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# CORRECTION

The Winter 1977 issue of LEADER contained an article on page nine entitled "Warehouse Distributors Plug Into MARK III Service Order Entry Capabilities." In that article, Gates Rubber Company should have been identified as one of the founding members of TRANSNET. The TRANSNET system, which is designed to help warehouse distributors cut order lead times and better manage inventories, evolved primarily from Gates' original order entry system.



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Services TIME SHARING + NETWORKING REMOTE BATCH PROCESSING EACH ITES MANAGEMENT

# PRODUCTIVITY GAINS ANTICIPATED FROM NEW PRODUCTS AND SERVICE **ENHANCEMENTS**

One of the more pleasurable occasions for any sales manager is the opportunity to announce the availability of new or improved products. Such is the situation at Information Services where recent technical achievements have resulted in a considerable number of new service offerings and system enhancements. A number of these offerings became available March 25th. Others will become effective on July 1st along with a restructuring of MARK III Service prices.

The March 25th offering includes a family of new products and features we refer to as MARK III PLUS. The new products include: FORTRAN 77, a new cost-effective FORTRAN language which meets all, and even exceeds many, of the proposed, new ANSI FORTRAN standards; DMS II, an enhanced database management and report generation system which builds on the time-proven capabilities of the original DMS; and JOBS, a master scheduler of large, productionoriented software systems.

MARK III PLUS couples these new products with two new service features: Data Entry Mode, a new low-cost means of data entry; and an Annual Program Maintenance Service Plan. The "on-line" section of this issue will bring you up to date on the inherent capabilities and potential customer benefits of each of these offerings.

MARK III PLUS will soon be augmented by two new system enhancements which will take effect on July 1, 1977. At that time, Metro Access will be expanded to five additional metropolitan areas: Atlanta, feature articles on the following pages



Boston, Dallas, San Francisco and Schenectady. When first introduced a year ago, Metro Access significantly enhanced the efficiency and cost performance of GE's 1200 Baud Service, Telephone Information Processing and 4800 Baud Service through the incorporation of mini-remote concentrators into the MARK III system. Coupled with the geographic expansion will be an extension of Metro Access to include 110-300 Baud Service.

Along with the July 1 system upgrades will be a restructuring of MARK III Service prices. The restructuring will include increases in Computer Resource Unit, Terminal Connect Hour, and Kilocharacter prices. While most customers will experience some increase in overall prices as a result of the restructuring, the degree of increase will vary depending upon usage of the productivity-improving influences of MARK III PLUS, Metro Access, and forthcoming Production FORTRAN enhancements. As a result of the latter, users of Production FORTRAN should generate fewer CRU's for applications accessing binary files due to system and software advancements. The impact for customers? Lower costs for those applications effective July 1.

Technology, however, is not the only fountain of productivity improvements. Many of our customers are improving the productivity of their own businesses through a reliance on remote computing in increasingly sophisticated applications, as the illustrate.

With the advent of summer, forest fires become an ever-present threat to our natural forest and wilderness areas. The U.S. Forest Service is helping to limit that threat through the use of a fire management system which is profiled on page 2. An article on page 7 shows how the Vulcan Materials Chemicals Division uses a mathematical modeling capability available on MARK III Service to help manage the operations of chemical plants in three cities around the country. Beckman Instruments has significantly upgraded the responsiveness and accuracy of its order service function with a customized order service system developed by GE and reported on page 8. In addition to illustrating remote computing capabilities, these articles demonstrate the diversity of application areas which lend themselves to productivity improvements through remote computing.

At this point I'll let you get on to the customer applications and service enhancements, which hopefully will give you a clearer understanding of the advantages that remote computing can bring to industry in general, and to your business in particular.

Roger T. Hobbs General Manager, Sales Department **GE** Information Services Division



Millions of years ago, cavemen had very little understanding of fire management. Besides an awareness that when near fire, it was warm, and when too near, it burned, their knowledge of fire was most likely limited.

Even so, fire served some of man's most basic needs, providing warmth from the elements and security against unwanted animals.

However, either due to human carelessness or a natural phenomenon such as lightning, cavemen were put in the perilous position of facing the challenge of wildfires.

Today, despite the passing of millions of years, man still is threatened by out-of-control fires. Ironically, too, human carelessness and lightning remain as the chief causes of wildfires.

#### From Cave To Computer Room

Fortunately, man's capabilities in the areas of fire fighting technology and fire management have made quantum leaps forward in the years since cavemen had to deal with such problems.

Perhaps one of the more important advances recently has been the use of computer processing power to assist in fire management tasks. For example, almost four years ago, a special forest fire research group at the Rocky Mountain Forest and Range Experiment Station at Ft. Collins, Colo., conceived, designed and tested a computer processing system designed to manage the National Fire-Danger Rating System (NFDRS). This is a complex set of information centered on meteorological data and used by a multiplicity of government and private agencies as a basis for management decisions.

The computer processing system, entitled Administrative Forest Fire Information Retrieval Management System (AFFIRMS), was developed by a task force from the U.S. Forest Service consisting of R. William Furman, Associate Meteorologist; Robert S. Helfman, Systems Analyst; and Robert J. Straub, Forester.

#### Computer Program Now A Boon To Modern Fire Management

Following a successful test period during two fire seasons, AFFIRMS was then adopted by the U.S. Forest Service as an integral part of its daily fire planning operation. Since then, relevant federal agencies such as the National Park Service, Bureau of Indian Affairs and Bureau of Land Management, as well as state protection agencies in 17 states use AFFIRMS. More states plan to adopt it during 1977. AFFIRMS is processed on GE's MARK III remote computing network, which provides massive computer power accessible in all 50 states.

James W. Lancaster, a forester and fire specialist who led the Ft. Collins project, now at the BIFC, said the interactive computer program has been a boon to modern fire management.

