

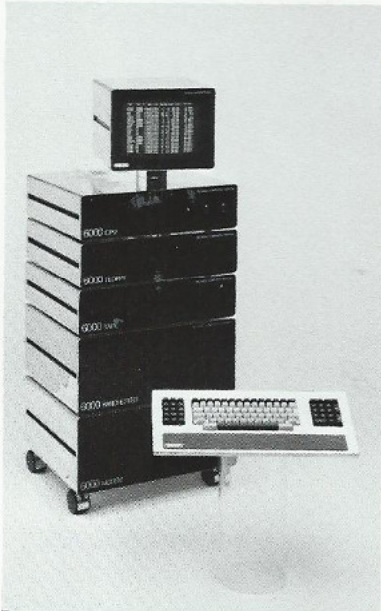
Computer progress

MAGAZINE

SPRING 1982



INTRODUCING:
The Billings 6000 Series
Computer and
Distributed Processing
System



We've Got It All!

With the new System 6000, 500 Series, and BC-12 line of professional computers, a unique distributed processing network, an excellent selection of peripherals, a complete library of state-of-the-art software, the DataTech Training School, and an aggressive international marketing program, Billings does have it all. Well, almost all. The only thing we are lacking is you.

We need competent, professional dealers throughout the world and especially in the United States. We have an excellent product, outstanding factory support, and a comprehensive training program for all of our dealers and now we need you to help customers fill their data processing needs.

Why Billings? Because we are small enough to really care about our dealers and large enough to be able to promptly fill the dealer's orders.

With the new 6000 and 500 Series computer systems and the distributed processing network, the market is virtually unlimited with the capability of selling the basic unit to the small businesses and entire networks to the large companies. This versatility, as well as the reliability of the Billings system, are the keys of success for an energetic dealer.

To help you support your hardware and software once it is in the customer's office, you can call on the services of your nearest DataTech Center, or send your prospective service people to a six-week DataTech School sponsored by Billings where even a computer novice can learn to repair machines, do programming, and train users.

If you have an enthusiastic, motivated sales organization and are interested in finding out how you can join the Billings Team call or write:

Billings Computer Corporation
18600 E. 37th
Independence, MO 64057
(816) 373-0000



Billings



The new Billings 6000 Series Data Center is featured on the cover of this historic issue of *COMPUTER PROGRESS*.

COMPUTER PROGRESS MAGAZINE is published quarterly by the Billings Corporation's Computer Division with Winter, Spring, Summer and Fall editions.

The price per single copy is \$2.00 with special rates for multiple copies. A four-issue subscription is available for \$5.00 (US Funds). For more information about rates and the Billings Software Listing Service write: *COMPUTER PROGRESS MAGAZINE*, 18600 E. 37th, Independence, Missouri 64057.

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**Computer
progress**
MAGAZINE

Table of Contents

Spring 1982 • Volume 2 • Number 1

CP SPOTLIGHT	2
<i>COMPUTER PROGRESS</i> features in this issue's Spotlight Section, the "Great Potato Caper."	
FROM THE PRESIDENT	3
INTERFACE	4
The Norwegian Connection . . . Viking Mikrosystemer A/S makes Billings largest selling business micro computer system in Norway. <i>COMPUTER PROGRESS</i> takes a close-up look at Viking's success story.	
FEATURE STORY	6
DataTechs: Service is Our Business What is a DataTech and what do they do? Billings reveals its new marketing support program which emphasizes personalized service.	
NEW PRODUCTS	8
Billings unveils its 6000 series line of professional computer systems.	
HARDWARE	12
The specifications for the BC-12 line of Computers and standard printers are listed.	
TECH SECTION	13
Billings Distributed Processing Network. <i>COMPUTER PROGRESS</i> announces the Billings Distributed Processing Network featuring functionally structured distribution.	
UP & RUNNING	20
The latest released and field test version software packs. Also listed are software offerings from Billings users.	
BYTES AND PIECES	24
<i>COMPUTER PROGRESS</i> describes the new Billings Westlaw Pack, Computamatic® Terminal software, and Database Manager as well as other technical bulletins.	

SPOTLIGHT

The Great Potato Caper

By Jim Dangerfield

2 A frigid wind blew through the late December night as a band of sinister figures lurked in the shadows near a red brick building in the downtown industrial section of Kansas City.

As the figures began to move toward the security fence surrounding the building, somewhere in the distance, a siren broke the constant din of freeway traffic. The figures slipped deeper into the shadows and waited.

A patrol car slowly cruised down the deserted street with its search light prying into random darkened corners. The light danced across the sign on the front of the brick building — "Dell's Potatoes."

The building had been broken into just three nights before — on Christmas Eve — and the local patrol car was making its obligatory security check.

Quickly, bolt cutters snipped through the tough security fence and the mysterious figures slipped through the opening to the safety of the shadows next to the building.

Crash! Thud! The alley window shattered and two figures scrambled into the warmth of the familiar office — an office they had visited and ransacked just a few nights before.

While loading up with tools, radios and several other small items during their earlier visit, they had noticed something worth more than all the nicknacks they had collected together. But they had no way of getting the computer back over the high security fence.

This time they were on a special

mission. They knew what they were after and had made all of the provisions to ensure that this night's intrusion was successful.

A yellow light flicked on and quickly scanned files ... desks ... the floor ... finally it focused on the small computer system on one of the desks.

With little delay the intruders unplugged the computer and a printer, shuffled back to the broken window and lowered the equipment to an accomplice outside.

After making a final check around the office for any other valuables, the last thief slipped from the window back onto the pavement and all disappeared into darkness.

As Dell Johnson, the owner of Dell's Potatoes, arrived at work first thing Monday morning, he was hit with that sinking feeling in his stomach as he realized that it had happened again. This time two very valuable pieces of equipment were missing, his Billings BC-12FD computer and his printer.

Immediately upon learning of the loss, Dell's Potatoes had another Billings Computer installed.

Though he could have picked any other computer on the market to replace the missing system, he chose to buy another Billings.

According to the most recent reports the police have no leads, but Dell's Potatoes is up and running again with a brand new Billings Computer. cp

EDITOR'S NOTE: We at *COMPUTER PROGRESS* were outraged by the break-in at Dell's Potatoes and especially by the wanton destruction of private property, but the incident made us start to think.

Why did the thieves make a special trip back to the scene of the crime to snatch the Billings Computer and what would they do with the computer when they returned to their hideout? Was the computer still operating properly after being tossed around as much as it must have been in the cold weather and, most importantly, why did Mr. Johnson decide to buy another Billings Computer?

All of these questions spawned an idea for the next Billings Computer national advertising campaign.

If you have an interesting story about your Billings Computer System that you would like to share with our readers, or if you have information about the "hot" computer, please write or call our editorial offices:

COMPUTER PROGRESS
18600 E. 37th
Independence, MO 64057
(816) 373-0000

FROM THE PRESIDENT

It is indeed a pleasure in this historic issue of COMPUTER PROGRESS to report the public announcement of the new Billings Distributed Processing System. The development of this system has taken over four years at a cost of almost ten million dollars. The original concept for the system, on which a process patent is now pending, was the impetus which caused Billings Corporation to become involved in the computer industry back in 1977. It was our feeling that this new technology, when put to work in an actual system, would have a very major and important impact on the entire computer industry.

When the first system employing functionally structured distribution became operative during 1981, the test performance results in potential application of the system surpassed even our most optimistic expectations. The unique characteristic of our new functionally structured distribution system is the ability of the design to be expanded in any direction without modifications to application software and without limit. In conventional computer systems, it is possible to expand the hardware until reaching a capacity for a particular design. Then that hardware system becomes obsolete and it is necessary to invest in a more powerful computer to accommodate the increasing demands of a user. In a system employing functionally structured distribution, the system can continue to expand to unprecedented sizes and capacities (millions of terminals, millions of hard disk drives) without slowing down user access, without modifications to

application software or system software and without reinvestment in existing pieces of the system. Equally important, the cost of installing and operating is substantially less than cost associated with traditional technology.

The Billings Corporation has long been recognized as an innovator of advanced technology. We are pleased that Billings products have performed reliably in the marketplace and that the Corporation is known for its high-quality service and user support. With this exciting new technology, it is our intention to become a major factor in the expanding computer industry of the upcoming decade.

Upon the occasion of this historic announcement I would like to express my personal and sincere appreciation to the engineers, the programmers, the administrators, the assembly-line workers, the suppliers, the dealers and the many others that have contributed so much to bring us to this very important point of beginning. My sincere best wishes to all of the Billings team as you continue to change the way computers think.

Sincerely,



Roger E. Billings

INTERFACE

The Norwegian Connection

4

Of all the small computers sold in Norway during 1981, one out of four was made by Billings.

With a dedicated team of over 100 people throughout the nation, including subdealers and home office personnel, Oslo-based Viking Mikrosystemer A/S combined an innovative marketing program with a capable, reliable product to capture a 25 percent share of the micro computer market in Norway during 1981.

That 25 percent means in just two years, through the efforts of Viking, Billings has become the largest selling small business computer in Norway.

After joining the Billings team officially on January 1, 1980, Viking-Askim A/S formed its computer marketing division, Viking Mikrosystemer A/S and hired a capable staff of professionals to man the main office.

With an initial investment of \$500,000 for operations and \$500,000 in inventory, the momentum began to build as work started on the development of a Norwegian Accounting System.

By September of 1980, the Norwegian Bookkeeper software was released and 50 systems had been

sold. At year end, the sales team had sold a total of 70 systems and had broken into the black.

One of the reasons for their success during the first two years was primarily due to its national network of subdealers which interacts directly with users and potential customers.

After a carefully planned advertising campaign to attract subdealers, Viking had 94 bonafide leads including software houses, CPA's, and other professional offices and by the end of 1980, they had 22 active, productive subdealerships.

By this time, the main office in Oslo was fully staffed with seven employees working in management and clerical, as well as four each in sales, software and hardware. The main office offered a central repair service center where subdealers were trained in hardware repair and in the operation of the bookkeeper package.

Each of the subdealers was required to have an electrical engineer, applications programmer with experience, a business manager with sales experience and an ability to talk with customers, and a manager with business administration and management experience.

To stimulate name recognition

and to support the subdealer's marketing efforts, Viking also began a national ad campaign promoting the product amounting to over \$50,000 during 1980 and \$120,000 in 1981.

The increased exposure and local dealerships activity paid off. During 1981, the number of subdealers increased to 46 and sales began to increase proportionately.

With over 160 systems — 120 BC-12FD's and 40 BC-12DF2M's — sold in 1981, Viking recorded \$2,200,000 in net sales which produced a net profit of over \$200,000. They were able to pay back over \$400,000 to the mother company for the initial investment.

Users purchasing systems during the first two years of operation included a taxi service, a furniture store, a gas station, accountants, shoe stores, paint shops, and a glass supply house, among others.

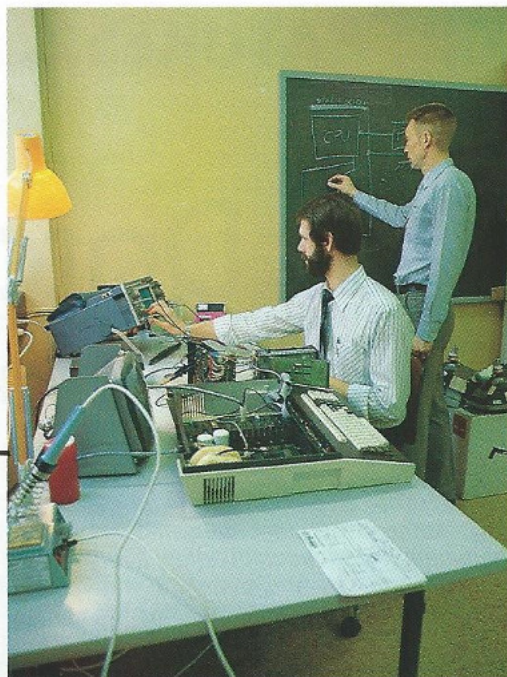
Viking was able to develop a special software program for the glass supply house to determine the cost of glass as well as other specialized programs for its users.

