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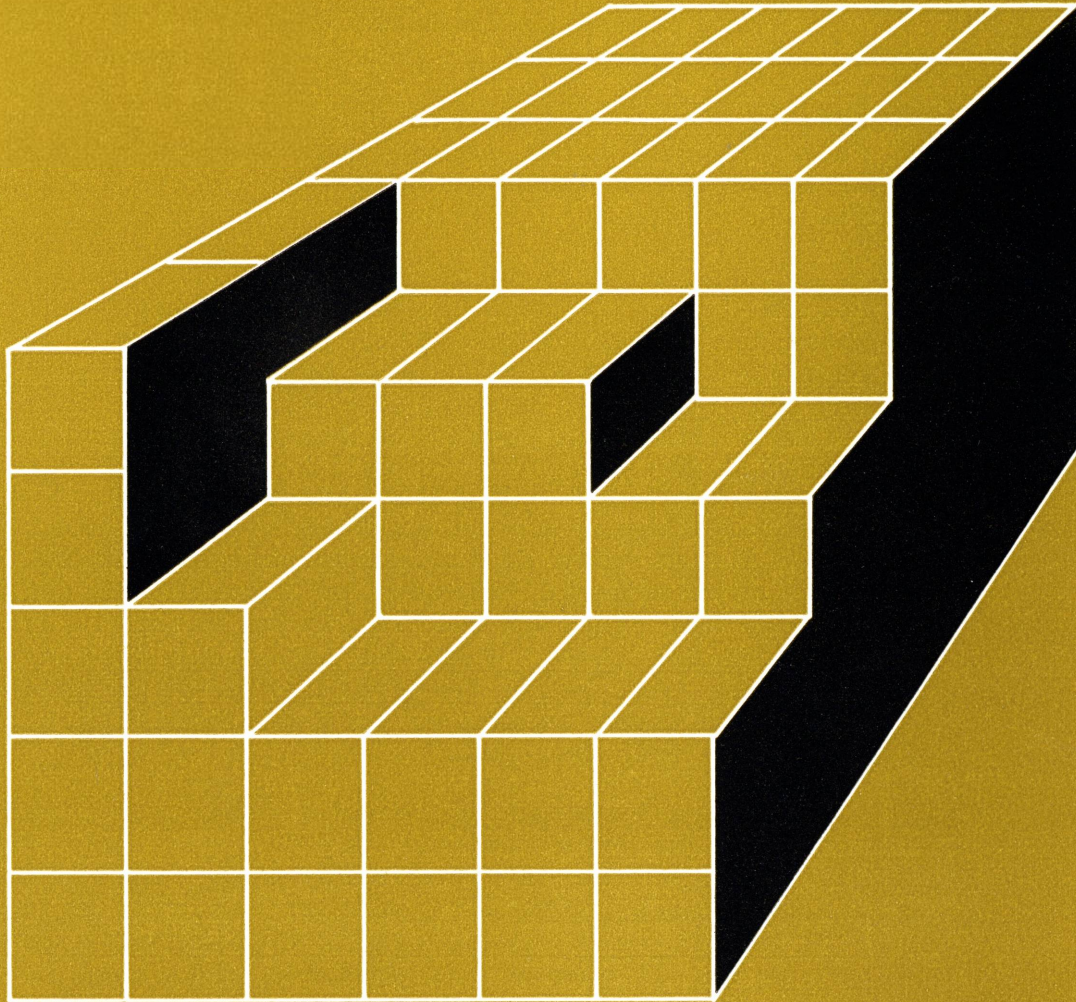
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management services

a magazine of planning, systems, and controls

September-October, 1969



A Lease or Purchase Decision Model for the XYZ Corporation

Jack R. Charrin

A Single Information Flow System for Hospital Data Processing

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Recognizing Management Services Opportunities

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Dollar-Value LIFO Retail Inventory Pricing

Roy Ageloff, A. Wayne Corcoran, and Richard H. Simpson

AICPA Computer Conference in Chicago

Staff Report

A Publication of the American Institute of Certified Public Accountants

Published by eGrove, 1969

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MANAGEMENT SERVICES FORUM

In our May-June issue we announced on page 9 that a panel of management services personnel from leading accounting firms would answer to the best of their ability questions from readers relating to any area in which they would like help—practice management, information development and utilization, computer selection and applications, client relationships. We also explained that correspondents would be kept anonymous. We have since decided that the identity of the individual firm replying would also be concealed.