"AFFIRMS has enhanced the fire management operation all the way 'round," Lancaster said. "It not only does a better job than the previous manual method, with fewer errors, but it frees personnel for other specialized fire duties and high priority work."

Basically, AFFIRMS provides users with the capability to process observed meteorological information, compute fire-danger ratings, and display both types of information upon request.

#### Forecasted Fire-Danger Ratings Determined Via AFFIRMS

More specifically, when fire station observers enter such data as wind speed and direction, relative humidity precipitation and a host of other data, AFFIRMS error checks the data and calculates current fire-danger ratings. Then, the fire-weather forecaster collects and evaluates observed data and enters weather predictions based upon the observer's input so that forecasted fire-danger ratings can be determined for the next 24-hour period. These ratings, vital to the preparedness levels for each protected wildland area, are stored in a common data bank which can be accessed quickly by concerned agencies.

Since the program's inception, Information Services' Denver Branch has provided strong support for AFFIRMS, assisting more than 200 MARK III Service users reaching from Alaska to Florida to California. Inputs are collected from more than 1000 data collection points from throughout the United States for processing on MARK III Service, according to Lancaster.

With as many as 60 to 80 users per time zone accessing AFFIRMS within a two-and-a-half hour time period each day, a highly sophisticated processing system such as MARK III Service is necessary to better utilize the NFDRS, he said.

#### Chance For Error Practically Eliminated

Prior to AFFIRMS, the problem of manually collecting, analyzing and processing the NFDRS information was mind-boggling, according to Lancaster.

"The chance for error has practically been eliminated by using AFFIRMS," he said. "There were just too many tasks involved between observing meteorological input and rendering operational fire-danger information to have made the manual method effective."

Using the manual system, firedanger station observers were saddled with the responsibility of independently calculating fire-danger ratings, a complicated procedure which involved using as many as 12 different tables. "All too often errors resulted during the observer's table look-up process, diminishing the effectiveness of the total fire management operation," Lancaster said.

In addition, the processed information was funneled back to users through a single device, usually a Teletype or a radio network. Consequently, each user had to cull through the total data in order to pick out useable information for a particular

(continued on page 14)





#### **General Services Administration** Awards Government Teleprocessing Services Schedule **Contract to General Electric** Information Services Division

Rockville, Maryland-The General Electric Information Services Division and General Services Administration recently signed a Federal Government **Teleprocessing Services Schedule** Contract with a potential value of \$56.7 million for the period ending September 30, 1977.

The multi-million dollar contract under the Schedule portion of the Government's new Teleprocessing Services Program will make available to Federal agencies and departments, the computer resources and technical support services of GE's MARK III Service nationwide computing network.

General Electric, a major supplier of commercial teleprocessing services and the eighth company put on the Schedule, has the ability to process orders amounting to \$8.1 million monthly under the contract. Among the items covered by the contract is full service. Thus, GE can provide both interactive and remote batch access to the same data files through the Foreground and GCOS/VS Background Services. GE's Honeywell 6088 and IBM 370 hardware provide the user with a flexible and reliable processing system.

As an incidental item the contract also provides for hands-on training sessions and lectures that enable personnel unfamiliar with computers to quickly learn to use the MARK III Service effectively.

A library of software packages is available to provide users with extensive processing capabilities. For example, DMS II, a new Data Management System, can produce multiple reports from a single pass of the database without additional programming, thereby significantly reducing development and implementation time and costs.

GSA's Teleprocessing Services Program will become mandatory for

most members of the Government's Executive, Legislative and Judicial Branches. However, the program is available to all other Federal agencies and duly authorized Government contractors. Prior to the time when the Schedule becomes mandatory, Federal agencies can obtain GE's MARK III Services under it's Schedule Contract if a sole source procurement can be justified.

GE's MARK III Service is available in more than 400 cities, spanning all 50 states, on a local call basis, 24 hours a day, every day of the year. Also, GE believes the protection of users' information on MARK III Service (such as IF ... THEN ... ELSE, DO through stringent security measures to be another major benefit to the Government.

Since round-the-clock access is available, the Government under the contract may take advantage of various discounts by processing in a deferred mode. GE also provides premium discounts for processing generated in some metro areas, such as, Washington, D.C., Los Angeles, Chicago, New York City, and Cleveland.

According to a GE spokesman, this is the largest Federal Government contract for Teleprocessing services signed by the company and further represents its commitment to provide the Government with an efficient remote computing network service nationwide.

#### FORTRAN 77, Based on Proposed New ANSI Standards, Now Available

FORTRAN 77, a new cost-effective FORTRAN language which meets all, and exceeds many, of the newly proposed ANSI FORTRAN standards is now available on MARK III Service. FORTRAN 77 was developed by GE to give users an edge in utilizing the latest industry standard features, and an opportunity to increase their productivity and programming efficiencies.

In addition to being one of the first commercially offered versions of FORTRAN to meet the new ANSI standards, FORTRAN 77 can be considerably less costly to use than any previous GE FORTRAN. One of the major features of the new language is structured programming construction WHILE and DO UNTIL) which simplifies and speeds up program development as well as maintenance and modification procedures.

Interrupt processing helps users increase program integrity by monitoring internal errors as well as external events, such as communication line failure. The program can be designed to come to an orderly halt or follow other programmer-established instructions without adversely affecting the database when a line failure occurs. Other powerful new capabilities of FORTRAN 77 include stream I/O, dynamic arrays, enhanced debugging capabilities, and improved string functions to allow for better control of processing.

Database applications developed using FORTRAN 77 are significantly less complex, as the language interfaces directly with GE's database management system (DMS II).

#### DMS II: Second Generation of GE's Database Management System

DMS II, a new database management system developed by GE, provides a new generation of standard setting capabilities for the development and management of database applications. DMS II is completely upward compatible with GE's current DMS product, and offers an extensive reporting capability that is efficient for both ad hoc inquiries and large, repetitive reporting requirements.