Projections for 1982 are just as rosey for the energetic dealership as it plans to remain the number one source for small business computers in Norway. cp

The Viking Team

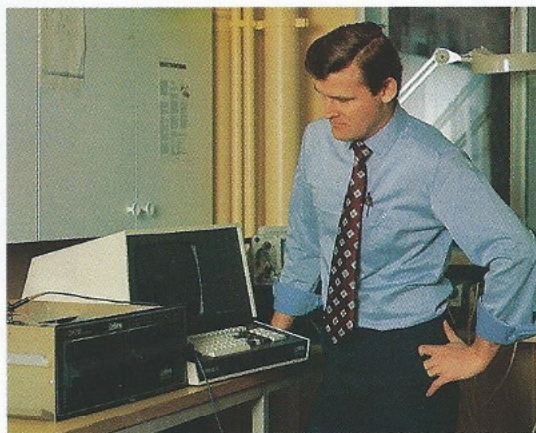


Roar Gruer — President

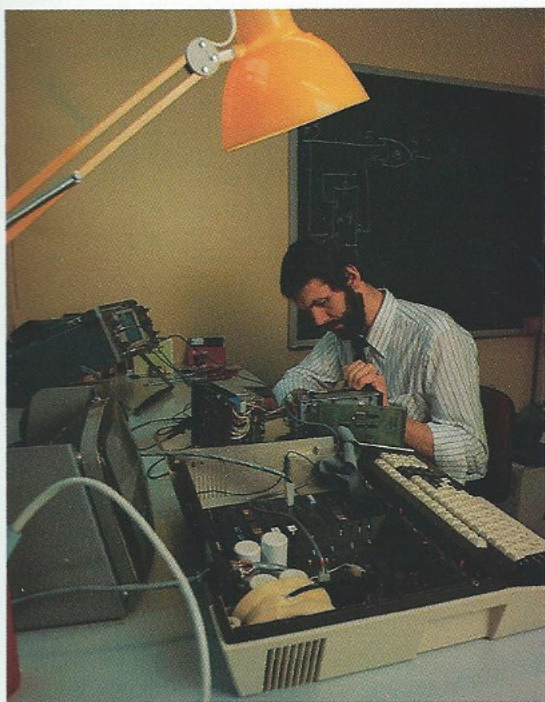


Olaf Berli — Engineer

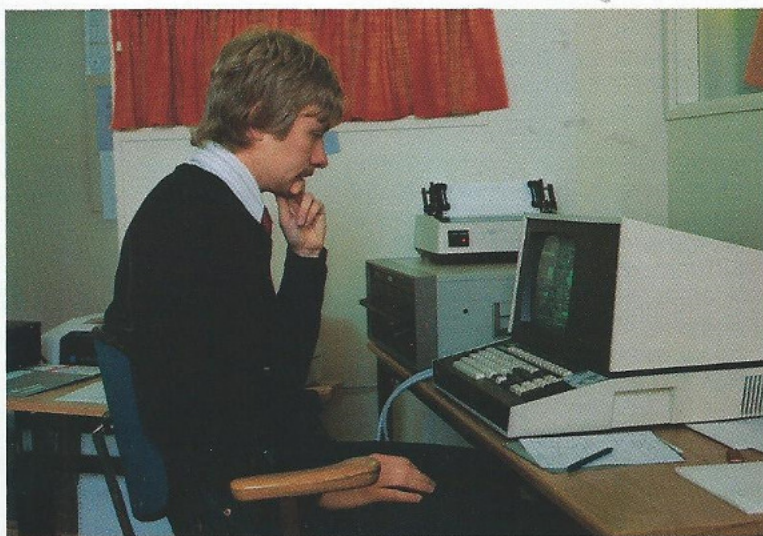
Helge Liseth — Chief Engineer



Birger Dramstad — Engineer



Olaf Berli — Engineer



Stein Caspersen — Programmer

CP FEATURES...

The DataTechs

Service is Our Business

6

As more sophisticated technology brings the cost of computer systems within reach of nearly every small business and even the individual, a new crisis is developing. Those purchasing a system are finding that without programmers, installers, and repairmen, their newly acquired computer is an expensive, useless nuisance.

This demand for qualified personnel in computer programming, repair, and sales is creating another growing problem in the industry. The supply of qualified computer technicians and software specialists has not kept pace with the ever growing demand, leaving a gap in the service department while driving salaries out of the reach of many computer companies.

Without the ability of capably supporting users' machines and software after the purchase is made, many computer companies are facing serious law suits and are quickly getting a bad name.

Billings Computer Corporation foresaw the upcoming crisis and prepared for it by designing a product that could be installed, programmed, and repaired by persons with little or no formal education in the computer field. It was found that from the intensive six-week training program, nearly all of the students who graduated could handle all of the basic repairs for both hardware and software problems.

As the students successfully complete the training course, they become Data Technologists (DataTechs) and are qualified to install the machine, help the user with programming questions, and service the system if something does go wrong.

Most experts thought it absurd to spend the extra time and money

to develop special Computamatic® software and easy to maintain hardware units. Besides, everyone knows it takes at least two years of training for a person to become even modestly competent as a computer programmer and another two years of electronics training to be able to repair a system.

Archimedes once made the statement that if he had the right tools (a lever and fulcrum) and a place to stand, he could move the world.

Billings plans to do some "world moving" in the computer marketplace with its DataTech Program. They have developed the right tools for the right job, thus making it much easier to teach relatively unskilled persons everything they need to know about the Billings system in a very short time.

An example of the DataTech's programming tools is Screen-ASIST. This user-friendly program allows the DataTech to create screens for special user application programs very easily. Because Screen-ASIST is written in a format that leads the user step-by-step through the program, even the most complicated COBOL programs can be modified without a complicated procedure or extensive computer background.

Because the computer hardware has a modular design, the DataTech learns basic trouble-shooting techniques to determine the source of the problem and then simply swaps out the faulty part.

When a user invests in a Billings system, he/she not only gets a professional, versatile machine, but also quick, efficient service at no cost if the machine is still under warranty and for a very low cost thereafter.

"In most cases, when a person first buys a computer," explained



Dr. Robert Ridge, Billings' assistant to the president, "there are a multitude of questions about the hardware as well as the software, even if he/she is an experienced computer user. We have trained each DataTech to help the user ease through that adjustment period."

"With many computer companies, a user might have a problem identifying the right person to ask about a problem," continued Dr. Ridge. "In the case of the DataTech Program, training, hardware support, and software support all come from the same person, which makes it much more convenient to get the assistance needed."

Though previous computer experience is no a prerequisite, the prospective DataTech must meet other very strict requirements before being allowed to enter the program.

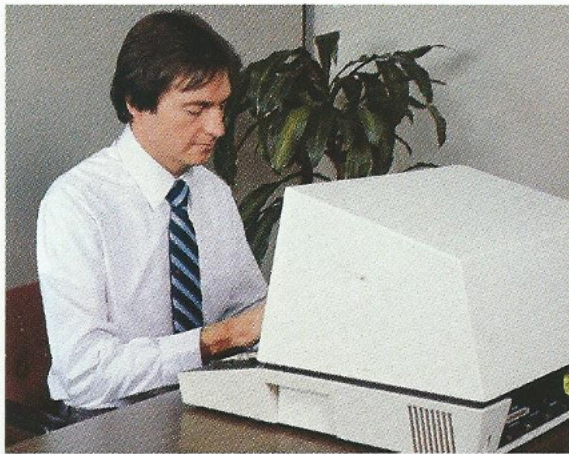
DataTechs must be dynamic, outgoing, self-confident and enjoy working with people. He or she also must have a professional, neat appearance and must be enthusiastic and energetic.

It is imperative that a DataTech be self-motivated, work well under pressure and be capable of making a good salary and willing to settle for nothing less, according to the application form.

When candidates are first screened, they are told that they will be required to attend the six-week training course without pay, but they can receive a paid-in-full scholar-



A team of professionally-trained DataTechs, a vital part of any Billings dealership, providing personalized service to the customer including consultation and training (left), hardware repair (above) and programming (right). Dealers can send DataTech candidates to a rigorous six-week training course at the Billings headquarters in Independence, Missouri.



ship if they qualify.

Commitment is the key word in becoming a DataTech — commitment to learning, working, and following instructions.

Using these criteria, the prospective students are carefully screened, especially those sent by Billings dealers and other DataTech Centers.

"We want to ensure," said Roger E. Billings, president of Billings Computer, "that the student and the dealer won't be wasting their time and money participating in the school. The course is rigorous and not everyone will make it through, therefore, it is our policy we only accept the most capable applicants with the best chance of completing the course successfully."

During the six weeks of intensive training before becoming a DataTech trainee, the students not only learn the mechanics of servicing machines and software, but also are

taught to determine if a person or company really needs a computer, and, finally, provide courteous service once the decision is made to invest in a system.

For six weeks the prospective DataTechs eat, drink, and sleep computers eight hours each day, five days a week, listening to lectures, taking tests, and gaining hands-on experience while actually doing some programming and repairing machines.

On Tuesday and Thursday evenings, special retention sessions also are required to test the students' knowledge of what they have learned.

"The progress of each student is closely monitored," said the Manager of the DataTech School, Robert L. Mitchell, "through testing experiences and personal observation. Before they can advance in the program, they must demonstrate com-

petency at each level of the class. If students can't meet the minimum requirements, they are scrubbed from the program."

After certifying through an extensive testing program in all aspects of marketing and servicing, the Billings Computer Systems, the student becomes a DataTech Trainee and is ready to learn the lessons only field experience can teach.

CASE IN POINT: Late on a Friday afternoon the phone rings in the DataTech Center. Mr. Grand has a problem with his payroll program. The person manning the phones transfers the call to the DataTech who is assigned to Mr. Grand.

After analyzing the symptoms over the phone and guiding Mr. Grand through a few simple tests, the DataTech realizes he will have to make a personal visit. He grabs his service kit and is in Mr. Grand's office in 20 minutes prepared for any eventuality.

While he double checks the disk drives to see if it is a hardware or software problem, he discovers that none of the diskettes will boot up.

He tests both disk drives with an oscilloscope and an alignment diskette. The azimuth is off on the "A" drive. Within just a few minutes, the DataTech swaps out the suspect drive with a reconditioned one and tests the program again — it works perfectly!

Mr. Grand is able to complete his payroll and it's business as usual. The downtime was kept to a minimum and the drive was covered under the Billings warranty program which means Mr. Grand pays nothing for the visit or repair.

With the first pilot DataTech Center now servicing the Greater Kansas City area, Billings plans to penetrate each major metropolitan market throughout the United States using the DataTech approach. Existing Billings dealers also are encouraged to enroll students in the DataTech school.

As each of the centers is initiated, potential DataTechs from that area will enter the DataTech School in Independence, Missouri for the six-week course.

"Our goal, as a company," concluded Mr. Billings, "is to provide competent, friendly service to everyone that invests in one of our systems. We believe that a DataTech network nationwide will help us to accomplish that goal." cp

NEW PRODUCTS

The Billings 6000 Series

8

After four and a half years and \$10 million, Billings Computer Corporation has released the 6000 Series Computers.

