/9 digits	0.026 (5 digits)	0.009	0.009
KEYBOARD INPUT				No	No
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	–	–
10-key numeric keyboard	Standard	Standard	Standard	–	–
Full accounting keyboard	Standard	No	No	–	–
PRINTED OUTPUT				No	No
Printing speed, chars/sec	78	100 to 650 lpm	85	–	–
Carriage width, inches	13	16	13.2 or 22	–	–
Split platen	Optional	No	Optional	–	–
Pin-feed forms handling	Optional	Standard	Standard	–	–
Friction-feed forms handling	Optional	No	Optional	–	–
Journal roll handling	Standard	No	No	–	–
MAGNETIC LEDGER CARDS	Optional	No	No	No	No
Data capacity, digits per card	Not specified	–	–	–	–
Automatic card alignment	Optional	–	–	–	–
Automatic card feeding & stacking	No	–	–	–	–
MAGNETIC DISC I/O	No	Optional	Standard	Standard	Standard
Max. on-line disc capacity, chars	–	23,000,000	9,800,000	9,800,000	82,000,000
Disc I/O speed, chars/sec	–	156,250	199,000	199,000	312,000
Interchangeable discs	–	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	No	240-720	20	1000	1000
Punched card output speed, cols/sec	No	40	20	120	120
Paper tape input speed chars/sec	No	No	No	No	No
Paper tape output speed, chars/sec	No	No	No	No	No
Line printer output speed, lines/min	No	100 to 150	No	1100	1100
Magnetic tape I/O speed, chars/sec	No	No	No	80,000	80,000
Communications interface	No	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	No	No	No	No	No
Compilers	–	MiniCOBOL, COBOL	BASIC, RPG II	RPG,FORTRAN IV	RPG,FORTRAN IV
Application programs	Std. business applications	Std. business applications	Std. business applications	Many available	Many available
Software separately priced	No	Partially	Yes	Yes	Yes
Technical help separately priced	No	Partially	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$11,990	$36,200-59,100	$47,830	$45,800	$139,300
Monthly rental of basic system	$450	$970-1,375	$1,002	$1,020	$3,300
Date of first U.S. delivery	March 1974	Oct. 1970	December 1970	January 1970	November 1973
Number installed in U.S. to date	200 worldwide	Not specified	Over 5,000	Over 15,000	–
COMMENTS	Formerly Paillard Hermes Systems.	FORTRAN compiler is also available. Multi-workstation available; up to 4 Teletype-compatible terminals can be connected to Model 58.	Offers optional CRT display output.	Disk-based, batch-oriented system.	Provides multi-programming support.

All About Small Accounting Computers

MANUFACTURER & MODEL	IBM System/360 Model 20	IBM 1130	IBM 6405	IBM 6420	IBM 6430
DATA FORMATS					
Word length, bits	8	16	–	–	–
Digits per word	2	2	10 + sign	10 + sign	10 + sign
Characters per word	1	2	–	Variable	Variable
Operand length, words	1-16	1 or 2	1	1	1
Instruction length, words	2, 4, 6	1 or 2	–	–	6 digits
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	Core
Storage capacity, words	4K-32K	4K-32K	20 to 120	20 to 40	See Comments
Cycle time, microseconds/word	1.0-3.6	2.2 or 3.6	Not specified	Not specified	Not specified
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	No	No	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Plugboard; 60 to 190 program steps	Plugboard; 100 to 190 program steps	Stored; 160 or 320 instructions
No. of operational registers	8	3	–	–	–
Capacity of each register	–	1 word	–	–	–
Add time, milliseconds/word	0.209	0.0049 or 0.0080	4.32	4.32	4.32
KEYBOARD INPUT		No			
Alphanumeric (typewriter) keyboard	Standard	–	Standard	Standard	Standard
10-key numeric keyboard	No	–	Standard	Standard	Standard
Full accounting keyboard	No	–	No	No	No
PRINTED OUTPUT		No			
Printing speed, chars/sec	15.5	–	15.5	15.5	15.5
Carrier width, inches	–	–	22	22	22
Split platen	No	–	Standard	Standard	Standard
Pin-feed forms handling	No	–	Standard	Standard	Standard
Friction-feed forms handling	Standard	–	Standard	Standard	Standard
Journal roll handling	No	–	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	Optional	No
Data capacity, digits per card	–	–	–	191 characters	–
Automatic card alignment	–	–	–	Yes	–
Automatic card feeding & stacking	–	–	–	Optional	–
MAGNETIC DISC I/O	Optional	Standard	No	No	No
Max. on-line disc capacity, chars	21,600,000	2,560,000	–	–	–
Disc I/O speed, chars/sec	156,000	156,000	–	–	–
Interchangeable discs	Yes	Yes	–	–	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	1000 cpm	600	15	15	15
Punched card output speed, cols/sec	500 cpm	120	15	15	15
Paper tape input speed chars/sec	No	60	15	15	No
Paper tape output speed, chars/sec	No	14.8	15	15	No
Line printer output speed, lines/min	1100	600	No	No	No
Magnetic tape I/O speed, chars/sec	60,000	RPQ only	No	No	No
Communications interface	Optional	RPQ only	No	No	No
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	No	No	No
Compilers	PL/1, RPG	RPG, FORTRAN, COBOL	No	No	No
Application programs	Many available	Many available	No	No	No
Software separately priced	Some	Some	–	–	–
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$16K-$124K	$49,600	$10,630	$18,000	$15,620
Monthly rental of basic system	$510-$2,090	$1,100	$340	$543	$440
Date of first U.S. delivery	November 1964	February 1965	1965	1964	1967
Number installed in U.S. to date	About 15,000	Not specified	Not specified	Not specified	Not specified
COMMENTS	Generally superseded in current IBM product line by System/3; 6 submodels of the 360/20 are available; often used as HASP workstations.	Designed for scientific computing but widely used for small-scale business data processing, the 1130 is now an appealing target for replacement.	Has from 4 to 24 selectors and 20 command keys.	Basic storage of 20-40 numeric words is augmented by special alpha and ledger storage.	Three separate storage areas hold 64 numeric words, 96 alpha chars., and 160 or 320 instructions.