Incorporating recommendations made by many of the more than 2000 users of DMS, the enhanced system accepts report initiation instructions in French and German, as well as in English. Extensive formatting and tabulating controls have been designed so that even computer novices can use the system effectively with a full range of file types. DMS II's modular design and easy-to-use conversational commands give users the ability to generate database systems and report or modify that data in ways not previously feasible. For instance, FORTRAN 77 generated code can be saved for tailoring to the user's unique requirements and multiple reports can be processed on a single database pass, thus saving both processing time and cost.

DMS II can be applied to a broad range of business applications, such as marketing and sales analysis, order service and inventory control, financial management, personnel, accounting and purchasing.

#### New Service Features Offer Cost Savings to MARK III Service Users

Increased user efficiencies and value are reflected in two new GE service features. Data Entry Mode (DEM) is an economical new pricing structure for on-line data entry; and a new Annual Program Maintenance Service Plan covers the costs of maintenance and some modifications to GE customdesigned applications.

The DEM terminal connect rate of \$1.50 per hour makes it practical and economical to remain connected to MARK III Service for long periods. In many cases, this low rate greatly reduces the need for interim off-line batching of data on magnetic or paper tape.

Data Entry Mode gives MARK III Service users a powerful tool for improving total system performance, and is ideal for any application which requires hours of keyboard data entry, such as order entry systems and program development projects. Also, during on-line entry, editing programs can improve the detection and correction of data errors. DEM permits the on-line data input function to be performed at considerably less cost than was previously possible with 110-300 baud and 1200 baud Metro Access service.

The new Annual Program Maintenance Service Plan streamlines contractual procedures for the maintenance and updating of Custom Application Operation-designed programs by providing for a fixed level of on-call programming support for these programs.

Contracted for on an annual basis, this plan assures the availability of predetermined levels of programming support service, minimizes paperwork delays in procuring such service, and is intended to facilitate the timely implementation of new programming features and capabilities into customer programs.

#### New Master Scheduler Automates the Running and Control of Production Runs

JOBS, a master scheduler of large, production-oriented software systems, has recently been made available to MARK III Service users. No other commercial vendor is known to offer a scheduling system as comprehensive as JOBS, which automates procedures and uses a modular, standardized approach designed to conserve administrative time and costs.

Based on user-defined commands for a master schedule, JOBS verifies availability of input data, triggers processing at predetermined times, automatically purges production work files, distributes output per established schedules, and provides detailed performance logs. When required, JOBS can also initiate program runs for an indefinite period at appointed times and frequencies. However, users retain full flexibility in modifying these repetitive functions.

For users with several reporting locations spanning several time zones, JOBS provides the means to coordinate complex reporting structures. Additionally, by allowing users to automatically schedule jobs in nonprime time or a deferred processing mode, JOBS helps to limit operational costs and conserve data processing budgets. It also minimizes the chance of errors and permits reduction of terminal connect hours.

JOBS is especially recommended for complex applications such as financial reporting, cash consolidation, and sales analysis. It can also be used to schedule GE library applications such as a financial analysis language (FAL II), a database management system (DMS II), and a plotting capability (PLOT). The new scheduling system can also be utilized to streamline program development functions and facilitate team programming.



# VUICAN CHEMICAL'S USE OF MATHEMATICAL MODELING SYSTEM TAKES THE **GUESSWORK OUT OF** BUSINESS MANAGEMENT

Few businessmen can afford to base million-dollar decisions on gut-level feelings. Today's business environment is just too complex. Each year more and more variable, often uncontrollable, conditions attempt to cloud management's perspective of where the Company stands and where it's headed tomorrow. The nagging questions decision-makers must come to grips with today are not easily answered, and perhaps the most difficult decisions loom on the horizon. Will our main product line be viable in 1985? Will it even be needed? What will our competition be doing? To what of other products, Heyd says. extent will tighter environmental controls affect us?

With such an ever-expanding list of considerations, businessmen have to rely less on snap-decisions and intuitive feelings and more on scientific analyses. Today, many decisionmakers use a computerized system modeling program as a tool to weigh alternatives and meet these challenges.

One such example can be seen at Vulcan Materials Chemicals Division, a relatively young member of the parent Vulcan Materials Company, a Fortune 500 firm headquartered in Birmingham, Alabama, and one of the facturing process changes tested by nation's leading producers of industrial the system have helped establish a chemicals, construction aggregates, secondary aluminum and detinned steel scrap. Vulcan's commitment to creative management techniques and analytical decision-making has catapulted the Chemicals Division into a position among the nation's leading chemical manufacturers in just ten years.

The fast-growing Chemicals Division, which markets a diversified line of chlorinated solvents, including carbon tetrachloride, chloroform, perchloroethylene, methylene chloride and trichloroethane, accounted for almost two-thirds-nearly \$35 million -of total Company earnings last year. ing allowed us to test his idea for a

## "... An Added Edge Against Competition."

As part of their effort to continue this success, the Chemicals Division is now making use of MPS III (Mathematical Programming System), a powerful system mathematical modeling capability available on MARK III Service. Ray Heyd, manager of Chemicals Marketing Research and responsible for the system's development, says the Division uses the modeling program to examine alternatives for day-to-day decisions as well as long-range strategic planning.

"The chemicals industry is dynamic and highly competitive," Heyd says. "Consequently, today's decisions have a dramatic effect on tomorrow's business climate, even to the point of survival.'

This is particularly true of Vulcan's primary product line, the group of socalled commodity chemicals mentioned above which are used in the cleaning of metals and textiles, and as intermediate chemicals in the manufacture

'Commodity chemicals are generally high-volume and low-margin types of products," he says. "But we feel our modeling capabilities give the Division an added edge against competition."