The 6000 Series is a melding together of futuristic design and state-of-the-art hardware technology and forms the foundation of the Billings Distributed Processing Network.

The modular design allows almost unlimited versatility with the ability to interface mini-floppies, eight-inch floppies, Winchesters, removable hard disks, modems, and other options. This versatility enables Billings to compete in the markets previously reserved for mini and mainframe computers. In addition the system can be expanded indefinitely by merely adding an unlimited number of Billings Computer Systems without sacrificing speed.

To give the user a wider range of capacity options, Billings provides three 6000 Series CPUs including the 6000 CPU-I which has one 360K-byte mini-floppy, and seven unused option slots; the 6000 CPU-II which has two mini-floppies with a total capacity of 720K-bytes; and the 6000 CPU which has no internal mini-floppies, but has eight empty option board slots allowing the unit to be connected to any of the 6000 Series mass storage modules.

For added convenience, all of the new System 6000 CPUs have a detachable keyboard and are designed to allow interchanging the CRT so that in the future the user may have the option of either color graphics or standard computer screen.

The new CRT screens are coated with a special no-glare finish.

Not only is the 6000 Series flexible, versatile, and very reasonably priced, its contemporary design and clean graphics will enhance any office setting. Another design consideration plus for the 6000 Series is its portability.

Though the 6000 Series is a step beyond the 500 CPU and standard BC-12 line of professional computers, it is completely interfaceable with the earlier systems and features the same high standard of reliability and support.

The electronics of the System 6000 consist of two major divisions — the System Controller and the I/O Controllers — both of which have been refined and upgraded over previous Billings systems.

The 6000 System Controller is the heart of the processing system. The processor is a Z80A-CPU operating with a 4 MHz clock. Throughput

is maximized since no WAIT states are generated. The standard 64K bytes of RAM is monitored by a parity checking circuit. In the unlikely event of a memory failure, a non-maskable interrupt will be generated by the parity detection circuit to prevent invalid and possibly destructive operations.

After a RESET or power-on condition, a 2K byte ROM is enabled which executes a complete memory test before loading the Billings Operating System. When BOS is loaded, the ROM is masked out of the memory space to allow more user RAM. By pressing the ENTER key during the memory test, the memory test will be halted and control will pass to the diagnostic monitor. Various I/O diagnostics may be performed at this level. For complete system testing, a test connector is provided. An external testing system or emulator may be attached to this connector. cp

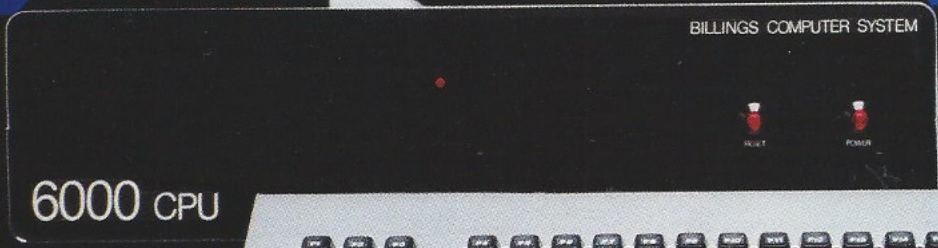
500 Series

The System 500 computer family consists of the 500 CPU, 500 CPU-I, and the 500 CPU-II and is in the middle range of the Billings line between the BC-12FD and 6000 Series.

A step above the BC-12FD, the 500 Series utilizes basically the same main logic board as the "FD" but has, in addition, an internal

power supply, more stylized packaging, detachable keyboard, and a new no-glare CRT.

The 500 CPU-I has one internal flexible disk drive, the 500 CPU-II has two drives and the 500 CPU has no internal drives and can easily be attached to the 6000 Series Floppy Disk unit.



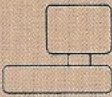

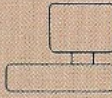





6000 CPU

8000 CPU




Hardware

6000 Series

10

		Main Memory	Option Slots	Mass Storage	Telecom Channels
	6000 CPU-I	64K-Bytes	9	360K-Bytes	—
	6000 CPU-II	64K-Bytes	5	720K-Bytes	—
	6000 CPU	64K-Bytes	9	0	—
	6000 Flexible Disk	—	—	21 MegaBytes	—
	6000 Tape	—	—	20 MegaBytes	—
	6000 Winchester-I	—	—	30 MegaBytes	—
	6000 Winchester-II	—	—	61 MegaBytes	—
	6000 Modem	—	—	—	16

500 Series

	500 CPU-I	56K-Bytes	0	315K-Bytes	—
	500 CPU-II	56K-Bytes	0	630K-Bytes	—
	500 CPU	56K-Bytes	0	—	—

Keyboards

		Number Keys	Function Keys	Numeric Pad
	6000 Keyboard	99	16	Yes
	500 Keyboard	94	16	Yes



The 6000 Series Option Boards

To allow greater flexibility in the 6000 CPUs, several empty option board slots are provided. By inserting the appropriate option board, the CPU can drive a wide variety of Billings peripherals including printers, plotters, the 6000 Modem, the 6000 Winchester-I and -II, the 6000 Floppy Disk, the 6000 Tape, and others.

The Video Board is used to provide the control signals for the video display unit and is a standard part of each of the 6000 CPU modules.

The Flexible Disk Controller Board is used for controlling either mini-floppies or eight-inch floppy disk drives. This is jumper selectable on the board so that the user has the option of using either type of drive with two FDCB's and have both sizes on the same CPU unit.

The Mass Storage Interface Board provides a parallel interface to connect the 6000 Tape Unit.

The Serial Peripheral Interface Board supports two RS 232-C channels suitable for driving serial printers, plotters and other peripheral devices.

The 6000 Modem Interface Board is used to connect the 6000 CPUs to the 6000 Modem with each controlling up to eight channels in the modem.

The Serial Communications Interface Board is a fully-implemented RS 232-C communications interface driver which can control four channels of either asynchronous, synchronous, or bit-oriented protocols such as SDLC and HDLC.

BC-12FD



Among the distinctive features of the BC-12 is automatic memory error detection which notifies the operator of any malfunction before data is lost. A full 64K bytes of memory is standard in every unit to allow for maximum power in handling complex tasks. The two disk drives which are integral to the unit use dual-sided, double-density recording to allow enough storage for serious business or scientific data processing.

To facilitate effective communication between the user and the computer, the keyboard includes a numeric pad, a cursor control section and 16 user-definable function keys in addition to the standard typewriter section for a total of 94 keys. The display screen is a full 24 rows of 80 columns with reverse video, dual intensity, and graphics capabilities.

12

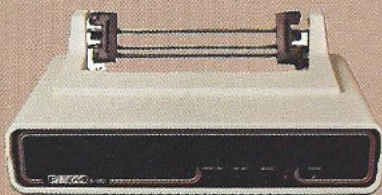
PRINTERS

P-110

The Billings P-110 is a low-cost printer providing many advanced features including a graphic capability.

The printing capabilities of the P-110 are remarkable for such a small printer. Not only can it print 80, 96 or 132 characters on an 8-inch line, but a special serif print mode changes the dot matrix to 7-high by 11-wide for correspondence printing. Also, dot addressable graphics capability is provided for plotting, printing screen graphics, drawing illustrations or producing identification marks. The horizontal resolution can easily be modified through selection of one of the four horizontal dot spacings, and double width printing also is included.

The printer speed of 100 characters per second is enhanced by automatically printing bidirectionally to eliminate unnecessary head movement. Forms may vary in width from 1 to 9.5 inches and may have two copies besides the original.



P-510

With speed of 180 characters per second, the P-510 printer features bidirectional printing which enhances throughput by reducing non-printing head motion and a maximum slew rate of 5 inches per second to minimize form feeding delays.

With the Billings P-510 printer, forms may vary in width from 3 to 15 inches, and a lever is provided to adjust for printing of forms up to six parts. The easy-to-change cartridge ribbon is rated for a life of 3 to 4 million characters.

The legibility quality of the P-510 is due to the 9-wire printhead which allows true lowercase descenders and simultaneous underlining.

All 96 ASCII characters are printed on a 9-high by 7-wide dot matrix and expandable print can be used to emphasize important text or headings.

Because of the quality of the printhead, the P-510 has proven to be one of the most durable in the industry with livetesting at over 650 million characters.

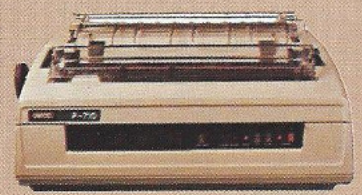


P-710

The Billings P-710 consolidates all logic electronics on a single board, incorporates a faster, more precise digital positioning system, and offers a higher efficiency, compact, one-piece universal power supply that its predecessor, the P-55.

The P-710 prints up to 55 characters per second using a print "thimble" which contains up to 128 fully-formed characters and features enhanced paper control system which uses a dual pressure roller assembly and a three-roller bail assembly which guides the paper firmly to the platen when the friction feed is engaged. This method ensures smooth, sure paper feeding, without skewing and also ensures excellent horizontal and vertical (line-to-line) registration of the printed text.

Some of the word processing enhancements include: half-line feed, negative half-line feed, automatic bold printing, shadow printing and underscore offset section.



Billings

Distributed Processing Network

DISTRIBUTED DATA PROCESSING USING FUNCTIONALLY STRUCTURED DISTRIBUTION

by Roger E. Billings
and Robert J. Ridge

Introduction to the Functionally Structured Distribution Concept

The Functionally Structured Distribution System (FSDS) is a concept which allows people to share information with others in a distributed data processing environment. This concept simplifies many of the traditional design dilemmas encountered in conventional approaches to distributed processing while providing unprecedented flexibility and system performance. This concept defines the elements which make up the system and the rules for connecting them to accomplish the desired result.

Trends in Technology Making the Concept Viable

Until recently, data processing equipment was very expensive and required trained technicians to operate it. As a result, only very large or wealthy organizations used this equipment. The computing machines required special electrical power and air conditioning, and special rooms were built to house the computer and its supporting equipment and personnel. The data processing needs of the organization were defined and given to the data processing department which had the assignment to write programs and produce reports which met those needs. This system of processing data often produced unsatisfactory results due to many factors, but among the most important were the often faulty

communication between the person who needed the information and the programmers and others who were required to obtain it, and the difficulty in getting the information correct and to the right person in a timely fashion.

Over the past several years the price of computing equipment has steadily gone down, and the capability of the equipment has increased. This made it possible to develop tools which made the equipment much easier to use. As the price of equipment continued to decline, it became practical to locate near to the user of the information terminals connected to the computer. This made it possible for the user to write programs and retrieve data conveniently at his/her own desk. This was a tremendous advancement in data processing and led to much greater use of computers for an ever broadening range of tasks by an ever expanding group of users. This new scheme, called "interactive processing," became the main thrust of the data processing industry in the 1970's. The traditional "batch" processing, the process of submitting a request and later receiving the result, was replaced with interactive computing. By entering a few simple commands, the user could have the data requested instantly displayed on the terminal or printed on the printer.

As the number of users began to increase, the capability of the computer to handle so many tasks began to degrade the response to the user. As more terminals were added, the time spent waiting for the computer to respond to a request became greater and greater until it became intolerable. Worse still, if the computer malfunctioned or broke down completely, the entire user community suffered accordingly. In

addition, the complexity of program operation in the computer increased significantly. Programs were written to try to service all the requests of all the users without affecting one another. The cost of developing new programs to generate new data became greater as it became necessary to spend extra effort to see that new programs, or modifications of old programs, did not affect other users.