All About Small Accounting Computers

MANUFACTURER & MODEL	ICC System 95/99	Linolex Desktop Processor	Litton ABS/1220-1, 1220-2	Litton ABS/1221-1, 1221-2	Litton ABS/1231
DATA FORMATS					
Word length, bits	16	8	40	40	40
Digits per word	4	2	12	12	12
Characters per word	2	1	5	5	5
Operand length, words	Variable	1-256	4 per word	4 per word	4 per word
Instruction length, words	Variable	1-4	4 per word	4 per word	4 per word
INTERNAL STORAGE					
Type of storage	Core	Semiconductor	Drum	Drum	Drum
Storage capacity, words	16-32K	4K-32K	2,046	2,046	2,046
Cycle time, microseconds/word	1.0	1.0	2,550	2,550	2,550
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	4	Variable	128	256	500
Capacity of each register	16 bits	Variable	12 digits	12 digits	12 digits
Add time, milliseconds/word	0.00135	0.020	14	14	14
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	100 std., 330 opt.	30, 100, or 165	35	35	35
Carriage width, inches	8" std.,132 pos. opt.		190 positions	190 positions	190 positions
Split platen	No	No	Standard	Standard	Standard
Pin-feed forms handling	Yes	Optional	Standard	Standard	Standard
Friction-feed forms handling	No	Optional	Standard	Standard	Standard
Journal roll handling	No	No	Standard	Standard	Standard
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	—	—	—	—	—
Automatic card alignment	—	—	—	—	—
Automatic card feeding & stacking	—	—	—	—	—
MAGNETIC DISC I/O	Optional	Optional	No	No	No
Max. on-line disc capacity, chars	4,588,000	18,000,000	—	—	—
Disc I/O speed, chars/sec	180,000	10,000	—	—	—
Interchangeable discs	Yes	Yes	—	—	—
OTHER I/O UNITS					
Punched card input speed, cols/sec	No	533	No	No	No
Punched card output speed, cols/sec	No	No	No	No	No
Paper tape input speed chars/sec	No	No	50	50	50
Paper tape output speed, chars/sec	63.5 (opt.)	No	50	50	50
Line printer output speed, lines/min	No	200	55	55	55
Magnetic tape I/O speed, chars/sec	No	10,000	No	No	No
Communications interface	Optional	Optional	No	No	No
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	See Comments	See Comments	See Comments
Compilers	FORTRAN	BASIC	No	No	No
Application programs	Inventory control, A/R	Std. business, data entry	Over 40 available	Over 40 available	Over 40 available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	No	No	No	No
PRICING & AVAILABILITY					
Purchase price of basic system	$22,500	$12,900	$14,900	$16,150	$19,760
Monthly rental of basic system	$930 (3-year lease)	$442 (1-year lease)	$436	$464	$545
Date of first U.S. delivery	October 1972	July 1972	1970	1970	1968
Number installed in U.S. to date	4	29	See Comments	See Comments	See Comments
COMMENTS	Based on Data General 1220 minicomputer. Basic system provides 400,000 bytes of directly addressable storage plus CRT.	Basic system includes 3 tape drives, 1600-character CRT, and keyboard.	Mnemonic Interpretive Language facilities programming. All models can read and punch tape and edge-punched cards at 50 char/sec. ABS/1221 differs from ABS/1220 in that the 1221 has facilities for front-feeding of ledger sheets. Over 3,000 installed of all 1200 Series systems.		

All About Small Accounting Computers

MANUFACTURER & MODEL	Litton ABS/1241	Litton ABS/1251	Litton ABS/1281	Litton Monroe 200	Martin, Wolfe Mini-Mesa
DATA FORMATS					
Word length, bits	40	40	40	16	16
Digits per word	12	12	12	12 or 15	2
Characters per word	5	5	5	None	2
Operand length, words	4 per word	4 per word	4 per word	15	1
Instruction length, words	4 per word	1	4 per word	14 bits	1
INTERNAL STORAGE					
Type of storage	Drum	Drum	Drum	MOS shift register	Core
Storage capacity, words	4,096	20,480	4,096	8 words	24K-32K bytes
Cycle time, microseconds/word	2,550	2,550	2,550	600	1.2
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	No	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Diode matrix board	Internally stored
No. of operational registers	2,000	18,000	2,000	10	6
Capacity of each register	12 digits	12 digits	12 digits	12 or 15	1 word
Add time, milliseconds/word	14	14	14	0.6	0.00135
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	No	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	35	35	35	18	80-165
Carriage width, inches	190 positions	190 positions	190 positions	13	132 positions
Split platen	Standard	Standard	Standard	No	No
Pin-feed forms handling	Standard	Standard	Standard	No	Standard
Friction-feed forms handling	Standard	Standard	Standard	Standard	No
Journal roll handling	Standard	Standard	Standard	Standard	No
MAGNETIC LEDGER CARDS	No	No	Standard	No	No
Data capacity, digits per card	—	—	1199	—	—
Automatic card align	—	—	No	—	—
Automatic card feeding & stacking	—	—	No	—	—
MAGNETIC DISC I/O					
Max. on-line disc capacity, chars	No	No	No	No	Standard
Disc I/O speed, chars/sec	—	—	—	—	4,800,000
Interchangeable discs	—	—	—	—	190,000
Interchangeable discs	—	—	—	—	Yes
OTHER I/O UNITS					
Punched card input speeds, cols/sec	80	80	80	No	No
Punched card output speed, cols/sec	No	No	No	No	No
Paper tape input speed, chars/sec	50	50	50	No	No
Paper tape output speed, chars/sec	50	50	50	No	No
Line printer output speed, lines/min	55	55	55	No	100-125
Magnetic tape I/O speed, chars/sec	No	No	No	No	36,000
Communications interface	No	No	No	No	Optional
SOFTWARE & SUPPORT					
Assembler	See Comments	See Comments	See Comments	No	Yes
Compilers	No	No	No	No	RPG
Application programs	Over 40 available	Over 40 available	Over 40 available	Billing	Custom, Std. business
Software separately priced	Yes	Yes	Yes	No	Partially
Technical help separately priced	No	No	No	No	Partially
PRICING & AVAILABILITY					
Purchase price of basic system	$22,760	$26,900	$22,960	$4395	$48,500
Monthly rental of basic system	$615	$745	$625	$413 (1-yr. lease)	—
Date of first U.S. delivery	October 1970	March 1973	September 1971	November 1972	June 1973
Number installed in U.S. to date	See Comments	See Comments	See Comments	Not specified	4
COMMENTS:	Mnemonic Interpretive Language facilitates programming. All models can read and punch paper tape and edge-punched cards at 50 char/sec. Over 3,000 installed of all 1200 Series systems.			Designed for billing and invoicing applications.	Multiple CRT terminals optional.