All correspondence is cleared through this office.

The members of our panel, one or more of whom are responsible for the answers printed in this department, are: William E. Arnstein, Main Lafrentz & Co., New York; Philip L. Blumenthal, Geo. S. Olive & Co., Indianapolis, Ind.; Roy A. Lindberg, J. H. Cohn & Company, Newark, N. J.; Arthur B. Toan, Jr., Price Waterhouse & Co., New York; and H. G. Trentin, Arthur Andersen & Co., New York.

We also said in our May-June issue that queries and answers of general interest would be printed in *Management Services*. Herewith one of our first inquiries and the reply from our panel.

The Editors

Gentlemen:

Our computer installation is one that has grown by leaps and bounds over the past several years. During that time we, like many others, have suffered our share of turnover, rapid promotion within the operation and insufficient time to properly train the advancing operators in areas other than pure machine operating. The result of this rapid growth situation has been that we now have personnel in supervisory positions with little or no training in working with and handling people.

In an effort to correct this problem situation I would greatly appreciate any advice that you might care to render in three specific ways:

1. What is the best way to train these now relatively green supervisors?
2. Disregarding the best way; what is a good way to accomplish this training in an on-the-job basis or in short sessions after or during the operating shifts?
3. What is the best way to provide this training to a person

being groomed for a supervisory slot on a continuing basis during his advancements through the operation?

Your response to these questions will be most appreciated. They are prompted from what is an obvious need and from the reading of your invitation for questions on page 9 of the May-June 1969 issue of your magazine.

Operations Manager
Service Corporation

The writer is connected with the service corporation for a major American stock exchange.

. . . and the reply drafted by a member of the *Management Services* panel

The inquiry reproduced on the preceding page presents a number of the classical symptoms of computer management problems. The rapid growth, high turnover, lack of time for training, are common phenomena which may represent both cause and effect. The three specific questions, in their content and in the sequence of their appearance, suggest that the management may do well to study not only the specific methods of training supervisors but also the relationship of the computer installation to the overall management process of the organization.

Factory analogy

Many managements have been awed by the apparently complex technology of the computer and have failed to recognize that the computer is simply a machine which operates in a factory environment, and will respond to time-proved industrial management techniques. The computer operating facility receives raw materials (data), performs pre-conditioning operations (keypunching, etc.) and feeds the properly conditioned data into automatic machines (computers) with product specifications (programs) provided by a research and development (systems and programing) staff.

Having recognized the operating computer installation as essentially the equivalent of a factory, we are prepared to suggest, in response to Question 3, that the training of first line supervisory personnel can best be accomplished through the use of techniques developed for industrial supervisors' training generally.

Traditionally the first line supervisor or foreman, both by example and by implementation of specific on-the-job training programs,

has been a key party in developing the supervisory as well as the technical skills of employees. The weakness (in terms of supervisory training) of the inquirer's present first line supervisors represents a serious gap in the personnel development cycle which must be closed.

Use of programed texts

Among the training methods which may be employed are the recently developed self-instructional or programed texts. These texts are specifically designed for self-study. Among titles of programed instruction listed in the extensive *American Management Association Bookshelf Catalog* are the following: Basic Skills in Communication, Constructive Discipline on the Job, Effective Interviewing for the Supervisor, On-the-job Training, and How to Plan and Organize Work. Perusal of the brochures of one industrial education organization (Industrial Education Institute) discloses the existence of one-day seminars with pertinent titles such as the following: Understanding & Motivating Employees, Improving Supervisory Skills, Increasing the Supervisor's Skill as a Trainer, Short Internal Scheduling, etc. Higher level supervisors and managers (and supervisors in the Systems Design and Computer Programing areas) may benefit additionally from some seminars specifically oriented toward Managing Data Processing Operations (AMA), Computer Operations Management (C-E-I-R Inc.), Computer Operations Management and Control (Brandon Systems Institute), and others. Computer manufacturers' computer management seminars are generally directed at top management levels.