This problem has received a great deal of attention, and ingenious programming has resulted in significant gains; but it is evident that the cost, complexity and unreliability of this approach to data processing are serious problems and that a new approach to the problem is necessary.

The development of powerful microprocessors now makes possible a totally new approach to Distributed Data Processing. Instead of many users sharing one computer, it now is practical to build a computer as a network of microcomputers. Since each user can have a personal computer, the complexity of supporting multiple users at once is removed. Now if a computer breaks, only one user is affected, and the cost of a small computer is economical enough that a whole computer can be swapped while the defective one is repaired. Thus the whole computing process becomes very reliable.

However, what if two or more users need to have access to the same information? It obviously is not very practical or desirable to have each person maintain information which needs to be shared with others. The solution is to connect all the users' computers together in a distributed processing network that allows them to share common data but without the complexity and response time difficulties that are characteristic of the multi-user computer system. Although the virtues of a microprocessor-

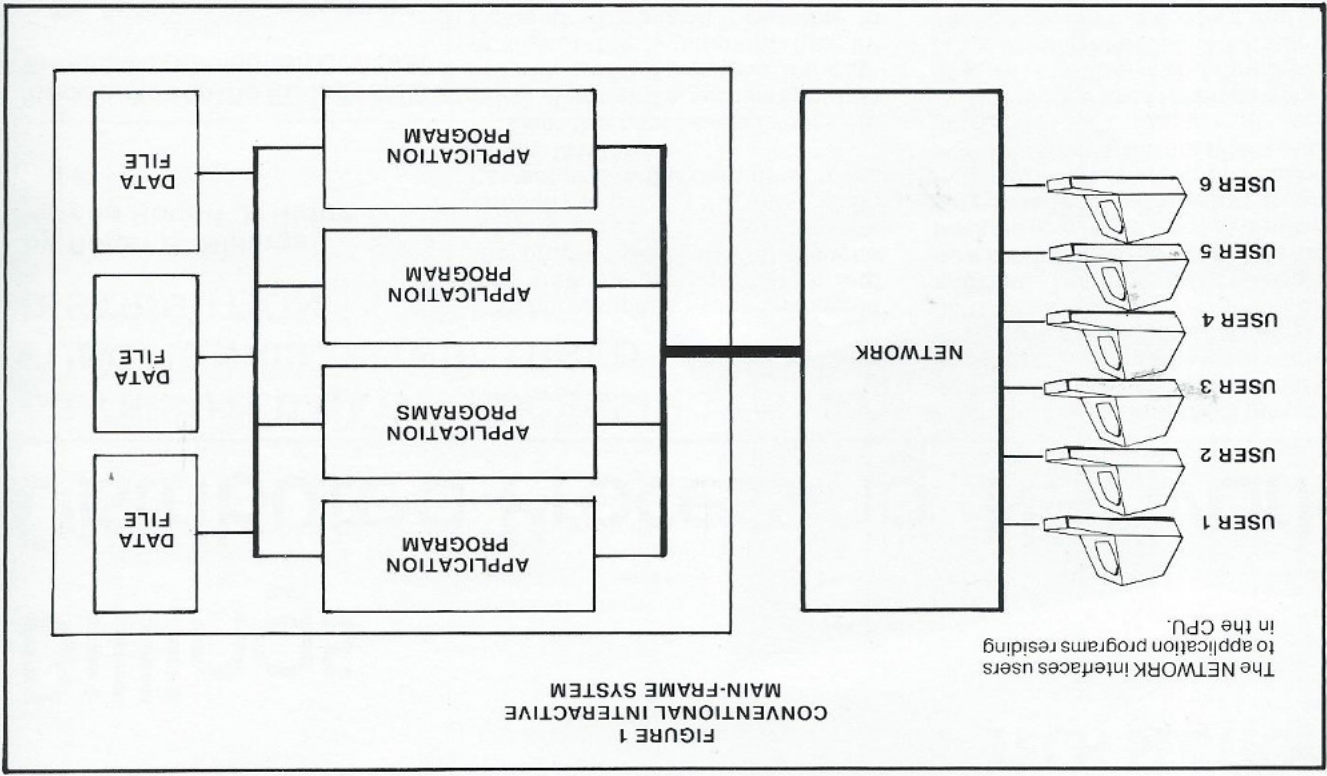


FIGURE 1
CONVENTIONAL INTERACTIVE
MAIN-FRAME SYSTEM

1. Each user is able to access the shared data over the network necessary to meet his/her needs. The network functions as an interconnected system where a request for information may be placed by any workstation, and the system locates and returns the information in the proper format.

A true Distributed Data Processing network should include the following capabilities:

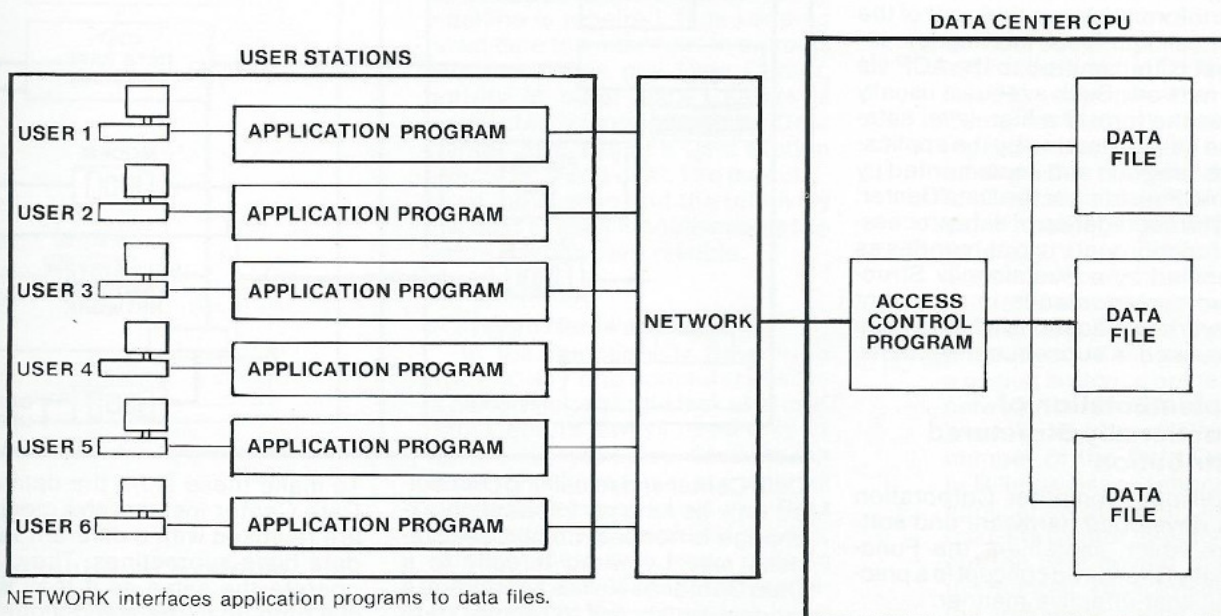
Overview of Implementation Goals

work of microcomputers. necessary to build a computer as a network. It is the "glue" necessary to make such systems readily usable. (1) Almost all of the components — the hardware and interface boxes — are available from various sources (but the "glue" is not included). In other words, building such systems will have to be a bootstrap operation for users. (2) The concept of FSD allows an unlimited number of users, each with his/her own computer, to share information in a simple, reliable, effective way. It is the "glue" necessary to build a computer as a network of microcomputers.

2. Each user has sufficient computer capability to process data to produce the necessary reports or other information needed.
3. The system provides a simple yet powerful design capable of structuring an implementation of any size or capacity. By its nature, the system enforces good design in applications software forcing the programmer to vigorously partition the problem.
4. The required amount of data transmission over the network in performing a specific data processing function should be minimal and substantially less than necessary for a multiprocessing computer system. At the same time, it must be possible for the system to be more "user friendly" providing more user prompting than in conventional methods.
5. The system is fault-tolerant in that the breakdown of any one component in the system does not result in the loss of effectiveness of the entire system. Preferably, no component should be so large or expensive that stocking of spares is impractical.

6. The system protects the security and privacy of information. Security should be implemented in a multi-level scheme so that different users are allowed access to only the information to which they are authorized.
7. Data integrity over the network must be maintained, but without a large portion of processor time dedicated to network overhead.
8. It is desirable to allow computer equipment from different manufacturers to connect together to form a network system. While hardware difficulties have been dealt with fairly effectively, software compatibility has been a serious problem requiring case-by-case program rewriting solutions. A good distributed processing system should provide a standard for information exchange between brands for both hardware and software.
9. The sharing of expensive computer peripheral equipment should be possible. High-speed printers, large disk storage systems, and high resolution graphics display and plotting equipment should be able to be re-

FIGURE 2
DISTRIBUTED DATA PROCESSING
WITH FUNCTIONAL DISTRIBUTION



15

resources shared by all users in a distributed system.

10. The cost per transaction processed should be less than with other systems when all costs are considered. Not only hardware costs, but software, maintenance, reliability system connection and transmission, and other operating costs should be included when comparing costs with conventional solutions.

The successful accomplishment of these goals at a remarkable reduction in cost and complexity of the entire system is a significant step forward for the data processing industry. The next section describes how the Billings Functionally Structured Distributed Data Processing System accomplishes these goals.

Description of the Billings Functionally Structured System

In an effort to facilitate the rigorous demands of a distributed data processing system, a Functionally Structured Distribution System has been developed. This system allows many computers (microcomputers) to be interconnected in a true distributed processing environment. The system requires that each system on the network be a completely independent and self-sustaining

computer system, and also requires that each computer be designated as belonging to one of two functional categories.

Any computer assigned to the first category is called a "User Station." The complete resource of computers assigned to this category is dedicated to fulfilling the data processing requirements of a single user. Typically, a User Station will process applications programs, provide interactive communication with the user, manipulate data and other information obtained from the network into formats desired by the user and output the information for use by the user. A user station also can store data files which are then available to that one user only.

The second functional category is that of a "Data Center." A Data Center is an independent computer system usually coupled with large mass storage devices such as hard disk drives. Data Centers continuously operate under control of a data Access Control Program (ACP). This program monitors communications channels for inquiries from user stations. When an inquiry is received, the Data Center retrieves or stores the information in the database according to the instructions of the User Station.

This system requires that the

following rules be followed regarding the interaction of Data Centers with User Stations:

1. Each User Station is an independent system capable of running its own programs.
2. Any User Station may contact any Data Center and exchange information if security restrictions are met.
3. No User Station ever contacts any other User Station directly.
4. Data Centers do not transfer information with other Data Centers.
5. Data Centers never initiate a contact with a User Station.

Figure 1 is a schematic block diagram of a mainframe computer system supporting six terminals or user stations via a network. In the example of Figure 1, four independent applications programs are operating, each with the capability of accessing data from any of three data files. Figure 2 is a block diagram of a Distributed Data Processing system with functional distribution. In this case, the application program is resident in each stand-alone User Station. The network is used to communicate between the application program and the ACP residing at the Data Center. A specific applications program operating at a User Station can interact with

the user in a very user-friendly manner without creating any burden for the network. When the application program has ascertained the specific information requirement of the user, a high-level information request is transmitted to the ACP via the network. Such a request usually takes the form of a high-level database call, generated by the applications program and implemented by the ACP residing at the Data Center.

The segregation of data processing functions into two categories as specified by a Functionally Structured system results in important network ramifications which will be discussed in subsequent sections.