All About Small Accounting Computers

MANUFACTURER & MODEL	Martin, Wolfe Mesa I	Martin, Wolfe Mesa II	Micro Computer Machines MCM 70	Microline MMCS	MCS MICOS
DATA FORMATS					
Word length, bits	16	16	8	16	16
Digits per word	2	2	1 per byte	4	2
Characters per word	2	2	1 per byte	2	2
Operand length, words	1	1	1 byte	1	Variable
Instruction length, words	1	1	1 byte	1	Variable
INTERNAL STORAGE					
Type of storage	Core	Core	MOS	Core	Core
Storage capacity, words	32K-48K bytes	30K-65K bytes	2K-8K bytes	16K-32K	24K-32K
Cycle time, microseconds/word	1.2	62	1	0.980	1.2
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	6	6	Not specified	6	4
Capacity of each register	1 word	1 word	Not specified	16 bits	16 bits
Add time, milliseconds/word	0.00135	0.00135	NA	0.0019	0.00135
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Optional
10-key numeric keyboard	Standard	Standard	Optional	Standard	Optional
Full accounting keyboard	No	No	No	Standard	No
PRINTED OUTPUT					
Printing speed, chars/sec	220-440	–	110 cps	10, 30, or 165	165
Carriage width, inches	132 char.	132 char.	34 char.	15	132 char.
Split platen	No	No	No	No	No
Pin-feed forms handling	Standard	Standard	No	Standard	Yes
Friction-feed forms handling	No	No	No	No	No
Journal roll handling	No	No	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	No	Standard	Standard
Max. on-line disc capacity, chars	18,200,000	36,400,000	–	200,000,000	400,000,000
Disc I/O speed, chars/sec	190,000	190,000	–	312,000	312,000
Interchangeable discs	Yes	Yes	–	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	No	No	RPQ only	330	533
Punched card output speed, cols/sec	No	No	RPQ only	No	No
Paper tape input speed, chars/sec	No	No	–	500 (optional)	300
Paper tape output speed, chars/sec	No	No	–	75	100
Line printer output speed, lines/min	100-200	125-2000	–	100, 300, or 600	600
Magnetic tape I/O speed, chars/sec	36,000	36,000	900 (cassette)	20,000	37,500
Communications interface	Optional	Optional	Optional	Standard	Optional
SOFTWARE & SUPPORT					
Assembler	Yes	Yes	No	Yes	Yes
Compilers	RPG	RPG	APL	BASIC, COMFORT	BASIC
Application programs	Custom, std. business	Custom, std. business	–	Material control, std. business	See Comments
Software separately priced	Partially	Partially	No	No	Yes
Technical help separately priced	Partially	Partially	No	No	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$55,000	$64,000	$3,500	$39,000	$55,000
Monthly rental of basic system	–	–	–	$975 (1-year lease)	$1,467 (1-year lease)
Date of first U.S. delivery	–	January 1971	December 1973	April 1972	December 1971
Number installed in U.S. to date	–	11	–	Not specified	Over 50
COMMENTS	Multiple CRT terminals optional, disk drives optional.	Minicomputer based system. Multiple CRT terminals, disk drives, POS terminals, are optional.	Virtual cassette system with storage to 120K bytes available for about $5,000.	Up to 16 video display terminals can be attached, 9600 bps. Offered as turnkey system with training, maintenance, analysis included.	System incl. hardware, MICOS operating system, plus about 12 applications programs. Based on Data General 1220, 800, or Super Nova.

All About Small Accounting Computers

MANUFACTURER & MODEL	Mobydata Hospitality 500	NCR Century 50	NCR Century 100	NCR Century 101	NCR 299
DATA FORMATS					
Word length, bits	16	8	8	8	64
Digits per word	2	1 or 2	1 or 2	1 or 2	16
Characters per word	2	1	1	1	8
Operand length, words	1	1-256	1-256	1-256	1
Instruction length, words	1	4-8	4-8	4-8	1
INTERNAL STORAGE					
Type of storage	Core	Thin-film	Thin-film	Core	Core
Storage capacity, words	16K	16K-32K	16K-32K	16K-64K	8K bits
Cycle time, microseconds/word	1.2	0.8	0.8	1.2	7 per bit
Storage usable for data	Yes	Yes	Yes	–	Yes
Storage usable for programs	Yes	Yes	Yes	–	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	4	63	63	63	7
Capacity of each register	16 bits	1-word	1-word	1-word	64 bits
Add time, milliseconds/word	0.00135	0.0590	0.0590	0.0288	220
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	No	No	No	Standard
10-key numeric keyboard	Optional	No	No	No	Standard
Full accounting keyboard	Optional	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	30	200	450/900	300	15
Carriage width, inches	12	132 char.	132 char.	132 char.	24
Split platen	No	No	No	No	Standard
Pin-feed forms handling	Optional	Standard	Standard	Standard	Not released yet
Friction-feed forms handling	Standard	No	No	No	Standard
Journal roll handling	No	No	No	No	Standard
MAGNETIC LEDGER CARDS	No	No	No	No	Not released yet
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	No
Max. on-line disc capacity, chars	6,000,000	113,000,000	113,000,000	240,000,000	–
Disc I/O speed, chars/sec	166,400	83,000	83,000	315,000	–
Interchangeable discs	Yes	Yes	Yes	Yes	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	No	60,000	96,000	96,000	No
Punched card output speed, cols/sec	No	23,520	23,520	23,520	–
Paper tape input speed, chars/sec	No	1500	1500	1500	–
Paper tape output speed, chars/sec	No	200	200	200	–
Line printer output speed, lines/min	60-200	900	3000	3000	–
Magnetic tapes I/O speed, chars/sec	No	40K	80K	240K	–
Communications interface	Optional	Optional	Optional	Optional	–
SOFTWARE & SUPPORT					
Assembler	Yes	Yes	Yes	Yes	No
Compilers	MOBOL	COBOL, BASIC	COBOL, BASIC	COBOL, BASIC	–
Application programs	Std. business, hotel back office	FORTRAN, RPG Many available	FORTRAN, RPG Many available	FORTRAN, RPG Many available	– Many available
Software separately priced	No	Some	Some	Some	No
Technical help separately priced	Yes	Some	Some	Some	No
PRICING & AVAILABILITY					
Purchase price of basic system	$48,000	$71,500	$89,000	$69,520	$7,250
Monthly rental of basic system	$1,200 (5-year lease)	$1,575	$2,500	$2,025	–
Date of first U.S. delivery	February 1973	February 1971	September 1968	April 1972	October 1973
Number installed in U.S. to date	6	Over 600	1,950	Over 50	2
COMMENTS	Complete turnkey system, including software, training, and maintenance. Based on Data General Nova 1200 minicomputer. Uses CRT console.	The Century 50 is a repackaged 100 with a lower price and somewhat limited configuration possibilities.		The Century 101 provides more than twice the performance of the smaller Century 50 or 100.	Features novel optical program entry technique. Core memory holds up to 63 program statements and 50 totals. Full deliveries began in January 1974.