We cannot stress too strongly

that the books and programed instruction and seminars (which may, of necessity, be used as primary elements of a program responsive to Question 2) are only tools for use in the development of a sound training and development program which will include both formal training and on-the-job training administered by qualified supervisors. Among the contents of the formal program, considerable emphasis should be placed upon pertinent management relationships within the organization. This essential part of the training program is unique for each organization and therefore must be tailor-made either by the organization or management advisors acting on its behalf.

Management's obligations

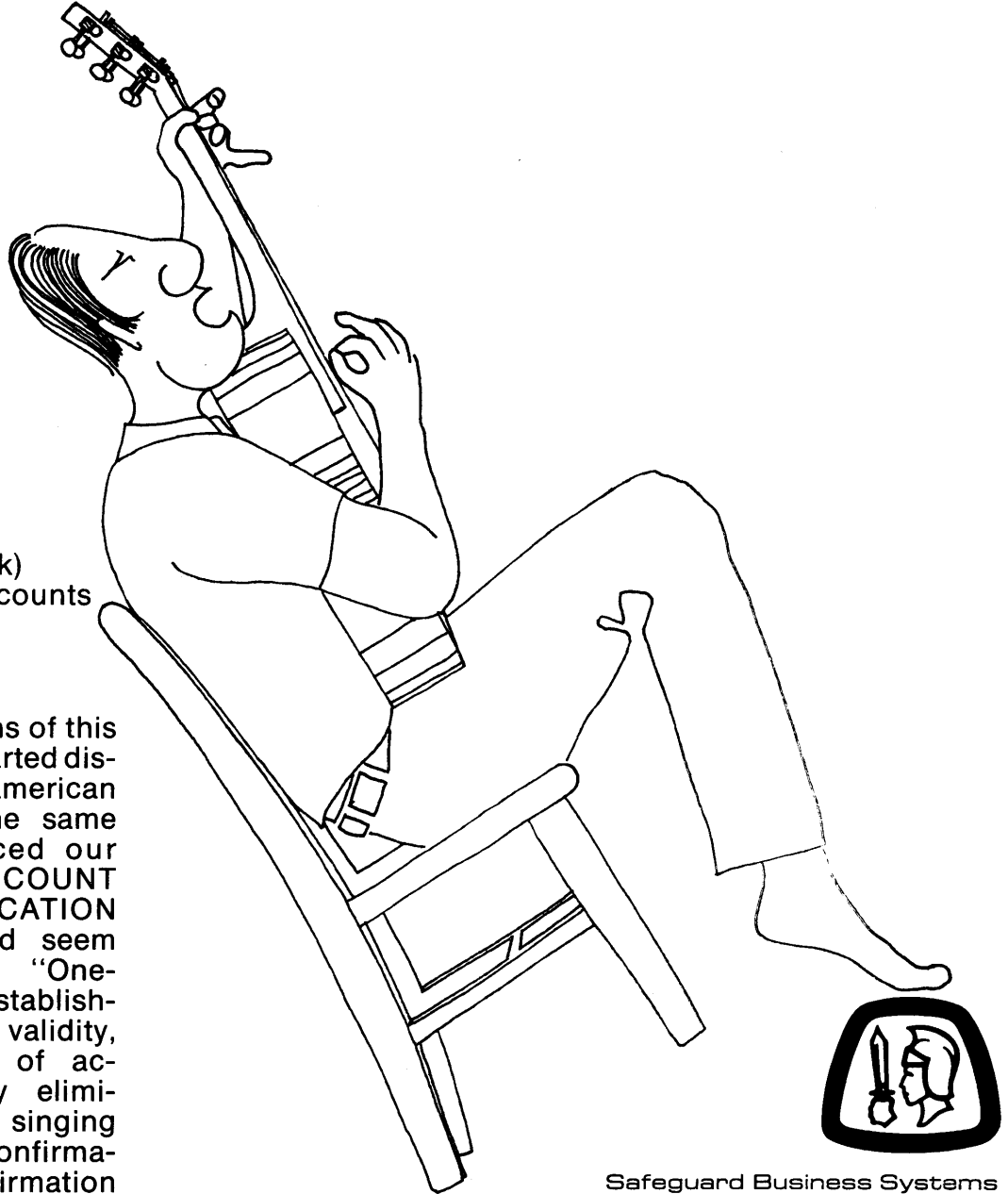
Management must be aware of the importance of developing its human assets and must be prepared to commit sufficient resources on a continuing basis to accomplish the job. Training responsibility should be specifically assigned, a budget should be adopted and staffing levels and work schedules should be reviewed to ensure availability of personnel to attend the designated training activities. The constraints implied in Question 2 should be eliminated at the earliest possible time.