Implementation of Functionally Structured Distribution

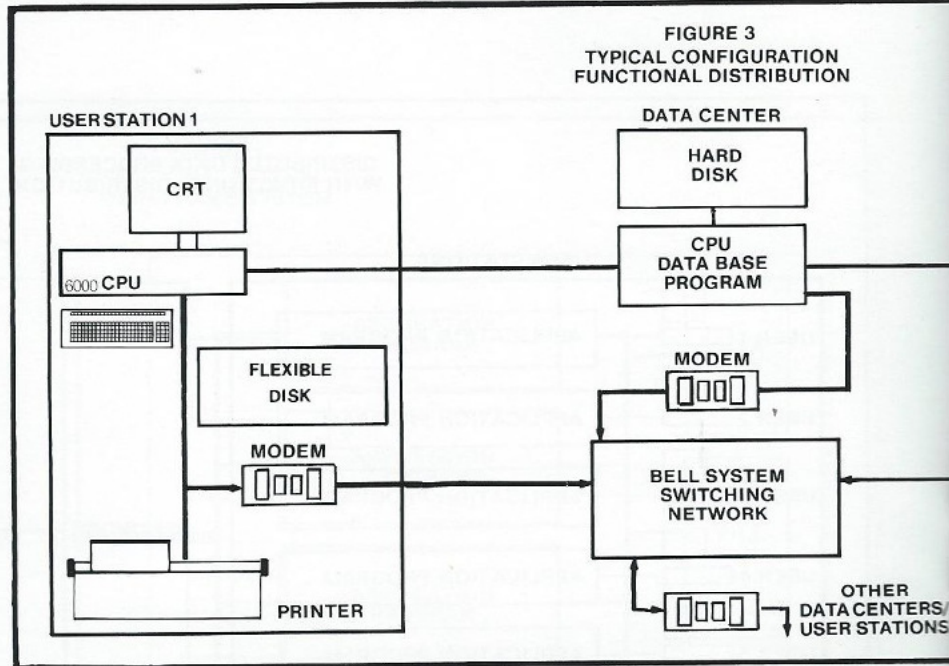
Billings Computer Corporation has developed hardware and software which implement the Functionally Structured concept in a practical, cost-effective manner.

User Stations

Billings familiar BC-12 series computers are ideal as User Stations. Each can function as a stand-alone computer system with a variety of software packages readily available. Each has two serial communication channels, either of which can be used to connect to a Data Center. Software has been developed which allows the BC-12 to connect directly to the Data Center with information transfer at rates up to 19,200 bits per second, or the BC-12 can connect through modems to a Data Center using the Direct Distance Dialing (DDD) network and transfer information at a rate of 2,400 bits per second. Currently, all User Station communication to Data Centers is done point-to-point. Other communications networks and protocols are completely compatible with the system and will be supported in the future.

Data Centers

The Billings Data Center is a new computer system that supports a variety of data storage devices such as hard disk, Winchester disk, streaming tape, and floppy disk. Multiple communication channels can be supported at one time. By connecting some of these channels to the DDD network through modems, many users can access data stored in the Data Center by calling the



Data Center and remaining connected only as long as information exchange is needed. Local User Stations may be wired directly to a Data Center as well as supporting a modem for access to remote Data Centers. Figure 3 represents a typical implementation of this type.

The Data Center Access Program (ACP) requires that User Stations sign-on before any information exchange can take place. Access can be read-only, write-only, or read-write. After sign-on validation is successfully completed, the User Station can make data requests in the form of calls to Billings Data Base Manager. The Billings Data Base Manager is a multi-level keyed method of storing and retrieving data with security at each level. Maximum record length is 1024 bytes. The program running at the User Station simply sends the appropriate data base request for storing, retrieving, or updating information to the Data Center where the ACP validates and processes it. Maintenance of the various data base files in the Data Center is performed by Query and the other data base utilities which usually are run at one of the User Stations. Thus, it is not necessary to take the Data Center off-line to perform these functions.

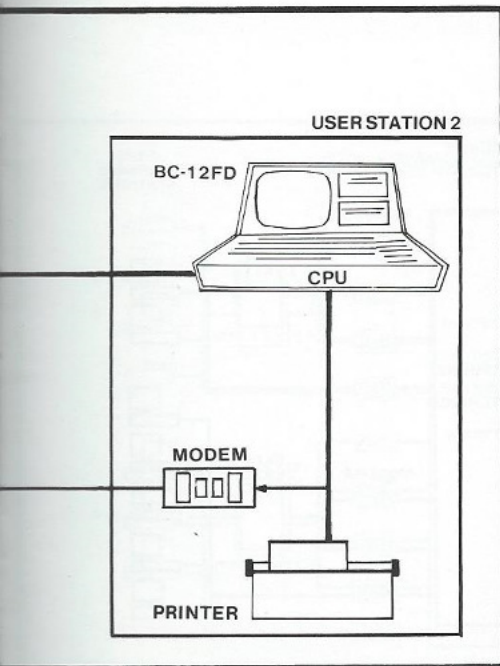
Application Programs and The Functionally Structured System

Billings has written many applications programs which have been run on the BC-12 series computers in a stand-alone environment. Many of these programs were written using the data base manager to handle data storage requirements.

To make these store the data at a Data Center instead, the modules are re-linked with a different set of data base subroutines. They then operate the same as if they were still running in the stand-alone environment except that information is retrieved and stored at the Data Center instead of at the User Station. Among the programs that are currently available are the Bookkeeper Accounting programs (payroll, accounts receivable, accounts payable, general ledger, and sales inventory), word processing, and electronic mail.

Special User Stations

The Functionally Structured System concept allows the addition of special User Stations to the system which can be used to perform special functions for all users. One example is the Printer User Station. This station is dedicated to watching for messages which are sent to the Data Center for printing. As soon as one is available, it retrieves the message and prints it on an attached printer. This makes it possible for several users to share a printer or other such device. Another example might be several users who need greater processing capability than is available in their User Station. They can send a message and data to a Data Center where an Arithmetic Processor User Station can pick up the message, perform the required calculations and return the result to the Data Center. The user then can obtain the result from the Data Center. This process is similar to remote batch job entry which has been used for such applications in the past.



Comparison to Conventional Systems

As a direct result of the design of the Functionally Structured System, a number of advantages over conventional distributed data processing systems are apparent.

Decreased Utilization Of Network Facilities

Because each User Station is a self-contained computer system, all user prompting, information displaying and data processing functions are done without requiring any network activity. Only as the program has need of information which is stored in the Data Center are the request and the response transmitted over the network. This greatly reduces the bandwidth requirements of the network compared to a system where all communication between user and computer must be transferred. In addition, if the Data Center should become unavailable due to malfunction or other cause, the user still can perform any other function which does not require information from the Data Center, such as word processing, program development or maintenance (editing, compiling, and even testing can be done in a stand-alone mode by the User Station), message preparation for Electronic Mail, etc. The store-and-forward nature of messaging with the Functionally Structured system makes it convenient to create the messages in advance and then send them when the Data Center is in operation again.

Since the cost of most Data Centers is minimal, in critical cases an entire spare set of equipment can be swapped in while the defective machine is repaired, thus keeping down-time to a minimum. In systems with more than one Data Center, activity at other Data Centers is unaffected by the loss of one Data Center. The loss of a User Station affects only one user. The modularity of the system and the relatively low cost of each module makes the entire system very reliable.

Simplification of System Hardware

In the Functionally Structured System, any one computer always is performing a single task at a time. Data Centers always need only to run the ACP task. User Stations run tasks for only one user at a time. All interface between users and Data Centers follow a simple set of rules; namely, users only issue calls to the Data Base Manager which responds with the requested information. There are no multi-user pitfalls to avoid, since no User Station need support more than one user. The Data Center, while servicing requests from more than one user, performs only one single task for all users, so no changes are needed to accommodate more users or more applications.

Applications programs can be written and tested in a stand-alone User Station using the local Data Base Manager. When ready, a simple replacement of the Data Base subroutines through re-linking is accomplished, and the application then can share data with other User Stations.

No modification to any program or Data Center is required to add new User Stations. The system basically is independent of network architecture. Any network capable of sending a message from one computer to another will work with this system. This includes the telephone DDD network, packet switching networks, local networks, etc. The choice of network will be dictated by speed, availability and other such considerations.

Security of Information

The Functionally Structured System incorporates many levels of data security:

1. To access information at the Data Center, it must be on-line to the network. Because

the Data Center performs no other processing, it can be turned off without affecting the ability of User Stations to perform needed functions that do not require access to the information at the Data Center. For example, the Data Center located in the accounting department may be turned off-line after business hours to eliminate midnight tampering or theft of information.

2. Before a User Station can access information at a Data Center, it must be connected to the Data Center through the network. If the network is a packet switched or the DDD network, the User Station must know the address or telephone number of the Data Center. In Billings User Stations, the application program can dial the Data Center directly without the user having to know the number. Thus, by keeping the address or phone number of the dial-up channels secret, only authorized users can reach the Data Center.
3. After a User Station is connected to the Data Center, the ACP requires a sign-on code and password. Again, the application program can supply these or the user can be required to enter this information. Access can be allowed for read-write, read-only, write-only, or denied entirely depending on the access granted by the Data Center Manager when entering the sign-on and password information for the Data Center. The Data Center Manager can enter or modify this information from any User Station if desired. However, this information can normally be changed only by a single User Station, known as the Data Center Manager's User Station. The Data Center Manager can modify these codes so that even the person who installed the Data Center cannot gain access.
4. Each level of the data base can have a security password assigned to it. Any request for access which does not have the correct password will be denied by the ACP. For example, information from the payroll data base can be organized such that name,

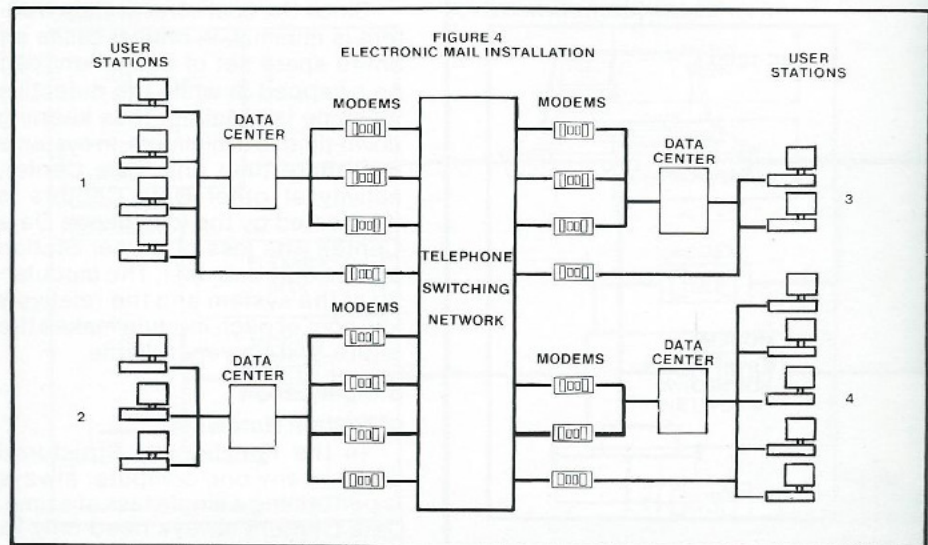
address, etc., are at level 2, while pay rates, withholding amounts, etc., are at level 3. Level 2 access can then be granted to all users, but level 3 access can be limited to those with the proper password in the personnel office.