All About Small Accounting Computers

MANUFACTURER & MODEL	NCR 395	NCR 399	NCR 400	NCR 500	Nixdorf 820/03
DATA FORMATS					
Word length, bits	–	4-2048	–	–	64 & 18
Digits per word	14	1-16	13	12	16 & 5
Characters per word	–	1-256	–	12	8 & 3
Operand length, words	1	1-256	1	1	1
Instruction length, words	–	6-12 digits	–	1	18 bits/instr.
INTERNAL STORAGE					
Type of storage	Disc	Core	Disc	Core	Core
Storage capacity, words	20-200	16K bytes	40-200	200-800	2K-4K
Cycle time, microseconds/word	Not specified	1.2	Not specified	Not specified	2.0
Storage usable for date	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	No	Yes	No	Yes	Yes
PROCESSING					
Programming technique	Control panel, front bar	Internally stored	Mylar tape, front bar	Internally stored	Internally stored
No. of operational registers	–	–	–	–	15
Capacity of each register	–	–	–	–	Varies
Add time, milliseconds/word	Not specified	2.2	Not specified	Not specified	3.2
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	No	Standard	No	Standard	Standard
Full accounting keyboard	Standard	Optional	Standard	Standard	No
PRINTED OUTPUT					
Printing speed, chars/sec	150 cycles/min.	24	150 cycles/min.	Not specified	15
Carriage width, inches	26	22.1	26 inches	26 inches	13.5
Split platen	Standard	Standard	Standard	Standard	No
Pin-feed forms handling	Optional	Optional	Optional	Optional	Optional
Friction-feed forms handling	Standard	Standard	Standard	Standard	Optional
Journel roll handling	Standard	Standard	Standard	Standard	No
MAGNETIC LEDGER CARDS	No	Optional	Optional	Optional	No
Data capacity, digits per card	–	354-1500	260	216	–
Automatic card alignment	–	Optional	Standard	Standard	–
Automatic card feeding & stacking	–	Optional	Optional	Standard	–
MAGNETIC DISCS I/O	No	No	No	No	No
Max. on-line disc capacity, chars	–	–	–	–	–
Disc I/O speed, chars/sec	–	–	–	–	–
Interchangeable discs	–	–	–	–	–
OTHER I/O UNITS					
Punched card input speed, cols/sec	133	400	133	133	200
Punched card output speed, cols/sec	25	26	25	133	19 or 50
Paper tape input speed, chars/sec	No	125	No	600	200
Paper tape output speed, chars/sec	30	75	30	120	25
Line printer output speed, lines/min	No	125, 200, 300	No	125	60-200
Magnetic tape I/O speed, chars/sec	No	No	No	No	Tape cassette
Communications interface	No	Optional	No	No	Yes
SOFTWARE & SUPPORT					
Assembler	No	Yes	Yes	Yes	Yes
Compilers	No	No	No	No	No
Application programs	Many available	Many available	Many available	Many available	Many available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$9,900	$14,000	$10,900	$23,000	$10,628
Monthly rental of basic system	$330 (1-year lease)	$420 (1-year lease)	$365	$605	–
Date of first U.S. delivery	Not specified	October 1972	1967	Not specified	1969
Number installed in U.S. to date	Not specified	Over 50	4500	Not specified	See comments (next page)
COMMENTS	Features standard typewriter keyboard plus full accounting keyboard.	Tape cassette is used to store both application and computer control programs.	External program tape may be in either loop or strip form.	Optional optical reader reads journal tape at up to 520 char/sec.	

All About Small Accounting Computers

MANUFACTURER & MODEL	Nixdorf 820/04	Nixdorf 820/110	Nixdorf 820/123	Nixdorf 820/125	Nixdorf 820/135
DATA FORMATS					
Word length, bits	64 & 18	12	12	12	12
Digits per word	16 & 5	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3
Characters per word	8 & 3	1, 2	1, 2	1, 2	1, 2
Operand length, words	1	1	1	1	1
Instruction length, words	18 bits/instr.	1-4	1-4	1-4	1-4
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	Core
Storage capacity, words	2K-4K	4K-16K	4K-8K	2K-16K	4K-16K
Cycle time, microseconds/word	2.0	2.0	2.0	2.0	2.0
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	15	15	15	15	15
Capacity of each register	Varies	Varies	Varies	Varies	Varies
Add time, milliseconds/word	3.2	3.2	3.2	3.2	3.2
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	15	15	15	15	15
Carriage width, inches	8" + passbook prntr.	13.5	13.5	13.5	13.5
Split platen	No	No	No	No	No
Pin-feed forms handling	No	Optional	Optional	Optional	Optional
Friction-feed forms handling	Passbook printer	Optional	Optional	Optional	Optional
Journal roll handling	No	No	No	No	No
MAGNETIC LEDGER CARDS	No	No	Standard	Standard	No
Data capacity, digits per card	–	–	476/side	1024/side	–
Automatic card alignment	–	–	Standard	Standard	–
Automatic card feeding & stacking	–	–	Standard	Standard	–
MAGNETIC DISC I/O	No	No	No	No	Standard
Max. on-line disc capacity, chars	–	–	–	–	2,800,000
Disc I/O speed, chars/sec	–	–	–	–	144,000
Interchangeable discs	–	–	–	–	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	200	200	200	200	200
Punched card output speed, cols/sec	19 or 50	19 or 50	19 or 50	19 or 50	19 or 50
Paper tape input speed chars/sec	200	200	200	200	200
Paper tape output speed, chars/sec	25	25	25	25	25
Line printer output speed, lines/min	60-200	60-200	60-200	60-200	60-200
Magnetic tape I/O speed, chars/sec	Tape cassette	Tape cassette	Tape cassette	Tape cassette	Cassette, 436
Communications interface	Yes	No	No	No	No
SOFTWARE / SUPPORT					
Assembler	Yes	No	No	No	No
Compilers	No	BOSS	BOSS	BOSS	BOSS
Application programs	Many available	Many available	Many available	Many available	Many available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$10,628	$16,890	$18,490	$18,990	$35,000
Monthly rental of basic system	–	–	–	–	–
Date of first U.S. delivery	1969	1969	1970	1969	1973
Number installed in U.S. to date	See Comments	See Comments	See Comments	See Comments	See Comments
COMMENTS	Manufactured in West Germany. Total of over 35,000 installed to date, mainly in Europe, with about 1,500 in the U.S.				