#### **Trend** To **Increased Profits Traced To** Modeling System

Vulcan's success-oriented management guides the operations of chemical says, and gives as an example the plants in Wichita, Kansas; Denver City, uncertain future of fluorocarbons in Texas; and Geismar, Louisiana, and though only about 15 per cent of its modeling system is completed, manutrend toward increased profits.

Charles E. Sturgeon, Vice President of manufacturing for the Division, explains: "A method for increasing profits by more than \$6,000 a day has been analyzed and put into operation at our Wichita plant. While we regard this as a great success, the net effect in terms of increased efficiency and profits at other plants could be even more significant."

Such a dramatic increase in plant profitability as a result of manufacturing process changes was "something Sturgeon had a feel for from the beginning," Heyd says. "But modelmatter of dollars rather than the large capital investment necessary for plant modifications."

Heyd is optimistic about future successes. "We've really only scratched the surface," he says. "We have many other plants which can be modeled just as in Wichita with similar results."

Likewise, Sturgeon sees the system as a boon to the Division's business. "We're involved in a number of very important 'what-if' games that hinge on our ability to discern the best possible alternatives," he says. "Ultimately, our models will be used throughout the Division, providing us with an integrated optimization planning system of almost unlimited potential.

In addition to modeling production processes, Vulcan hopes to also examine plant expansion alternatives with the system. Hevd says.

"The expense of building a new plant versus adding facilities to an established plant can be measured by mathematical simulation on the system at minimal cost," Heyd says. "Of course, this becomes a particularly important capability with escalating construction costs.'

#### **Environmental & Purchasing** Considerations Analyzed For Optimum Return

Also of concern for Vulcan is the effect of increasingly stringent environmental controls. Here, the ability to analyze and quickly adjust to changing environmental factors is critical, Heyd aerosol use, which could affect the production of several of Vulcan's products.

Another area which benefits from Vulcan's far-reaching system is the choice of raw material feed stocks used in manufacturing chemicals. "Our model can now help us determine where we can get the best buy for our investment," Heyd says, "and the result is the optimal choice of feed stocks in terms of cost and efficiency."

Vulcan's modeling system will continue to expand, according to Heyd. Scheduled for operation in the near future is a transportation matrix which will further enhance the Division's efficiency and profit potential.

"Basically, the transportation matrix will allow us additional input in determining the manufacturing of shipping points for a certain chemical depending upon the location of the user. That

# CUSTOMIZED INTERNATIONAL ORDER SYSTEM IMPLEMENTED IN RECORD TIME FOR BECKMAN INSTRUMENTS, INC.

When a typical customer order consists of hundreds, or thousands, of precision components for use in electronic circuitry, an automated order service system becomes a business necessity. Such is the case with Beckman Instruments, Inc., a major international manufacturer of high technology products for science, medicine, and industry. Beckman's Helipot Division, named after their Helical Potentiometer, manufactures a long line of electronic circuitry components.

Beckman's Puerto Rican subsidiary began shipping directly to customers in 1974 and utilized a manual order processing method in Puerto Rico to fulfill its orders from a customer base comprised almost entirely of independent distributors. At Division headquarters in Fullerton, California, the sales department preprocessed all orders, kept track of order status, and entered Puerto Rico's bookings and shipments into the in-house sales reporting system.

However, fast growth of the distributor market in recent years and parallel demands in Puerto Rico for more efficient delivery and invoicing of customer orders were beginning to outgrow the capabilities of the manual order service system. Currently the usual sales order for Beckman-Puerto Rico is comprised of thousands of Helipots, trimming devices, and dials and is normally valued between \$1,000 three months. and \$5,000. The independent distributors served by Beckman have demanding requirements for efficient order fulfillment. In addition to keeping ample inventory on hand, they must move that inventory off the shelves fast. As a result, they are continually replenishing their supplies. "Delays and inaccuracies were creeping into Puerto Rico's order service, says Robert B. Thompson, manager of management information systems for the Helipot Division. "We were

becoming less responsive to our customers, and occasional shipping delays occurred."

There are close to 700 different products making up the total line produced in Puerto Rico. So, while production and inventory control are of paramount importance for this high volume, fast turnover operation, the need for a modern order service system is vital to the future growth and profitability of the business.

As Thompson was exploring solutions to the problem, the Puerto Rico subsidiary continued to expand. By the middle of August, 1976, Helipot Division management set a goal for themselves to implement a fully operational order service system in less than three months.

#### Customized Order Service System Designed, Programmed, And Implemented Within 60 Days!

Because of its extensive remote data processing network which provides local access in Puerto Rico, General Electric's Information Services Division was called in to propose its solution to Beckman. Within 60 days of the initial meeting, a completed, customized order service system serving Beckman's Puerto Rican operations and its Division headquarters, was functional on GE's MARK III Remote Computing Network.

Providing all of the required local Puerto Rican control for processing orders, producing shipping papers and invoices, controlling inventory, and preparing replenishment notices, the new General Electric order service system also gives headquarters the ability to monitor stock order status. It also provides the means to automatically consolidate Puerto Rico's sales information into the Fullerton computer system via the MARK III Service interprocessing capability. This feature is accomplished by generating a transaction file on MARK III Service which is then transmitted into Beckman's computer two or three times per week.

#### Computerized Program Generators Cut Development Time And Cost

OMNI, GE's order service software generator, was the key to the rapid, successful implementation. "The system does everything we need it to do," reports Thompson. With OMNI, GE's



application programmers can develop a system to meet a customer's specific needs in a fraction of the development time and cost normally required in a made-from-scratch approach.

The OMNI software was developed with two major objectives in mind. The first was to drastically reduce the normal development and implementation time frame of order service systems, and the second was to provide the means to easily customize the system to meet the user's precise input, processing, and output reporting requirements. Thus OMNI became the tool, or the means to provide the final solution, without being the final "off the shelf" packaged approach that characterizes the constraints of many other available systems.