5. Those Data Centers without public dial-up facilities can only be accessed by User Stations which are connected to the local network. Thus, access to information in the Data Center requires access to one of these User Stations. Information is secure as long as the network is contained within a physically secure area.
6. Any additional security which is part of the operating system or network architecture, such as sign-on procedures, data encryption, etc., are added levels of security which are available if needed.
7. Because no user-written program can be executed in the Data Center, no circumvention of the security system is possible. It is impossible, for example, to ask for a file-dump of any of the system password files. Only legitimate data base calls are allowed.

18

Suppose someone wanted to gain unauthorized access to data at a Data Center in the Functionally Structured System. First, access must be gained to a User Station which can be connected to the Data Center. In this example, assume the Data Center has a public dial-up channel. The phone number still must be found for the Data Center. Even users who are authorized to access the information may not know the phone number, since the program can automatically dial the number without the user's knowledge. Next, he/she must find an access code and password that the ACP program will accept. Then the name of the data base, the structure of the data base, and the proper passwords for each level of information in the data base must be known. If the information is encrypted in the network, as is the case with Billings implementation, he/she also must decipher the encryption. After all these tasks have been completed, then can access to the information be gained.

Perhaps the unauthorized user can succeed in stealing a disk or a diskette which already is pro-



grammed to access the information. The thief still must figure out the account and password to be able to run any programs on the User Station, then he/she must know the sign-on code and password for ACP validation.

In those cases where the Data Center is turned off-line after normal business hours, the information becomes unavailable to anyone. Physical security of the Data Center and User Stations can further protect extremely sensitive information.

Examples of Implementation

Perhaps the unique capabilities of the Functionally Structured System can best be understood by looking at a few examples.

Electronic Mail

Electronic mail is a system which essentially operates similarly to the postal system, but without the paper. Messages are prepared using a word processor or similar means, and these then are sent to the recipients. The sender must address the message and pay for the postage in most cases. The recipient must look in the mailbox occasionally to see if there is any mail. A reply by return mail can be made if desired. Other features, such as registered mail, also should be included.

Billings has implemented electronic mail using the Functionally Structured System. See Figure 4. A program is run at the User Station which assists in creating messages

using the Word Processor or other editor. When the message is ready, the user then enters the name (patron name) and address (telephone number of the Data Center) and presses a button to send the message. The program automatically dials the Data Center, sends the sign-on command, and then sends the message. The Data Center files the message in the appropriate mailbox for the addressee.

Later, the addressee calls the Data Center where his/her mailbox is kept, and selects the option to see if there is any mail. If there is, a request can be made that it be transmitted to his/her own User Station for printing or other processing.

While not a requirement, it is assumed that most patrons will be located within a local phone call to their Data Center. Each patron receives all mail at his/her local Data Center. It is the responsibility of the sending user to see that the message is sent to the appropriate Data Center. The sending user also pays for any long distance call (the postage.)

It sometimes is desirable to set up a conference of several patrons and to send one message to them all. This is accomplished by keeping a list of all members of the conference at one of the Data Centers. This list will usually be kept at the Data Center closest to the greatest number of members. The sender then will specify the conference address to receive the message, the program automatically obtains the list of members' addresses and sends the message to each one at his/her Data Center. Billings electronic mail

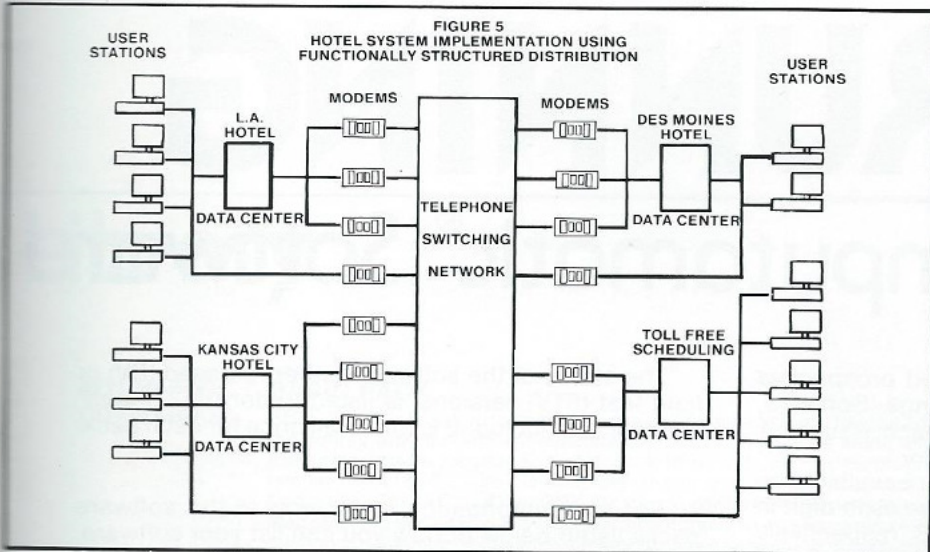


FIGURE 5
HOTEL SYSTEM IMPLEMENTATION USING
FUNCTIONALLY STRUCTURED DISTRIBUTION

requires that only one copy of the message be sent to any given Data Center, regardless of how many members of the conference may happen to have mailboxes at that Data Center.

Other features allow the user to obtain the status of a message (whether it has been received by the addressee), list messages which the user has received recently, etc.

Notice that this "store and hold" system uses the normal Data Center and ACP. The electronic mail Data Center also can be used to store data for other applications. The receiver need not be on-line before the sender can send a message. The timely receipt of the message depends only on how often the receiver checks his/her mailbox. No complicated system for routing messages from one computer to another is required. This system works equally well using the telephone DDD network, public packet-switching networks, or even the TWX/TELEX network, although the latter is rather slow by modern standards. The only requirement is that both the sender and the receiver be able to access the same Data Center.

World Wide Hotel Scheduling and Accounting

Very large hotel chains would like to be able to accept and confirm reservations for any hotel in the chain at any other hotel or at a regional reservations center. In the past, massive computing facilities have been required to handle the large number of users and the large information storage requirements

of such systems. The cost of lost business and customer dissatisfaction in the event of computer malfunction has necessitated the installation of sophisticated backup procedures. The programming effort to support such a system has required large programmer staffs with typically two- to three-year project schedules.

With the Functionally Structured System concept, the problem becomes a simple one. Each hotel maintains a Data Center at the hotel with information on all facilities available at the hotel and the scheduling of each room, dining facility, etc. One or more User Stations also are located at each hotel.

A program which makes reservations is written and distributed to all hotels and reservation centers, along with the address (telephone number or other network address) of the Data Center at each hotel. When an inquiry is made as to accommodations at any particular hotel, the program connects to that hotel's Data Center. All the latest information is immediately at hand, and the reservation can be confirmed. It is important to note that the activity at any one hotel is minimal when compared with the entire chain. Thus, only a few User Stations will need to be simultaneously connected to any one hotel Data Center. Notice also that because most reservations originate locally to each hotel, low-cost communication lines from one hotel to the others are sufficient.

Local accounting information for each hotel can be kept on the same Data Center as the scheduling information. This information is ac-

cessed most often from a User Station in the hotel, but can be accessed by the corporate accounting office if desired. System-wide accounting reports can be prepared at the corporate headquarters as needed. A block diagram for such a system is represented in Figure 5.

Conclusions

The Functionally Structured System concept is a new approach to distributed data processing which eliminates many of the difficulties of traditional approaches while maintaining or improving desirable capabilities.

The secret of the system is that each user has a User Station which is dedicated to serving his/her needs only. No multi-user applications are required. Information needed by more than one user is stored at Data Centers and can be accessed by anyone having proper authority.

The concept can be implemented on many different kinds of computer equipment. A large main-frame computer can be either a Data Center or a User Station. As a Data Center, it would honor requests for information in the form of calls to its data base management system. As a User Station, it would execute programs and request information from a Data Center. Many small computer systems could be programmed to be User Stations, and some could even run the ACP and be Data Centers. Any network capable of transporting messages from one computer to another can be used.

Advantages of this method include reduced traffic on the network, greater isolation of each user from other users with attendant improvement in data security, reduced software complexity and cost, greater expansion capability without degradation of performance, and less vulnerability to disruption caused by equipment malfunction. CP

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- (2) Dale Kutnick, "Distributed Processing and the Automated Office," *Intel Com '79 Exposition Proceedings*, (Horizon House International, 1979).

UP & RUNNING

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20	PART NO.	DESCRIPTION	STATUS	PRICE
	00100-500A 00100-800A	TRAINING AND SUPPORT PACK The Billings Training and Support Pack provides the beginning computer user with the necessary background and confidence to use any of the Billings BC-12 line of professional computers. This pack also includes a duplicator diskette for backing up existing programs and a BC-12 Operator's Manual which gives more in-depth information concerning the care and use of the computer system as well as set-up instructions, system specifications and a glossary of computer terms.	RV	\$195.00
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	00110-500C 00110-800C	BILLINGS OPERATING SYSTEM PACK The Billings Operating System (BOS) is a powerful tool designed to simplify program development and execution. While it was specifically programmed for Z80-based micro-computers, it was designed for both experienced and beginning computer users and has many features traditionally found on mini and mainframe systems. The most powerful feature of the BOS Pack is the ability to create stored sequences of commands and programs, including user-written programs, through the EXEC capability. The BOS Pack also includes a complete reference manual which supplements the Pack's built-in "help" function.	RV	495.00
	00111-500A 00111-800A	DIAGNOSTICS PACK The Billings Diagnostic Pack provides the capability to track down hardware problems in a Billings system. Besides the Diagnostic Diskette, an alignment diskette and instruction manual are included. Use of this pack requires specialized training and is normally used by a certified DataTechnologist.	RV	495.00
	00120-500A 00120-800A	MACRO ASSEMBLER PACK The Billings MACRO Assembler Pack provides a symbolic assembly program for the Z-80 CPU. It is a two-pass assembler designed to run under the Billings Operating System. It allows complete flexibility in the selection of standard input and output device options. It may be used to generate either absolute or relocatable object code from the source program file. The type of object file produced is controlled by the occurrence of certain directives in the source file. Both type of object programs must be processed by the LINK edition before they can be executed as programs. Included in the MACRO Assembler Pack is a diskette and instruction manual.	RV	395.00
	00130-500A 00130-800A	FORTRAN PACK Billings FORTRAN is a full implementation of the X3.9 1966 ANSI standard except for the COMPLEX data type. One of the most significant enhancements is the addition of overlay capability through the BLINK linkage editor. This allows the execution of much larger programs than would otherwise be possible. Console and printer interfacing is greatly simplified and enhanced by the addition of Billings Screen- and Print-ASIST support. Other enhancements include the use of byte variables as integer quantities and in DO loops, mixed mode arithmetic, hexadecimal constants, literals and Holleriths allowed in expressions, logical operations on integer data, end-of-file and error-condition branching in READ and WRITE statements, ENCODE and DECODE for format operations in memory and PEEK, POKE, INP, OUT or memory and port transfer of data. Included in the FORTRAN Pack is a diskette and instruction manual.	RV	495.00
	00140-500A 00140-800A	COBOL PACK Billings COBOL is a full implementation of the X3.23 1974 ANSI Standard level 1 features as well as the most useful level 2 options. In addition, several unique Billings enhancements have been added including the addition of overlay capability through the BLINK linkage editor. This allows the execution of much longer programs than would otherwise be possible. Console and printer interfacing is simplified and enhanced with the support of Billings Screen- and Print-ASIST. Some of the level 2 options implemented include STRING, UNSTRING, PERFORM, COMPUTE AND SEARCH verbs along with convenient condition-names, compound conditions, abbreviated conditions and Comp-3 data format. Also included in the Pack is a complete instruction manual describing compiler usage and reference for the COBOL language as well as enhancements.	RV	695.00