Frequently, staff responsibility for training is assigned to the personnel department where it is possible to coordinate training needs with the equally important policies governing recruitment, compensation, promotion and related employee evaluation techniques which can identify, and provide suitable incentives for, those with the combination of technical aptitude and personal balance to become competent supervisors.

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 Gonna do?
 (plunk)
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 Gonna do?
 (plunk)
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Jack R. Charrin • A Lease-or-Purchase Decision Model for the XYZ Corporation p. 19

The pros and cons of leasing new equipment, as compared to other methods of financing its acquisition, are frequently discussed, but they are applicable to specific corporate decisions only in the most general

way. Each acquisition must be analyzed individually in the light of the criteria appropriate to it. This case study, based on actual company data, demonstrates the type of analysis that is required.

Belverd Needles, Jr. • A Single Information Flow System for Hospital Data Processing . . p. 27

Many hospitals are experimenting with electronic data processing. None, however, has yet developed a system based on the single information flow concept, the approach that most EDP specialists believe will be

the method of the future. This article reports the results of a study to determine the feasibility for a general hospital of such a system, utilizing a single pool of data for all applications.

Jordan L. Golding • Recognizing Management Services Opportunities p. 38

Management consulting, this author feels, offers "unlimited opportunities" for CPAs. The recognition of such opportunities, he says, is identical with recognition and understanding of clients' needs. The CPA who is already familiar with a company's financial

affairs through his auditing and tax practice should find it easy to spot operating problems; the author cites a number of possible situations that can lead to engagements for the CPA and higher profits for the client.

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Roy Ageloff, A. Wayne Corcoran, and Richard H. Simpson • Dollar-Value Retail

Inventory Pricing p. 46

Retailers that value their inventories on a LIFO basis often use the technique known as dollar-value retail LIFO to convert ending inventories at retail to the prices prevalent at the beginning of the period. The computations are tedious, particularly if the ratio of

selling prices to cost varies among departments. To reduce this drudgery, these authors outline a mathematical statement and a computer program for stating the retail dollar value of both aggregated and sectionalized inventories.

Staff Report • AICPA Computer Conference in Chicago (Part 1) p. 54

The AICPA's Fifth National Conference of Computer Users, held in Chicago May 19-21, was the first in a new series of annual automation conferences which

will replace the former series of semi-annual ones. This article summarizes some of the major presentations at the Chicago meeting.

DEPARTMENTS

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What people are writing about p. 58

Current books and magazine articles on subjects of interest to management and management consultants.

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people, events, techniques

GAO Recommends Government Purchase Computer Peripheral Equipment From Independent Manufacturers Rather Than Computer Concerns

A report recently released by the Government Accounting Office may put more of the Federal Government's annual \$2 billion computer business into the hands of peripheral equipment manufacturers. The GAO's findings indicate a Government saving of \$100 million if "plug-to-plug" components are obtained from independent sources instead of agencies' continuing to rely on systems manufacturers for complete packages.

The GAO study was initiated after the Subcommittee on Economy in Government of the Joint Economic Committee held hearings in late 1967 on Government procurement of EDP equipment.

The subcommittee was concerned with procurement practices that tended to favor larger manufacturers.