The customized development cycle of an OMNI generated order service system begins with a questionnaire, used to define the functional policies and procedures of the order service application. Bob Thompson, working with GE, selected the questionnaire responses that best fit the Beckman operations, defining such aspects as the pricing algorithms, stock allocation requirements, shipping policies, historical data needed, inventory replenishment parameters, and so on. A data field definition table was then defined, based on Beckman's requirements, which allowed easy customization and addition of the required database fields and transaction input formats and rules. This table, plus the questionnaire responses and the data definitions, formed the complete system specifications needed to generate an order service system. From these specifications, and the normal functions of order entry, order processing, inventory accounting, etc. already included in the OMNI software, a complete system was generated which, in Beckman's case, satisfied approximately 80% of their total requirements. The last 20% was accomplished through manual programming enhancements and, for the output report customization, through the sophisticated report writer contained in GE's newly released Data Management System (DMS II).

#### Ease Of Use Results In Increased Productivity

The actual implementation in Puerto Rico was accomplished in a week, as the system was easy to learn and operate. Orders are entered throughout the day and are completely edited for accuracy on line. They are then saved for processing overnight with the resulting paperwork available the following morning. Although Beckman has the option of processing the data on a more frequent basis, their operations do not require it: and by utilizing overnight processing, Beckman thus saves 60% of the processing costs in accordance with standard MARK III Service pricing.

Beckman's system produces the normal set of operation paperwork including order acknowledgements, ship-sets, invoices, and inventory replenishment suggestions. It also produces some 20 special summary and analysis reports, prepared on demand. As an integral part of the data processing performed, customer orders are tracked, inventories are controlled, inventory replenishment analysis is performed, backorders are controlled, and customer and product master data is maintained.

"When we first put up the system and used the inventory file, we found that a previous price increase had not been implemented correctly in Puerto Rico. The OMNI System helps us identify these kinds of problems quickly and correct them easily," says Charles Reed, manager of sales administration for the Helipot Division. "Also, we now have the ability to look at all outstanding customer orders to plan our product allocations more efficiently."

#### Beckman Instruments, Inc. continued . . .

These benefits have allowed Beckman to control its own internal operations more closely. In addition to the regular reports which come off the system unstructured, ad hoc inquiries can be prepared on any aspect of the order, product, or customer information using DMS II. Its interactive query capability utilizes an Englishoriented language which Puerto Rican and Fullerton management learned to use quickly and effectively.

#### Responsiveness To Customer Needs Enhanced By Automated System

Improved management information, however, was only one objective of the new computerized approach. The other primary goal-to better serve Helipot Division customers-has also been achieved. For instance, Beckman Puerto Rico now has the ability to incorporate customer change orders as these come in. "Even routine changes, such as quantity or delivery date, were difficult to make previously," says Reed. By the time the change was processed, an order could have been shipped and even billed. Now the database can be updated immediately upon receipt of a change request.

An additional benefit arose, not in Puerto Rico, but in Fullerton where preprocessing of Puerto Rico's orders used to be conducted. "Previously, we had two clerks entering Puerto Rico's bookings and shipments information into our in-house system," says Reed. "With these functions now automated, these same two clerks are in sales service dealing directly with customers and providing a more important function for us."

As orders are processed and shipped more rapidly these days, invoices are also turned around more quickly, thereby improving the accounts receivable position within Beckman's operation. According to Reed, the savings accrued in prompt issuing of invoices and the resulting decreased accounts receivables are "sufficient to account for a significant portion of the development cost of our order service system."

Finally, on the production side, the system's stock-keeping unit for each product allows management to maintain its finished goods inventory at appropriate levels and apply product Thompson. "They can do certain allocations more accurately. Also backorders can now be kept to a minimum. could. For example, the OMNI pro-

#### \$22,000 Development Cost: "Extremely Reasonable—"

What made the system successful? According to Bob Thompson, a unique phased implementation approach was the critical factor for Beckman.

Beginning early last September, GE investigated the functional requirements of Beckman's system and decided that a phased development approach would be most suitable. Phase I was a pilot system satisfying close to 80% of Beckman's requirements and took about three weeks to complete, based mostly on the OMNI generated software.

Thompson then tested the pilot system delivered in Phase I. He could assess the package's capabilities and recommend enhancements for Phase II (the customization and implementation phase). During this second period, about four weeks long, the customized output reports were added and the final program modifications were included.

The total cost for Beckman through the implementation phase came to less than \$22,000. Having had prior experience in custom software development, Thompson claims this cost for both computer and personnel resources was "extremely reasonable."

#### The GE Solution: Most Able To Meet Beckman's Requirements

Bob Thompson recalls that GE's remote computing network was an important factor in selecting them as a vendor. "We explored several alternatives before deciding on General Electric. For instance, the costs to install a dedicated communications line between Puerto Rico and Fullerton were prohibitive, and we would still need the software to give Puerto Rico the functional control it required. We also looked into upgrading the minicomputer which Puerto Rico used for payroll processing, but it fell far short of the needed computerization."

For an international corporation such as Beckman, with its own computers and communications network, the use of MARK III Service takes on a different appearance. "We supplement our in-house system with GE's remote computing capability," says Thompson. "They can do certain things more economically than we could. For example, the OMNI program generators could be developed because of GE's large, potential customer base. We couldn't justify the expense to undertake this kind of software development just for one application."

However, Beckman was able to find a few more in-house applications which suit it well. The Scientific Instruments Division manufactures some of its product line in Puerto Rico. Although it's a smaller order service function, it is still economical for Beckman to include it in a future system enhancement.