Library

00150-500C	BASIC PACK	RV	395.00
00150-800C	BBASIC is an interpreter/compiler language. This means that it has the advantages of an interpreter (ability to make changes to the source program and immediately re-execute, immediate mode, etc.) along with the advantages of a compiler (faster execution, smaller program size on disk and in memory, and source program protection). EBASIC, a less sophisticated but very fast version of BASIC, also is available. The Billings BBASIC supports three types of files: Sequential, Direct, and Indexed Sequential. The "AT" and the "CRT" functions provide BBASIC with complete cursor control along with other screen functions. Also chaining and linking allow very large programs to be segmented for execution in a system with a relatively small amount memory. In addition, it has an excellent group of debugging commands (TRACE, TRACE VARS, BREAK, and STEP).		
00160-500A	SCREEN-ASIST PACK	RV	395.00
00160-800A	Screen-ASIST is a tool which greatly enhances the communications capabilities between the operator and the program while at the same time significantly reducing the programmer's time and effort required to design and implement operator interaction. Instead of coding prompting messages and outputting them to the display screen, then looking for and interpreting an operator's response, Screen-ASIST frees the programmer entirely of prompt message and response formatting and allows all screen oriented input and output to be done through simple subroutine calls.		
00161-500A	PRINTER-ASIST PACK	RV	395.00
00161-800A	Printer-ASIST is a tool which greatly simplifies the output of information from a program to a printer. The programmer defines the form(s) used in printing on the display screen using the Print-ASIST editor. Any areas used for program-generated data are defined as either fixed or variable length fields and assigned an identification number. The programmer then simply specifies what is to be printed in each field, and then requests the form to be printed. It also includes interface modules for EBASIC, COBOL, FORTRAN and assembly language. A complete manual describes the philosophy and implementation of ASIST and also gives examples.		
00190-500A	COMPUTAMATIC® TERMINAL PACK	RV	245.00
00190-800A	The Computamatic® Terminal Pack allows your Billings Computer to be a smart ASCII terminal. In addition, the program has been designed so that user written exit routines can be added into the program to allow the program to do special screen control, to translate received data, or to transmit data. Received data can be saved directly to disk or stored in memory and then saved to the disk if desired. Transmitted data can be sent from the keyboard or from a disk file. These capabilities are selected by pressing the function keys. Besides the Computamatic® Terminal diskette, the Pack also includes an instruction manual.		
00191-500A	WESTLAW PACK	RV	195.00
00191-800A	The Billings Westlaw Pack allows authorized users to tie into West Publishing Company's law research library. Though Billings is not a Westlaw agent, the Pack is designed to help the user, who has subscribed to the Westlaw service, to easily and quickly interface the Billings Computer with the enormous resources of the Westlaw Library. The Pack includes a Westlaw Diskette and a Westlaw Demonstration Diskette as well as an instruction manual.		
00170-500A	DATABASE MANAGER PACK	FTV	995.00
00170-800A	The Billings Database Manager (BDM) is a relational data base system that operates within a B-Tree and inverted key architecture. A full contingent of access methods is available — read random, update, re-write, delete, read sequential, and add. In addition, some other functions have been incorporated, such as read prior (backwards), verify record existence, twin (duplicate) existence at the lowest level of the tree, ability to access by first/last name, horizontal sequential access (read sequentially forward or backward by level), and EOF-BOF file wrap. The Pack also includes a complete instruction manual.		
00310-500A	WORD/FORMS PROCESSOR PACK	RV	495.00
00310-800A	Billings Word and Forms Processor programs are complete screen oriented text processors with many powerful features which are very "user friendly." Both diskettes have features which are not found on even much larger, more expensive programs. With 16 function keys and 16 escape-function keys, copy can easily be manipulated to the user's exact requirements including bold face, automatic centering, justification, automatic page numbering, subscripting and superscripting, character alignment, underlining, search, and many other features. Forms processing also includes the ability to create variable fields for personalized information. The Pack includes six diskettes and an instruction manual.		
00320-500A	LETTER PROCESSOR PACK	RV	195.00
00320-800A	The Billings Letter Processor Pack allows a user to compile mailing lists and personalize letters using 10 variable fields and 10 selection codes for each name entered. The letter processor diskette also is set up to print cheshire labels and a name list. It utilizes many of the same text editing functions found in the Billings Word/Forms Processor Pack.		
00330-500A	DOCUMENT COMMUNICATOR PACK	RV	195.00
00330-800A	The Document Communicator Pack enables Word/Forms Processor documents to be sent between two computer systems over regular telephone lines at a rate of about 4- to 5-pages-per minute using a Billings C-2000 Communications Modem. By following simple step-by-step instructions, this version of electronic mail allows complete manuscripts to be sent to a remote terminal, changes can be made and the document can be returned in a matter of minutes. The Document Communicator Pack comes with a diskette and an instruction manual.		
00410-500B	LEGAL ACCOUNTING PACK	RV	495.00
00410-800B	Billings Legal Accounting Pack plays a fundamental role in managing fees, cash receipts and disbursements, and statements. When combined with the Billings Bookkeeper Payroll and General Ledger, the Legal Accounting Pack provides a comprehensive account package customized for each law office. The Pack comes with self-teaching computerized training as well as manuals for both Fees Manager and Check Manager.		

00501-500A	DEALER ACCOUNTING SUPPORT DISKETTE	RV	25.00
00501-800A	The Dealer Accounting Support Diskette allows a dealer to personalize accounting programs for customers' software using the Billings Screen-ASIST and Print-ASIST. This means a program can be adapted to the users forms and accounting format very quickly. It comes with one diskette and an instruction manual.		
00511-500B	BOOKKEEPER ACCOUNTS RECEIVABLE PACK	RV	595.00
00511-800A	The Bookkeeper Accounts Receivable Pack is one module in the Bookkeeper Series which combines to make a complete accounting system. The Accounts Receivable system manages sales and customer information, and printed reports, and can be used with the Retail Inventory Management to automatically deduct purchased parts from inventory. The Pack includes Accounts Receivable, Accounts Receivable Data diskettes, and an instruction manual.		
00521-500B	BOOKKEEPER ACCOUNTS PAYABLE PACK	RV	595.00
00521-800A	The Bookkeeper Accounts Payable Pack is part of the Bookkeeper Series and allows a user to easily and quickly record and recall important payable information. There are four main areas of information which are managed by Accounts Payable: master vendor information, invoice information, check printing, and printed reports. The Pack includes Accounts Payable and Accounts Payable Data diskettes as well as an instruction manual.		
00531-500B	BOOKKEEPER GENERAL LEDGER PACK	RV	595.00
00531-800A	The Bookkeeper General Ledger Pack, part of the Bookkeeper Accounting Series, is a package designed to accomplish three main tasks: maintenance of general ledger accounts and balances, entering of general journal entries, and preparation of financial reports. Throughout the system, a complete audit trail is maintained to preserve the integrity of the records. Included in the Pack are the General Ledger and General Ledger Data diskettes as well as an instruction manual.		
00541-500B	BOOKKEEPER PAYROLL PACK	RV	595.00
00541-800A	The Bookkeeper Payroll Pack is part of the Bookkeeper Series and has been designed to maintain employee information, calculate and print payroll checks, and print payroll reports. Included in the Pack are the Payroll and Payroll Data diskettes as well as an instruction manual.		
00512-500A	RETAIL INVENTORY MANAGEMENT PACK	FTV	450.00
00512-800A	The Retail Inventory Management Pack is a group of programs which interface directly to the Accounts Receivable Pack in the Bookkeeper Series. It allows the user to keep track of stock, double check shipping reports, input sales, enter and find serial-numbered and non-serial-numbered items, keep track of the value of stock items, and indicate when to reorder items when the stock drops below pre-set level. Items sold are automatically deducted from inventory and an invoice is printed. Besides the Retail Inventory Management and Retail Inventory Management Data diskettes, the Pack also contains an instruction manual.		

22

LET CP LIST YOUR SOFTWARE

COMPUTER PROGRESS would like its subscribers to know about your software. If you have a software package you have developed which is up and running on a Billings computer and you would like to offer it to other Billings users, please write for an application form.

Software will be listed as either a field test or released version. In order to qualify for released status, it must be field tested for at least three months by three different users.

Write for your application and verification forms today!

COMPUTER PROGRESS
UP & RUNNING DEPT.
18600 E. 37th
Independence, MO 64057
(816) 373-0000

USER Software

EDITOR'S NOTE: In addition to the Billings Software Library, *COMPUTER PROGRESS* also lists the software available from Billings Computer users and dealers. The status is listed as either released version (RV) or field test version (FTV). Billings neither claims responsibility for nor endorses the software listed below. The vendor of the software has accepted total liability and

responsibility for supporting any software he/she sells. If a software pack is listed as "released version," the vendor has certified that it has been field tested by at least three people for more than three months on a Billings Computer. If you would like to list your software in *COMPUTER PROGRESS*, please write to: *COMPUTER PROGRESS*, 18600 E. 37th, Independence, MO 64057.

Source	Title and Application	Status	Version	Price	23	
Brett Schachat Assoc. Sydney F. Brett P.O. Box 9304 Johannesburg 2000 Repub. of South Africa Ph. (011) 396787	INTERACTIVE ABSTRACTING & BILL PRODUCTION SYSTEM	RV	2.0	US\$5335		
	The Program provides assistance to quantity surveyors or cost engineers in working up measurements for construction projects into document form suitable for tendering or negotiation. It uses a unique method of rough sorting and measurements into trade or work categories. The final document is created under word processing principles with specialized functions. Specifications, preambles, etc. are created under the SCRIPT processor.					
	Valuations and Escalation Calculations System	RV	1.2	US\$2365		
	This program is designed to assist the quantity surveyor or cost engineer in the valuing of construction works for interim and final payments. The system is based on the philosophy of valuing elements or activities which the computer then sorts into trade and work group categories. The system also calculates escalations due on an indexed-based escalation formula.					
	Scheduled Measurement	FTV	1.0	US\$8250		
	This system facilitates the measurement of quantities for construction projects from schedules eg. steel reinforcement, column bases, structural steel, internal finishes, door and windows, etc.. All Brett Schachat Assoc. software is written in BBASIC.					
Micro Data Base Syst. John Morris P.O. Box 248 Lafayette, IN 47902 (317) 448-1616	MDBS. I AND MDBS. III	RV	1.06, 3.0	\$900+		
	MDBS is a tool for developing software applications. It includes a true Data Base Manager System, an English-like Query Language, and a recovery system. The Data Representation not only encompasses CODASYL and relational approaches, it also supports state-of-the-art structuring features. MDBS is written in Assembly language and is independent of the language to which it interfaces.					
Fairfield Data Systems Marty Yaeger 22 Steven Drive Hewlett, NY 11557 (516) 791-5688	AIR CONDITIONING HEAT LOAD CALCULATOR	FTV	LOAD 1	\$300		
	This program is written for air conditioning contractors. The programs prompt the user to supply data and prints out the total load in tons of air conditioning as well as a complete sensible and latent load for each factor. It is written in E-BASIC.					
Kimbrow Data, Inc. D. Brian Kimmel P.O. Box 373 Ebensburg, PA 15931 (814) 472-6597	REL FILE LIST	FTV	1.0	\$75		
	Takes a REL File Output from BMAC, COBOL, or FORTRAN and lists the contents on that file. REL File List is written in Assembly language.					
	COGO	FTV	1.0	\$250		
	COGO is an engineering/surveying coordinate geometry program. It performs a comprehensive variety of calculations for geometric layout including area, intersections and curve design. It has 15-digit accuracy throughout and 1000-point storage. COGO is written in Fortran.					
	Z-80 DISASSEMBLER	FTV	1.2	\$150		
	The Z-80 Disassembler takes a COMMAND FILE and lists, prints and creates a disk assembly file in assembly language. It also can be modified and reassembled. Z-80 Disassembler is written in Assembly language.					
AIM, Inc. Joe. E. Clayton P.O. Box 4334 Boise, ID 83704 (208) 375-7124	INVESTMENT ANALYSIS SYSTEM	FTV	2.1	\$495		
	The Investment Analysis System provides a powerful interactive tool for evaluating and comparing real estate investment opportunities. Based on the (208) Internal Rate of Return (IRR/FMRR) concept, the System relates investor position, property characteristics, and time sensitive cash flow parameters to after-tax investment yield. The Investment Analysis System is written in BBASIC.					