58 per cent savings found

GAO investigators focused their attention on magnetic tape transports and disk storage drives, two types of plug-to-plug compatible components marketed by manufacturers of independent peripheral equipment. The researchers found at least three independent manufacturers marketing tape transports at a saving in purchase cost of up to 58 per cent below the computer manufactur-

er's price. Savings in monthly leasing costs differed as much as 25 per cent. Similarly, disk storage drives could be purchased from three independent companies for as much as 29 per cent below the computer manufacturer's component price and leased for 24 per cent below the manufacturer's monthly price. The GAO estimates \$5 million could be saved by buying these components from independent companies instead of systems manufacturers, and \$23.5 million could be saved if the items were rented from independents.

The report cites private organizations that have experienced large savings by using plug-to-plug com-

patible equipment. Among these are: General Electric Company, Missile and Space Division, Long Beach, Calif., annual rental savings \$40,000, annual purchase savings \$311,000; Lockheed-California Company, Division of Lockheed Aircraft Corporation, Burbank, Calif., rental savings \$129,000; and Long Island Lighting Company, Hicksville, N.Y., purchase savings \$200,000.

While the report takes note of the many services provided by the computer system manufacturer, it states: "We believe that more and more situations arise when some users do not require all of the support services made available by the system manufacturer."

Subsequent to the GAO report the U.S. Comptroller General sent a letter to the heads of Federal departments and agencies recommending that they: replace leased components of computer systems with more economical plug-to-plug compatible units; evaluate alternate sources of EDP equipment; and in cases where purchase of plug-to-plug compatible equipment is determined not to be advantageous, consider third-party leasing arrangements.

ADAPSO Attacks Hardware Manufacturers Offering Preferential Rates

The Government's relationship with systems manufacturers has also recently been reviewed by the Association of Data Processing Organizations. In a position paper the Association has pledged to bring legal action against hardware manufacturers who charge nonprofit and government groups lower rates than ordinary customers.

Effect anti-competitive

The Association claims these discounts are "anti-competitive in ef-

fect and harmful to the ability of the electronic data processing services industry properly to serve the public."

William R. Lonergan, RCA division vice president for Government marketing, has announced that his company will separate pricing for the Federal Government on the maintenance of the computers it leases to them. He said RCA acted upon a request from the General Services Administration. However, separate pricing for the rest of RCA's customers is still only under consideration.

IBM, however, has responded to ADAPSO and other critics. Besides separating prices for all its customers, as of June 30, 1969, it has also cut its discounts to four-year institutions and junior colleges. Its former maximum discount of 30 per cent has now dropped to 10 per cent for qualifying institutions. Effective Nov. 1, 1969, IBM will also no longer give education discounts on maintenance agreements.

ADAPSO's interest in educational discount policies stems from the large amount of private contract data processing that is performed by educational institutions. Lowering the discount to colleges and universities means they will have to charge more for such services.

IBM 'Unbundling' May Lead to Higher Operating Costs

IBM's new pricing policy has made many hardware and software manufacturers reassess the value of bundling.

As of June 23, 1969, IBM has untied its single-price bundle of hardware, systems engineering, training courses, and special programs and now has separate prices for each. The company has also announced an across-the-board 3 per cent cut on equipment lease and purchase prices.

"IBM's unbundling will unleash a healthy competitive struggle among computer software suppliers and a series of secondary explosions will affect the computer industry and individual users," said Robert L. Harmon, vice president and general manager of McDonnell Automation Company.

Among the explosions Mr. Harmon expects are: an overall higher operating cost for computer users; increased demand for experienced data processing personnel; and a better marketplace for software developers. McDonnell is one of IBM's largest commercial customers, and IBM is also one of McDonnell's customers.

Firmly in support of unbundling, the Association of Data Processing Service Organizations, has issued a position paper which calls, "a tie-in sale no less odious than the full line forcing of products which are separately priced.

"ADAPSO believes that the best interests of all users (service organizations and others alike), would be served if all computer manufacturers would separately price any service or function which is or can be available in the marketplace or provided by the user himself if he chooses," the paper reads.