#### System Flexibility Allows For Ease Of Enhancements

Future enhancements are already part of an ongoing Phase III postimplementation stage for the Helipot Division. Either by re-generating the system with additional policies selected, or by additional custom programming on a particular module of the system, enhancements become a very straight-forward and natural part of the evolution of the application. "For instance, we are currently programming the system to provide accounts receivable information and customer statements, and we soon plan to program the system to automatically invoice freight charges in Puerto Rico, which has always been tedious and time consuming for us," says Thompson.

Beckman's orders are bundled together and shipped via air freight from Puerto Rico to a central delivery point in the United States. Here the package is broken up and sent to individual customers. Later, Beckman amortizes the total air freight bill and incorporates the local carriers' waybills into a total freight charge for its customers, billed separately from the product invoice. "But customers often complained because they wanted to pay one invoice per shipment, including these freight charges," Thompson says. Soon, Puerto Rico will accomplish this function automatically on the original invoice.

"Although our requirements will continue to grow and change, the flexibility of the system will allow us to meet our short- and long-term needs," Thompson claims. "It's a very cost effective system for us."



Vulcan Chemicals Continued . . .

way, transportation costs can be significantly reduced while at the same time increasing our ability to quickly serve customers," Heyd says.

#### "... Even In-house Processing Could Not Match GE's Economy Of Use."

Heyd says Vulcan management decided on General Electric's MARK III Service after studying a variety of available processing alternatives. "Overall, MARK III Service offers the availability, reliability and capability for our continually expanding needs," he says. "Even our in-house processing could not match GE's economy of use."

According to Heyd, "Our benefit-tocost ratio is running about 200 to one. There's no other way to look at the multitude of production and expansion alternatives in such a realistic, yet inexpensive, manner than our modeling system."

Of course, no method of weighing the voluminous amounts of data needed as a basis for sound decisions is fail-safe or even all-inclusive. There might always be a missing piece to the puzzle. Still, more and more decisionmakers are finding it's good to have an added quantitative tool to complement their intuition and experience in making decisions.

Sturgeon, reflecting on the success of the Chemicals Division's system thus far, adds: "It is important to know you're working with as good a system as possible in making decisions. Our system today has produced positive results in our decision making process and will become more important to that process as development is completed, thereby contributing to the continual growth of the Division."

#### MPS III... Mathematical Programming For Optimizing Business Resources

The modeling system used so effectively by Vulcan Chemicals in the accompanying article is MPS III, a proprietary product of Management Science Systems of Alexandria, Va. Available on MARK III VS Background Service, which utilizes IBM System 370 equipment, MPS III is an advanced, high-performance software system that builds and solves mathematical models to determine the best allocation of scarce business resources over large numbers of competing activities and operating constraints.

Built on linear programming (LP) techniques, MPS III combines modern mathematics with economics and computer technology to produce optimized solutions ... such as maximum profit or minimum cost. Because it is particularly useful in solving complex problems containing a great number of constantly changing variables, MPS III is ideal for applications such as process flow modeling, operations planning, production distribution planning. facility location, and similar applications.

Because LP is not only an optimizing technique but also a simulation technique, MPS III produces solutions that contain extensive and unique information describing complex interactions and responses to change in the business system being modeled.

# "...but what have they done for us lately?"

When your business is providing time-sharing, Especially designed by GE for remote comnetworking and remote batch computer services to more than 5000 companies around the world, your reputation goes on-line twenty-four hours a day. To maintain that reputation, service must be continually enhanced to reflect the increasingly stringent performance and value demands of your customers.

General Electric MARK III® Service is ready to satisfy those demands with a new family of service enhancements that raise the levels of performance and value standards for the remote computing industry. Collectively referred to as MARK III PLUS, they include:

# FORTRAN '77

Extremely powerful and cost effective, FORTRAN '77 meets, and even exceeds the new proposed ANSI X3J3 FORTRAN standards. The structured programming concepts designed into FORTRAN '77 will allow you to develop programs more efficiently and quickly... reduce maintenance time... lower operating costs ... improve database interfacing ... in short, FORTRAN '77 sets a new standard in capability and cost effectiveness.

## New Database Management Capabilities

DMS II represents a significant software evolution that reduces development and implementation processing time and costs. With DMS II you can process an entire report writing job, as well as produce multiple reports from a single pass of the database. International customers can construct DMS II verbs and error messages in French and German, as well as in English. A simple interface with GE's PLOT program allows easy production of charts and graphs from DMS II databases. For database applications in marketing, sales, personnel, finance and order service, you'll find DMS II a definite plus to MARK III Service.

# Automated Scheduler For Repetitive Processing

A new, comprehensive scheduler, JOBS, can monitor and control complex systems of interrelated programs that run repetitively.

puting application systems, JOBS verifies the availability of input, initiates processing at prescribed times, automatically purges production files, manages output, and feeds back actual processing steps. By automating procedures and improving the control of production systems, JOBS can reduce operational time, costs, and reruns for both GE programs and customer developed applications.

# New Low Price For Data Entry

A new low Data Entry Mode connect charge now makes it economical to access MARK III Service for extended data entry sessions. The economics of the new arrangement areatly reduces the need for interim off-line batchina of data on magnetic or paper tape. The Data Entry Mode is ideal for any application which requires hours of keyboard data entry, such as order entry systems and program development projects.

# **Customized Software Maintenance**

A special Annual Program Maintenance Service Plan streamlines the procedure for updating programs designed by GE's Custom Applications Operation. The plan, which covers your GE customized software for a year at a time, provides twenty-four hour initiation of subsequent program modifications and enhancements.

# MARK III PLUS ... Closing The Gap!

General Electric's worldwide remote computing service is designed to bridge the gap that often exists between a company's data processing requirements and their data processing capability. Our latest family of service enhancements, MARK III PLUS, was developed to further help you close that gap ... efficiently ... economically.

That's what we've done for you lately!