BYTES & PIECES

TECH BULLETINS

24

EDITOR'S NOTE: As a service to its dealers and customers, Billings will be offering a list of recent technical bulletins and software releases in Bytes and Pieces each issue. In addition, an index of all of the technical bulletins and software releases year-to-date also will be provided. If you wish to order copies of previous bulletins or releases, please note the number (indicate TB, technical bulletin or SR, software release before the number) and title and return it to *Computer Progress*, 18600 E. 37th, Independence, MO 64057.

Using the Dealer Network TB81011A

The Billings Dealer Network is an invaluable tool which allows dealers to send or receive messages and to obtain software updates and other information.

To use the Dealer Network, it is necessary to have a C-1200 Communications Modem connected in the usual manner. (See attached description on Document Communicator for details on modem arrangement.) You also must have a Dealer Communicator Diskette (available for \$25.00 as part number 115-X11A, X=5 or 8 depending on diskette size). Simply boot-up the Dealer Communicator diskette and follow the instructions given.

To connect to the network, call (816) 373-0000 and ask the operator for the network computer. (After hours call (816) 373-0064.) You will hear a high-pitched tone for a few seconds, followed by a lower-pitched tone. When you hear the lower tone, move the Voice/Data switch to the Data position and hang up the telephone. In a couple of seconds the RTS, CTS, DSR, DTR, and CXR lights on the modem will go on, indicating you are ready to transfer data.

An ASIST screen is displayed showing the various options. Before transferring any information, however, it is necessary to "log on" to the network. This is done by entering the dealer number and password and then pressing F5. After a short pause, the cursor will move to the File-name field and the message count will

indicate the number of messages waiting. To receive the messages, push F4. To send or receive a file, enter the name of the file and the drive (S or A) you want the file to be written on and push F2 or F3. To quit, push F16. Don't forget to put the Voice/Data switch back to the Voice position after terminating the program.

It is recommended that messages be printed using the "LIST" program for filing and future reference.

There is one file which you will usually want to receive and examine each time you access the network. The name of the file is "BILLBOARD.FILE." It contains information for dealers on other files and information which is available over the network. It is recommended that dealers check this "billboard" at least weekly to be sure they keep up-to-date.

To send a message to Billings, create a file (using EDIT or BEDIT) with the name "BCCINDEP.MSG" and send it. You may send more than one by naming them "BCCINDEP.MSG1," "BCCINDEP.MSG2," etc. Don't forget to identify yourself in your messages.

Westlaw Software Pack TB81021

The West Publishing Company of Minneapolis, Minnesota has a computer service which is used by legal professionals to assist in law research. The Billings WESTLAW Diskette allows the user of a Billings computer to tie into this legal library. (The service is basically a data-base manager system which al-

lows the user to access information.)

It should be noted that Billings Computer Corporation is not an authorized Westlaw sales representative. To use the Westlaw service, arrangements must be made with an authorized Westlaw representative. Again, the Billings Westlaw Diskette simply allows the user to tie into Westlaw from a Billings computer. The user must obtain such information as account number and password number necessary to run Westlaw from a Westlaw representative.

The Westlaw Pack also includes a demonstration diskette which allows Billings Dealers to demonstrate the Westlaw service without actually connecting to the Westlaw database. Dealers and others who are interested in this service are encouraged to contact their nearest Westlaw sales office directly.

Computamatic® Terminal TB81020

The Computamatic® Terminal Program allows the Billings Computer to emulate an intelligent terminal which can communicate with a variety of host computers or with other terminals.

The program is controlled by the function keys. The functions allow the user to specify a disk file so that data transmitted can be from the keyboard or the disk file. Data received can be saved directly as a disk file or stored in memory and then, if desired, saved on disk or printed. Other functions allow the user to specify various baud rates and parity options.

The program includes a facility which allows character-by-character translation of incoming and outgoing data. This is accomplished by writing an assembly language routine which is then incorporated into the program. By using this method, great flexibility is available in handling special screen control sequences, special protocols, etc. It is easy to create a different diskette for each type of terminal needed.

The ability to send or receive information on disk can cut down on the user's connect time and telephone time. The user can create text files using the system editors in advance and then send them while connected to the host. After receiving information from the host, the system listing commands can be used to display or print the information, or it can even be modified as necessary by using the system editing capabilities. This can mean significant savings in computer cost and long distance telephone bills.

Transient Voltage Suppression TB81024

Where power lines are "noisy," such as in rural areas or near factories, the system could reset or reboot, or generate other problems such as memory parity errors or disk read errors. To eliminate these potential problems, a Metal Oxide Varistor (MOV) should be added to the power supply. This MOV would then actually cut off any high

voltage spikes that could occur on the AC voltage line.

**Operating System Diskette
TB81034**

A new RECEIVE Command was put onto the Operating System diskette to allow larger files to be received. Before, only 254 segments per file could be received. Also, SYSTEM.DEVI8 and SYSTEM.DEV19 were updated to facilitate this change. The new part number is 110-X11C.

**Billings Database Manager
TB81025**

The Billings Database Manager (BDM) is a relational data base system that uses a B-Tree and inverted key architecture. A variety of access methods is available — read random, update, rewrite, delete, read sequential, and add. In addition, some other functions have been incorporated such as read prior (backwards), verify record existence, twin (duplicate) existence, access to first or last twin, horizontal access (read forward or backward by level), and EOF-BOF file wrap.

The Billings Database Manager is a disk file access method designed to meet the requirements for a random and sequential Database system in an environment that may require large volume access to existing data. The use of BDM is restricted to its own type of files which are designed to function as though they were a sequential, a direct, and an indexed file in combination. The attempt has been to make it possible for a user to better define data and thus use it more efficiently. Multiple level (tree) structure and concurrent multi-data-base access have been incorporated.

A full complement of support utilities to maintain BDM and the associated data base files is included. This release of BDM will interface with BMAC, FORTRAN, and COBOL programs. Neither BASIC language currently is supported. Also included are the necessary .REL files to allow a programmer to access the data base. These files are described in Appendix B of the reference manual.

One of the utilities is a general Query capability which is a generalized search and reporting system that can be used with any existing BDM Database. The search, sort and report constructs are entered in a free flow English format. This allows a non-computer oriented user to quickly grasp the use of query and use it effectively in a short period of time.

The Database support utilities, as well as Query, are screen assist supported. This makes the use of these functions highly tutorial in nature and much easier to use since extensive memorization of input as to order and options is eliminated.

TECHNICAL BULLETIN INDEX

If you are interested in receiving any of the technical bulletins listed below, please write: *COMPUTER PROGRESS MAGAZINE*, 18600 E. 37th, Independence, MO 64057. cp

INDEX

Technical Bulletin Index

Number	Date Issued	Title
TB 81001	03/18/1981	Excessive Disk Read Errors
TB 81002	03/16/1981	Excessive Memory Parity Errors
TB 81003	04/15/1981	Using the Weld Capability
TB 81004	04/15/1981	ISAM File Recovery on Power Failure Using EXEC
TB 81005	04/15/1981	New Software Packaging
TB 81006	05/18/1981	Current Software Versions
TB 81007	05/18/1981	Release of BOS Version 5.3J
TB 81008	05/18/1981	New Release of BBASIC
TB 81009	05/18/1981	Release of Print-ASIST
TB 81010	05/18/1981	Use of Version Numbers and Release Dates
TB 81011	05/26/1981	Instructions on Using the Dealer Network
TB 81011A	06/09/1981	Instructions on Using the Dealer Network
TB 81012	05/30/1981	Re-release of BBASIC
TB 81013	05/30/1981	Re-release of Operating System
TB 81014	05/30/1981	Release of Bookkeeper General Ledger
TB 81015	05/30/1981	Release of Bookkeeper Accounts Payable
TB 81016	05/30/1981	Release of Bookkeeper Accounts Receivable
TB 81017	05/30/1981	Release of Bookkeeper Payroll
TB 81018	05/30/1981	Using the Bookkeeper Accounting Support Diskette
TB 81019	06/08/1981	Re-release of Document Communicator
TB 81020	11/03/1981	Release of Computamatic Terminal
TB 81021	11/03/1981	Release of Westlaw
TB 81022	06/17/1981	Re-release of Legal Pack Disbursements
TB 81023	06/23/1981	Re-release of Bookkeeper 5" Diskettes
TB 81024	10/20/1981	Transient Voltage Suppression
TB 81025	11/11/1981	Release of Billings Database Manager
TB 81026	11/20/1981	Additional Information on LIST Command
TB 81027	11/20/1981	EREAD-EWRITE ACB Number Open Conflicts and notes.
TB 81028	11/20/1981	FORTRAN Default Filename Contains Dollar S
TB 81029	11/20/1981	COBOL Listing to Disk Via D=A Option
TB 81030	11/20/1981	COBOL Verb "Indexed by" Version 3.2 and 3.
TB 81031	11/20/1981	COBOL Usage of JULIAN ACPDAT
TB 81032	11/20/1981	COBOL Error On Last Perform Statement
TB 81033	11/20/1981	Applications Software File Naming Convention
TB 81034	11/20/1981	Re-release of Operating System Diskette
TB 81035	11/20/1981	Re-release of BBASIC Diskette

Software Release Index

SR81001	04/15/1981	New Software Packaging
SR81002	05/18/1981	Release of BOS Version 5.3J
SR81003	05/18/1981	New Release of BBASIC
SR81004	05/18/1981	Release of Print-ASIST
SR81005	05/30/1981	Re-release of BBASIC
SR81006	05/30/1981	Re-release of Operating System
SR81007	05/30/1981	Release of Bookkeeper General Ledger
SR81008	05/30/1981	Release of Bookkeeper Accounts Payable
SR81009	05/30/1981	Release of Bookkeeper Accounts Receivable
SR81010	05/30/1981	Release of Bookkeeper Payroll
SR81011	06/04/1981	Re-release of Print-ASIST Pack
SR81012	06/04/1981	Release of Bookkeeper Accounting Support Diskette
SR81013	06/08/1981	Re-release of Document Communicator
SR81014	11/03/1981	Release of Computamatic Terminal
SR81015	11/03/1981	Release of Westlaw
SR81016	06/17/1981	Re-release of Legal Pack Disbursements
SR81017	12/08/1981	Release of Data Manager Pack
SR81018	11/20/1981	Re-release of Operating System
SR81019	11/20/1981	Re-release of BBASIC
SR82005	04/01/1982	Re-release of Computamatic® Terminal Pack
SR82006	04/01/1982	Re-release of Bookkeeper Series Packs

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