All About Small Accounting Computers

MANUFACTURER & MODEL	Nixdorf 840/110	Nixdorf 840/123	Nixdorf 840/125	Nixdorf 840/135	Olivetti Auditronic 730
DATA FORMATS					
Word length, bits	12	12	12	12	84
Digits per word	1, 2, 3	1, 2, 3	1, 2, 3	1, 2, 3	14
Characters per word	1, 2	1, 2	1, 2	1, 2	—
Operand length, words	1	1	1	1	14
Instruction length, words	1-4	1-4	1-4	1-4	1
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	Core
Storage capacity, words	4K-16K	4K-8K	2K-16K	4K-16K	30 14-digit words
Cycle time, microseconds/word	2.0	2.0	2.0	2.0	24 per digit
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	No
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Stored on mag. tape cartridges
No. of operational registers	15	15	15		3-1
Capacity of each register	Varies	Varies	Varies	Varies	14 digits each
Add time, milliseconds/word	3.2	3.2	3.2	3.2	4.4
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	50	50	50	50	15
Carriage width, inches	17.4	17.4	17.4	17.4	27.5
Split platen	No	No	No	No	Standard
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	No	No	No	No	Standard
Journal roll handling	No	No	No	No	Standard
MAGNETIC LEDGER CARDS	No	Standard	Standard	No	Optional
Data capacity, digits per card	—	496/side	1,024/side	—	50 chars/side
Automatic card alignment	—	Standard	Standard	—	Standard
Automatic card feeding & stacking	—	Standard	Standard	—	No
MAGNETIC DISC I/O	No	No	No	Standard	No
Max. on-line disc capacity, chars	—	—	—	2,800,000	—
Disc I/O speed, chars/sec	—	—	—	144,000	—
Interchangeable discs	—	—	—	Yes	—
OTHER I/O UNITS					
Punched card input speed, cols/sec	200	200	200	200	No
Punched card output speed, cols/sec	19 or 50	19 or 50	19 or 50	19 or 50	No
Paper tape input speed chars/sec	200	200	200	200	50
Paper tape output speed, chars/sec	25	25	25	25	15-50
Line printer output speed, lines/min	60-200	60-200	60-200	60-200	No
Magnetic tape I/O speed, chars/sec	Cassette, 436	Cassette, 436	Cassette, 436	Cassette, 436	No
Communications interface	No	No	No	No	No
SOFTWARE / SUPPORT					
Assembler	No	No	No	No	No
Compilers	BOSS	BOSS	BOSS	BOSS	No
Application programs	Many available	Many available	Many available	Many available	Std. business applications
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$20,890	$22,490	$22,990	$40,000	$8,245
Monthly rental of basic system	—	—	—	—	—
Date of first U.S. delivery	November 1973	November 1973	November 1973	November 1973	Oct. 1971
Number installed in U.S. to date	—	—	—	—	Over 250
COMMENTS	Nixdorf provides the 840's on a 1-year or 2-year rental basis for 3.15% or 3.0% of the purchase price per month. The Interpreter control program for the 840's resides in a 4K or 6K word ROM.				Each mag. tape cartridge may contain 1280 instructions. Over 50 applications available.

All About Small Accounting Computers

MANUFACTURER & MODEL	Olivetti P203	Olivetti P603	(Paillard) Hermes F-4	Phillips P-351	Phillips P-352
DATA FORMATS					
Word length, bits	Variable	Variable	Variable	64	64
Digits per word	15 or 30	1-30	Variable	15+ sign	15+ sign
Characters per word	–	1-30	Variable	8	8
Operand length, words	½ char.	½ char.	Variable	1	1
Instruction length, words	1 char.	1 char.	Variable	1	1
INTERNAL STORAGE					
Type of storage	Delay line	Delay line	IC Registers	Core	Core
Storage capacity, words	10 32-digit words	16 32-digit words*	3, 7, or 15	400	400-1200
Cycle time, microseconds/word	Not specified	Not specified	Not specified	3.5	3.5
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	No	Yes	Yes
PROCESSING					
Programming technique	Internally stored (see Comments)	Internally stored	Diode plugboard	Internally stored	Internally stored
No of operational registers	3	3	3, 7, or 15	–	–
Capacity of each register	30 digits	30 digits	11 digits	–	–
Add time, milliseconds/word	80	Not specified	Not specified	1.5	1.5
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	15	15	17	40	40
Carriage width, inches	18	18	13	18	18
Split platen	Optional	Optional	No	Standard	Standard
Pin-feed forms handling	Optional	Optional	Optional	Standard	Standard
Friction-feed forms handling	Standard	Standard	No	Standard	Standard
Journal roll handling	Standard	Standard	No	Optional	Optional
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	No	No	No	No	Yes
Max. on-line disc capacity, chars	–	–	–	–	4,600,000
Disc I/O speed, chars/sec	–	–	–	–	Not specified
Interchangeable discs	–	–	–	–	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	No	No	No	No	373
Punched card output speed, cols/sec	No	No	No	50	50
Paper tape input speed chars/sec	No	20	No	No	50
Paper tape output speed, chars/sec	40	20	20	50	50
Line printer output speed, lines/min	No	No	No	No	50
Magnetic tape I/O speed, chars/sec	No	1000	No	No	Tape cassette
Communications interface	No	No	No	No	Optional
SOFTWARE / SUPPORT					
Assembler	No	No	No	No	Yes
Compilers	No	No	No	No	No
Application programs	Std. business applications	Std. business applications	Billing Process application	Over 200 avail.	Over 200 available
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	No	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$4,295	$6,260	$4,195	$8,840	$15,000
Monthly rental of basic system	–	–	–	$185	–
Date of first U.S. delivery	April 1968	July 1972	Oct. 1969	June 1970	June 1970
Number installed in U.S. to date	Over 2500	Over 1000	Over 700	No specified	Not specified
COMMENTS	Programs may contain up to 160 instructions and are loaded from magnetic cards. Over 140 programs available.	Programs from magnetic cards loaded can hold 384 instructions. Over 100 applications available. *Storage expandable to 3,584 words.	Designed mainly for billing and source data recording. Minicassette output tape available. Now sold by Hermes Products Inc.	Uses core storage for both instructions and data. Upward compatible with larger Philips systems.	See Comments on next page.