For more information contact: General Electric, Information Services Division, 401 N. Washington Street, Rockville Md. 20850.

# GENERAL 🐲 ELECTRIC

Forest Fire Agencies continued . . .

area. In some cases verbal relays contributed to errors.

"Often information was not available data, AFFIRMS can usually point it when needed due to the time lag under the manual system," Lancaster said. "And with the critical time schedules which must be adhered to in this type of job, AFFIRMS has proved to be most sor, controls all operations from initial efficient in managing the volumes of data needed to use the NFDRS."

## Four Main Elements Comprise AFFIRMS

Basically, the NFDRS consists of four elements on AFFIRMS; the catalog, current observation file. interpreter and processor.

The catalog is used to store semipermanent information about each station, input usually not subject to rapid change such as elevation, slope and fuel models. Once the catalog information is entered into AFFIRMS. it becomes part of the record and is used in subsequent processing.

The current observation file (C.O.F.) stores all meteorological observations and forecasts and the corresponding computed indexes, component and manning levels. Reports of selected data and computed danger indexes are immediately available to all users. Data are also made a part of a permanent data library. This is accomplished through one of the most powerful AFFIRMS features, an automatic archiving program.

Each night, the AFFIRMS archiver program inspects the regular observation files, copying any observations recognized as current and adding them to an archive file, which may be interactively accessed for one month. At the end of a month's time the file is permanently stored on magnetic tape, which may be available to users. This procedure replaces the manual keypunch method and saves hours of valuable personnel time.

An interpreter section of the system converts users' conversational instructions into computer language for processing. Thus, very little time had to be spent on training personnel to use the new computerized system, Lancaster added. The interpreter also performs a myriad of error-check operations on input data.

The logic of AFFIRMS permits most message commands to be used in any order, any number of times. This, plus the comprehensive error message library make it practically user-proof,

Lancaster said.

"If a mistake is made in entering out to the user immediately, which was impossible under the manual system,' he added.

The final system section, the procescatalog entries to processing meteorological observations and forecasts to archiving. The processor, controlled from the terminal keyboard by a set of simple conversational commands, also retrieves for display only the desired amount of information from the data files.

## System Flexibility Is Key To Success

AFFIRMS has other far-reaching capabilities. In addition to basic meteorological data, such detailed information as fuel models, fuel moisture levels, lightning risks and man-caused fire risks are included in the fire-danger station observers' daily input, greatly adding to the accuracy of forecasts and fire management decisions.

Also, if a sudden change in any reported condition occurs, the observer merely inputs the revised data and MARK III Service immediately processes the new calculations.

Flexibility is a key to the success of AFFIRMS, "Not only can a user select the fireweather stations for which he wishes information, but also the information he desires: meteorological, fire-danger, or both; observed, or forecasted, or both, in the desired display order," he said. "Not only that, but, reports can be generated according to administrative or governmental areas, such as a particular forest, region or county." Each user may specify a unique report format to fit his particular operation using MARK III Service, he added.





The advantages of using AFFIRMS are clear, according to Lancaster, who said the specifically tailored reports received by users on request are always in a neat, tabular form, and accurate. Since updating is handled by the sophisticated data management system, the number of times weather data is susceptible to human error is minimized.

## **TIP Used For Data Entry**

As good as AFFIRMS is, it should continue to improve according to Lancaster. An example, is the interfacing with Telephone Information Processing (TIP) offering, also available on GE's MARK III Service.

TIP provides low volume users with an inexpensive means of directly accessing AFFIRMS. For example, an ordinary push-button telephone can be used to enter data rather than a conventional terminal. By merely pressing the appropriate telephone buttons after being prompted by TIP's synthesized human voice, users can enter data quickly and efficiently.

The TIP offering was another reason for the selection of MARK III Service for AFFIRMS, Lancaster said.

"A state-of-the-art technology is necessary to keep up in such a volatile area as fire management," Lancaster said. "Especially since more and more people are coming in direct contact with our wildlands and increasing the chance of wildfires." Lancaster added that the trend during recent years has been an increase in the number of fires, but a decrease in the natural resources destroyed. AFFIRMS is an example of the modern technology assisting the U.S. Forest Service and other cooperating agencies in managing fires.

The fear of wildfires is no less today than in the days of cavemen, but there is little doubt that we are better prepared to deal with the situation through such means as the powerful, computerized AFFIRMS program.



# MORE PROFITABLE READING

#### Not All Data Management Systems Are Created Equal ... Now There's DMS II

New brochure reviews DMS II, an advanced, comprehensive software system that represents the latest thinking in computerized data management techniques. (5610.12) (451)

#### Remote Computing: GE's Solution To The Federal Executive's Data Processing Dilemma

New brochure (available June 1) reviews the remote computing capabilities General Electric now offers the Federal Government under a GSA TSP Schedule Contract. (0910.26) (597)

- There's An Easier Way... General Electric's Response To Business Managers' Decision Dilemmas New brochure describes GE's response to the major problems faced by corporate financial executives in areas of financial forecasting and analysis, cash management, investment portfolio management, etc. (5100,13) (688)
- Securities Database New brochure outlines GE's extensive Securities Database System for cost effective investment management. Brochure highlights new system's ability to aid in portfolio management and securities analysis. (5105.08) (694)
- Currency Exchange Database For International Money Management

New brochure explains how GE's new product offering can help businesses concerned with international money values. (5103.21A) (45)

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## New and Revised Documentation

New FORTRAN 77 is documented in four books. All had been available in advance release versions, and were republished, with extensive additions, in Revision A editions in late March:

• FORTRAN 77/FORTRAN IV Comparisons (3106.02A). A comparison of GE's new ANSI FORTRAN 77 (F77) and its predecessor FORTRAN IV (FIV/PFN) for experienced FIV programmers.