All About Small Accounting Computers

MANUFACTURER & MODEL	Philips P-354	Philips P-356	Philips P-358	Philips P-359	Qantel System 1100, System 1200
DATA FORMATS					
Word length, bits	64	64	64	64	8
Digits per word	15 + sign	15 + sign	15 + sign	15 + sign	1 or 2
Characters per word	8	8	8	8	1
Operand length, words	1	1	1	1	1
Instruction length, words	1	1	1	1	2-5
INTERNAL STORAGE					
Type of storage	Core	Core	Core	Core	MOS I.C.
Storage capacity, words	600-1200	400-1200	600-1200	800-1200	4K-32K
Cycle time, microseconds/word	3.5	3.5	3.5	3.5	1.5
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	—	—	—	—	—
Capacity of each register	—	—	—	—	—
Add time, milliseconds/word	1.5	1.5	1.5	1.5	58.5
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	40	40	40	40	165
Carriage width, inches	18	29	29	29	132 char.
Split platen	Standard	Standard	Standard	Standard	No
Pin-feed forms handling	Standard	Standard	Standard	Standard	Standard
Friction-feed forms handling	Standard	Standard	Standard	Standard	No
Journal roll handling	Optional	Optional	Optional	Optional	No
MAGNETIC LEDGER CARDS	Standard	No	Standard	Standard	No
Data capacity, digits per card	672/side	—	672/side	1,344/side	—
Automatic card alignment	Standard	—	Standard	Standard	—
Automatic card feeding & stacking	Yes	—	Yes	Yes	—
MAGNETIC DISC I/O	No	Yes	No	No	Standard
Max. on-line disc capacity, chars	4,600,000	4,600,000	4,600,000	4,600,000	120,000,000
Disc I/O speed, chars/sec	Not specified	Not specified	Not specified	Not specified	666,000
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	373	373	373	373	666
Punched card output speed, cols/sec	50	50	50	50	—
Paper tape input speed chars/sec	50	50	50	50	50
Paper tape output speed, chars/sec	50	50	50	50	50
Line printer output speed, lines/min	55	55	55	55	100-1,800
Magnetic tape I/O speed, chars/sec	Tape cassette	Tape cassette	Tape cassette	Tape cassette	60,000
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	Yes	Yes
Compilers	No	No	No	No	QIC
Application programs	Over 200 available	Over 200 available	Over 200 available	Over 200 available	Std. business applications
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Yes	Yes	Yes	Yes
PRICING & AVAILABILITY					
Purchase price of basic system	$15,500	$22,000	$20,000	$23,000	$29,500/30,9000
Monthly rental of basic system	—	—	—	—	$878/921 (5-yr lease)
Date of first U.S. delivery	January 1972	June 1972	May 1971	May 1971	April 1970
Number installed in U.S. to date	See Comments	See Comments	See Comments	See Comments	Over 200
COMMENTS	Can control up to 16 I/O units, up to 4 of which can operate simultaneously. Can be equipped with 1 or 2 front forms feeds, journal roll feed, and continuous forms feed. P-358 and P-359 can have dual continuous forms feed. A mosaic line printer and an automatic magnetic ledger reader were added to the line in 1972. Magnetic tape cassette, extended core memory, and disks were added in 1973. Over 18,000 installed world-wide; over 1,200 in U.S.				Both systems based on Answer hardware. 1100 supports 2 terminals; 1200 supports 6 terminals.

All About Small Accounting Computers

MANUFACTURER & MODEL	Q1/LMC	RPG Data Systems RPG 310-1	RPG Data Systems RPG 310-2	RPG Data Systems RPG 310-3	Scidata Series 5
DATA FORMATS					
Word length, bits	8	8-bit byte	8-bit byte	8-bit byte	12
Digits per word	2	1 per byte	1 per byte	1 per byte	2
Characters per word	1	1 per byte	1 per byte	1 per byte	2
Operand length, words	1-255	Variable	Variable	Variable	
Instruction length, words	1-3	Variable	Variable	Variable	1
INTERNAL STORAGE					
Type of storage	MOS	Core/ROM	Core/ROM	Core/ROM	Core
Storage capacity, words	4-64K	24K-64K	24K-64K	24K-64K	32K
Cycle time, microseconds/word	6	1.1	1.1	1.1	1.2
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	8	5	10	5	8
Capacity of each register	8-16 bits	16/8	16/8	16/8	12 bits
Add time, milliseconds/word	0.002	Not specified	Not specified	Not specified	0.0024
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Standard	Standard	Standard	Standard	Standard
Full accounting keyboard	Standard	No	No	No	Yes
PRINTED OUTPUT					
Printing speed, chars/sec	30	165 to 1650	165 to 1650	165 to 1650	30
Carriage width, inches	13	132 char.	132 char.	132 char.	132 char.
Split platen	No	No	No	No	No
Pin-feed forms handling	Optional	Standard	Standard	Standard	Standard
Friction-feed forms handling	Standard	No	No	No	No
Journal roll handling	No	No	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	No	No
Data capacity, digits per card	–	–	–	–	–
Automatic card alignment	–	–	–	–	–
Automatic card feeding & stacking	–	–	–	–	–
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard	Standard
Max. on-line disc capacity, chars	1,000,000	40 million	40 million	40 million	12,800,000
Disc I/O speed, chars/sec	30,000	190,000	190,000	190,000	416,666
Interchangeable discs	Yes	Yes	Yes	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	–	800	800	800	800-1333
Punched card output speed, cols/sec	–	96	96	96	134
Paper tape input speed chars/sec	–	300	300	300	300
Paper tape output speed, chars/sec	–	30-75	30-75	30-75	75
Line printer output speed, lines/min	–	60-600	60-600	60-600	100,200,300,600
Magnetic tape I/O speed, chars/sec	–	36,000-72,000	36,000-72,000	36,000-72,000	60,000
Communications interface	Optional	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT					
Assembler	Yes	Yes	Yes	Yes	Yes
Compilers	PL/1	RPG II	RPG II	RPG II	FORTRAN, RPG
Application programs	Credit union, text processing	Several	Several	Several	Std. business applications
Software separately priced	No	Yes	Yes	Yes	Yes
Technical help separately priced	Yes	Partially	Partially	Partially	Either
PRICING & AVAILABILITY					
Purchase price of basic system	$10,000	$33,500	$65,000	$35,000	$50,000 to $100,000
Monthly rental of basic system	–	–	–	–	$1000 to 2000
Date of first U.S. delivery	September 1973	April 1973	January 1974	June 1974	October 1972
Number installed in U.S. to date	10				About 80
COMMENTS	Input display on keyboard.	Single CPU system.	Dual CPU, shared data	RJE system, emulates IBM 2770 with local processing capability.	Oriented toward basic accounting, inventory control, distribution, auto dealers, feed formulation, and insurance agencies.