• FORTRAN 77 reference manual (3106.01A). Gives syntax and description of statements and features. Describes dynamic arrays, stream I/O, interrupt processing, improved string manipulation, and conventional F77 capabilities.

• FORTRAN 77 System Routines (3107.01A). Documents calling sequences and examples of routines that an F77 program can reference.

• FORTRAN 77 Loading and Overlaying user's guide (3106.03A). Describes how to overlay a job's execution modules, thereby conserving memory and controlling allocation. Includes reference and usage information on loader statements.

GE's new Data Management System, DMS II, is documented in three new booklets. Again, all had been available in advance release form, and were republished, with additions, in Revision A editions in late April:

• **DMS II** reference manual (5610.09A) contains syntax and descriptions of each statement and feature of DMS II. Database administration, retrieval, and reporting are covered.

• DMS II Retrieval and Reporting user's guide (5610.10A) describes usage and application techniques for reporting from a database, with emphasis on how to use DMS II effectively in a production environment.

• DMS II Database Administration user's guide (5610.11A) gives usage guidelines, examples, and application techniques for designing, building, and maintaining a DMS II database.

Also of interest to F77 and DMS II users may be the newly revised **HISAM** (Hierarchical Indexed Sequential Access Method) reference manual (5605.05A).

• JOBS, The Job Scheduler User's Guide (3501.18A) describes a utility system that automates the running of jobs on a predefined schedule. This tool for production environments accommodates Foreground, GCOS and VS Background, and High-Speed services.

**PLOT II** user's guide (5111.02A) shows how to use this business graphics system to produce any of seven graph types. For those who have used PLOT II's predecessor, PLOT\*\*\*, the differences between the two systems are listed.

The pocket-sized **Guide to Background Documentation** (2000.04F) has been revised as of April. For the first time, a list of documents appropriate for supporting software on the VS Background system is included. GE, Honeywell, and IBM document numbers are cross-referenced.

The **Publications Price List** (402.01K) has been updated as of April 29. The F77, DMS II, and VS Background documents are among the new items included.



VS Background Service Offers New Energy Systems Analysis Programs and New Programming Language For Computer Simulation Models

GE's VS Background Service which utilizes IBM 370 system hardware was recently enhanced by the availability of two new Network Services Software packages.

Energy Systems Analysis (ESA), a proprietary product of Ross F. Meriwether and Associates and now offered on the MARK III Service network by Automated Decisions Corporation, is a series of computer programs designed to simulate the energy consumption of various airside systems and mechanical plants. The programs allow company management to examine the potential behavior of an energy system, or compare the overall behavior of several systems and determine the most economical system to own and operate over a period of time. Included with these VS Background programs are MARKIII Service Foreground drivers to facilitate job submission and output retrieval.

In the past, energy conservation was only considered when it resulted in reducing total building costs. There was a time when it was actually less expensive to waste energy than to conserve it, and during that foreverlost period it was normal to make decisions on a strict cost/performance basis. Today, however, with the tremendous increases in the cost of all forms of energy, selecting the most efficient type of energy system for heating, cooling, power generation, or industrial process is critical in the battle to conserve energy and stabilize costs.

As important as energy system economic comparisons are, few companies can devote the time, manpower, and machinery needed to make the essential performance evaluations necessary for these comparisons. Because of this fact, energy consumption simulation is recognized as a key element in decision making and planning. The growing list of ESA users includes:

- Consulting Engineering Firms
- Corporate Engineering Divisions
- Utility Companies
- Government Agencies
- Hotel/Motel Chains
- Schools, Hospitals, Supermarket, and Department Stores

Use of ESA falls into two major categories of study:

- New energy system design and evaluation involving a conscious effort to minimize both capital and energy consumption costs for a new energy system in the design stage.
- Energy system evaluation to determine optimization alternatives for existing energy systems. Studies in the category range from new control and operating schemes to the addition of new features to an existing energy system.

In either category, ESA benefits include reduced energy cost by the proper selection of air-side systems, operating schedules and equipment configurations; analysis of capital cost vs energy savings; and accurate projections of energy consumption.

ESA is a fully documented system. Two separate user manuals written by Ross F. Meriwether and Associates, Inc. are available. Vol. 1 User Input Instruction Manual contains detailed input descriptions and forms for each ESA program. Vol. 2, sample ESA Input and Output, contains sample problem input and output for each of the five major ESA programs.

Documentation, user support, training and consulting services are available from:

> Automated Decisions Corporation Mariemont Executive Building 3814 West Street Cincinnati, Ohio 45227



#### New Programming Language Facilitates Computer Simulation

SIMSCRIPT II.5, a modern freeform language with all the built in facilities needed for model development is now available on the MARK III Service network. A proprietary product of C.A.C.I., Inc., the language is being made available on MARK III VS Background Service by Automated Decisions Corporation. Included in the offering are Foreground Service interactive programs for job submission and output retrieval.

The natural modeling concepts of SIMSCRIPT II.5 provide a natural framework which can be readily related to real objects and systems. Model components can be programmed so that they clearly reflect the organization and logic of the system and the amount of programming needed to model a system is significantly less than with other languages. Its freeform language lends itself to top down development. Through a preamble that allows the model builder to define system elements, their relationship and desired statistics before writing executable code, the model can then evolve easily and naturally from simple to detailed formulation. The result is that total job time is normally less than with other programming languages because fewer man-hours are usually required to prepare programs.

SIMSCRIPT II.5 is capable of multiple levels of detail or abstraction. It can be used for systems involving people, products, objects, services, events, or any combination of these. It is designed to deal with a very simple system as well as with large, complex interrelated systems, and its compatibility with FORTRAN allows the user to integrate existing subroutines into a SIMSCRIPT II.5 model.

For more information on either ESA or SIMSCRIPT II.5 and how their availability on MARK III Background Service can enhance the productivity, of your modeling applications, contact your local GE representative.