All About Small Accounting Computers

MANUFACTURER & MODEL	Scidata Series 6	Singer 5005 Computyper	Singer 5800	Singer 6800	Singer System Ten
DATA FORMATS					
Word length, bits	16	48	96	6	6
Digits per word	4	12	16	1	1
Characters per word	2	—	16	1	1
Operand length, words		1	1	4	4
Instruction length, words	1-3	7 bits/instr.	1	2	2
INTERNAL STORAGE					
Type of storage	Core	Delay line	Core	Core	Core
Storage capacity, words	128K	5	4,096	20K-30K	20K-110K
Cycle time, microseconds/word	0.9 or 1.2	Not specified	1 millisecond	3.3	3.3
Storage usable for data	Yes	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	See Comments	Yes	Yes	Yes
PROCESSING					
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	8	3	90	3-60	3-60
Capacity of each register	16 bits	12 digits	16 digits	18 digits	18 digits
Add time, milliseconds/word	0.0023	11.0	1.0	0.0066	0.0066
KEYBOARD INPUT					
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard plus CRT	No (CRT)
10-key numeric keyboard	Standard	Optional	Standard	On CRT	Standard
Full accounting keyboard	Yes	No	No	No	No
PRINTED OUTPUT					
Printing speed, chars/sec	30	12	25	25	25
Carriage width, inches	132 char.	16 or 20	20	17	17
Split platen	No	Optional	Optional	No	No
Pin-feed forms handling	Standard	Optional	Optional	Standard	Standard
Friction-feed forms handling	No	Standard	Standard	No	Optional
Journal roll handling	No	No	Optional	No	No
MAGNETIC LEDGER CARDS	No	No	Optional	No	No
Data capacity, digits per card	—	—	440	—	—
Automatic card alignment	—	—	Standard	—	—
Automatic card feeding & stacking	—	—	Standard	—	—
MAGNETIC DISC I/O	Standard	No	No	Standard	Optional
Max. on-line disc capacity, chars	12,800,000	—	—	10,000,000	10,000,000
Disc I/O speed, chars/sec	416,666	—	—	299,166	299,166
Interchangeable discs	Yes	—	—	Yes	Yes
OTHER I/O UNITS					
Punched card input speed, cols/sec	800-1333	No	256	No	Up to 1133
Punched card output speed, cols/sec	134	No	No	No	Up to 267
Paper tape input speed chars/sec	300	70 (cartridge)	25	No	275
Paper tape output speed, chars/sec	75	20	25	No	150
Line printer output speed, lines/min	100,200300,600	No	100	70	Up to 450
Magnetic tape I/O speed, chars/sec	60,000	No	1000	No	20,000
Communications interface	Optional	No	Optional, 120K	Optional	No
SOFTWARE / SUPPORT					
Assembler	Yes	No	Yes	Yes	Yes
Compilers	FORTRAN, RPG	No	No	RPG II	RPG II, BASIC
Application programs	Std. business applications	Some	Many available	See Comments	See Comments
Software separately priced	Yes	Yes	Yes	Yes	Yes
Technical help separately priced	Either	Yes	Yes	No	No
PRICING & AVAILABILITY					
Purchase price of basic system	$55,000-100,000	$4,995	$11,995	$33,450	$47,600
Monthly rental of basic system	$1,100-2,000 (5-yr. lease)	$135 (5-yr. lease)	$419.25	—	$1,463
Date of first U.S. delivery	September 1972	March 1968	June 1971	June 1973	June 1970
Number installed in U.S. to date	2	2500	1,500	90	1200
COMMENTS	Based on DEC PDP-11; handles message switching and communications control.	Separate delay line memory holds 406 instructions. Programs are loaded from snap-on punched tape carriages.	Separate core storage for program holds 1K to 4K instructions. Park station feature: 2 MSL cards are held at once without operator handling.	6800 is a prepackaged System Ten with a smaller physical chassis. Model 6810 includes a typewriter-style Workstation; Model 6820 has a CRT and line printer.	Features novel hardware-level multiprogramming capability. Software includes Accounting and Reporting (STARS), Modular Business System, and CPA Accounting.

All About Small Accounting Computers

MANUFACTURER & MODEL	Synetics, Inc. System 1/300	Ultimacc	Ultimacc Model N	Ultimacc Super Disc
DATA FORMATS				
Word length, bits	16	16	16	16
Digits per word	4	4	4	4
Characters per word	2	2 or 3	2 or 3	2 or 3
Operand length, words	1	Variable	Variable	Variable
Instruction length, words	1	Variable	Variable	Variable
INTERNAL STORAGE				
Type of storage	Core	Core	Core	Core
Storage capacity, words	8K	16K-32K	16K-32K	16K-32K
Cycle time, microseconds/word	1.2	1.2	1.2	1.2
Storage usable for data	Yes	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes	Yes
PROCESSING				
Programming technique	Internally stored	Internally stored	Internally stored	Internally stored
No. of operational registers	4	4	4	4
Capacity of each register	1 word	1 word	1	1
Add time, milliseconds/word	0.00135	0.00135	0.00135	0.00135
KEYBOARD INPUT				
Alphanumeric (typewriter) keyboard	Standard	Standard	Standard	Standard
10-key numeric keyboard	Optional	Standard	Standard	Standard
Full accounting keyboard	No	No	No	No
PRINTED OUTPUT				
Printing speed, chars/sec	15	165	165	165
Carriage width, inches	9.75	132 char.	132 char.	132 char.
Split platen	No	No	No	No
Pin-feed forms handling	Standard	No	No	No
Friction-feed forms handling	Standard	No	No	No
Journal roll handling	Optional	No	No	No
MAGNETIC LEDGER CARDS	No	No	No	No
Data capacity, digits per card	—	—	—	—
Automatic card alignment	—	—	—	—
Automatic card feeding & stacking	—	—	—	—
MAGNETIC DISC I/O	Standard	Standard	Standard	Standard
Max. on-line disc capacity, chars	5,000,000	20,000,000	20,000,000	126,000,000
Disc I/O speed, chars/sec	200,000	200,000	200,000	312,000
Interchangeable discs	Yes	Yes	Yes	Yes
OTHER I/O UNITS				
Punched card input speed, cols/sec	267	267	267	267
Punched card output speed, cols/sec	No	No	No	No
Paper tape input speed chars/sec	10-300	300	300	300
Paper tape output speed, chars/sec	75	100	100	100
Line printer output speed, chars/sec	60-200	300	300	300
Magnetic tape I/O speed, chars/sec	Optional	36,000	36,000	36,000
Communications interface	Optional	Optional	Optional	Optional
SOFTWARE / SUPPORT				
Assembler	No	Yes	Yes	Yes
Compilers	No	BASIC, FORTRAN	BASIC, FORTRAN	BASIC, FORTRAN
Application programs	Many available	See Comments	See Comments	See Comments
Software separately priced	No	No	No	No
Technical help separately priced	Conversion—Yes	No	No	No
PRICING & AVAILABILITY				
Purchase price of basic system	$35,000-40,000	$57,600	$71,000	$72,000
Monthly rental of basic system	$950-995 (5-yr. lease)	$1,595 (5-yr. lease)	$1,975 (5-yr. lease)	$1,995 (5-yr. lease)
Date of first U.S. delivery	October 1973	August 1971	March 1974	January 1972
Number installed in U.S. to date	2	52	—	2
COMMENTS	TTY or CRT input; system is designed for wholesale distribution.	Based on Data General 1200 minicomputer. Basic disc storage capacity is 5 million bytes. On-line inventory control system, invoicing, A/R, sales analysis, A/P, GL, and payroll. Turnkey price includes programming and support services.		

All About Small Accounting Computers

MANUFACTURER & MODEL	UNIVAC 9200	UNIVAC 9300	Xerox 530
DATA FORMATS			
Word length, bits	8-bit byte	8-bit byte	16
Digits per word	2	2	2
Characters per word	1	1	1
Operand length, words	1-2 bytes	1-2 bytes	1.2
Instruction length, words	4-6 bytes	4-6 bytes	1.2
INTERNAL STORAGE			
Type of storage	Plated wire	Plated wire	Core
Storage capacity, words	8K-16K bytes	8K-32K bytes	8K-64K
Cycle time, microseconds/word	1.2 per byte	0.6 per byte	0.8
Storage usable for data	Yes	Yes	Yes
Storage usable for programs	Yes	Yes	Yes
PROCESSING			
Programming technique	Internally stored	Internally stored	Internally stored
No. of internal registers	8	8	8
Capacity of each register	16 bits	16 bits	16 bits
Add time, milliseconds/word	0.0408	0.0204	0.00192
KEYBOARD INPUT			
Alphanumeric (typewriter) keyboard	Optional	Optional	Optional
10-key numeric keyboard	Optional	Optional	Optional
Full accounting keyboard	No	No	No
PRINTED OUTPUT			
Printing speed, chars/sec	30	30	10
Carriage width, inches	14	14	12
Split platen	No	No	No
Pin-feed forms handling	No	No	No
Friction-feed forms handling	No	No	No
Journal roll handling	No	No	No
MAGNETIC LEDGER CARDS	No	No	No
Data capacity, digits per card	–	–	–
Automatic card alignment	–	–	–
Automatic card feeding & stacking	–	–	–
MAGNETIC DISC I/O	Optional	Optional	Optional
Max. on-line disc capacity, chars	233,400,000	233,400,000	200,000,000
Disc I/O speed, chars/sec	312,000	312,000	312,000
Interchangeable	Yes	Yes	Yes
OTHER I/O UNITS			
Punched card input speed, cols/sec	500-1300	500-1300	265/500
Punched card output speed, cols/sec	100-300	100-300	130
Paper tape input speed, chars/sec	300	300	300
Paper tape output speed, chars/sec	110	110	120
Line printer output speed, lines/min	800-2000	800-2000	350/1100
Magnetic tape I/O speed, chars/sec	68K	68K	208-30K
Communications interface	Optional	Optional	Optional
SOFTWARE / SUPPORT			
Assembler	Yes	Yes	Yes
Compilers	COBOL, FORTRAN, RPG	COBOL, FORTRAN, RPG	COBOL, FORTRAN, RPG II
Application programs	Many available	Many available	Yes
Software separately priced	No	No	Partially
Technical assistance separately priced	No	No	Yes
PRICING & AVAILABILITY			
Purchase price of basic system	$30,970-42,570	$52,225-111,040	$20,000-48,700
Monthly rental of basic system	$1,225	$3,451	$7,00-1,500
Date of first U.S. delivery	June 1967	June 1967	August 1973
Number installed in U.S. to date	See Comments	See Comments	Not specified
COMMENTS	Available in a wide range of card, magnetic tape, and disc-oriented configurations. Over 3,000 systems are still in use. Larger, upward-compatible systems are available.		Designed for scientific, commercial, and communications applications. Compatible with Xerox Sigma 3.