However, both Honeywell Inc. and the Sperry Rand Corporation's Univac Division have announced that they will keep their present packaged pricing policy.

While Univac briefly stated that IBM's price changes in no way affect its own operations, the vice president and general manager of Honeywell EDP, C. W. Spangle, gave a longer explanation for his company's stand.

"Our studies indicate that with separate pricing, customers would have difficulty predicting their future full costs, and the majority would pay significantly more in the future in order to continue to get the data processing services they are at present receiving," Mr. Spangle said.

Concurrent with its bundling announcement, Honeywell said it will

raise its winter prices for leased systems approximately 1 per cent. Although IBM is reducing its prices 3 per cent many users are unhappy that the reduction is not larger.

Paul Williams Jr., president of the Boothe Computer Corporation, said that the costs of IBM's auxiliary services would now amount to many times the 3 per cent reduction in hardware costs. Richard C. Jones, president of Applied Data Research, estimated the price cut was really a 25 per cent increase. IBM's 3 per cent reduction could be accounted for just on education, he said.

To help the EDP consumer evaluate unbundling, two consulting firms have compiled extensive reports that are now available. Programming Sciences Corporation, 90 Park Avenue, New York City, has written a booklet for corporate management analyzing the IBM decision's present and possible future effects on the data processing industry as a whole.

Operational Analysis Reports is a new addition to SOFTWARE PACKAGES: AN ENCYCLOPEDIA GUIDE, published by System Interaction Corporation, 8 West 40th Street, New York City. The new SIC publication is aimed at helping data processing management judge the alternatives offered by the unbundled market. The company claims the expanded service puts "everything but the systems manuals on your desk."

'Punch Card' Stock Certificates Advised To Ease Paperwork

In an attempt to solve Wall Street's paperwork problem the Committee On Uniform Security Identification Procedures of the American Bankers Association has recommended that the New York and American stock exchanges make all listed companies switch

to punch card certificates from the current large printed forms.

After three years of studying the backlog problem CUSIP recommends future stock certificates be standard punch card size, with a printed section that shows basic data, such as certificate number and stockholder identification number, legible to both cashier and an optical character reader.

If the broker is unable to afford scanning equipment punch card equipment could be used, the association says.

Printers of the standard 8- x 12-inch certificates now in use have protested that in the transition period there would be chaos, and that the smaller certificates could easily be counterfeited. The U.S. Banknote Corp., a certificate printer for decades, has instead suggested that for optical scanning a strip with identification numbers should be added to the top of existing forms and that future forms be printed with numbers on their back.

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1969

832 pages

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Uniform Procedures For Military Purchases Being Established

A data base containing technical and financial information on all contracts administered by the U.S. Army Matériel Command is being developed by the Computer Sciences Corporation, at facilities in St. Louis, Mo., and Washington, D.C.

The contract, valued at about \$1.6 million, was awarded to CSC's Systems Division by the Army Aviation Systems Command at St. Louis, Mo. It is aimed at stricter contract control.

CSC will develop what is to be called Military Standard Contract Administration Procedures. MILSCAP will provide uniform procedures for administering contracts. Standardized forms and data elements will be used to record all transactions. The computerized file will be automatically updated with every new contract transaction. MILSCAP will be part of the National Automatic Data Processing Program for Army Matériel Command Logistics Management, which is being developed by the Automated Logistics Management Systems Agency, St. Louis.

Another Army contract recently awarded to CSC is for the development of a computer-based information system that will quickly determine the cause of Army aircraft accidents and establish appropriate preventive measures.

Housebound Mothers Put to Work— Keypunching at Home

The hand that once rocked the cradle is now busy punching Touch-Tone telephone keys.

Mothers of pre-school-age children in Beltsville, Md. are adding keypunching to their other house-

hold chores. The women can earn extra money without leaving their homes by working for COMPUT-A-CREDIT of D.C., Inc.

After about an hour's training the mothers are ready to start work. Source documents are delivered to them at home. Then by using the Touch-Tone telephone as a keypunch keyboard they pass the information on to the COMPUT-A-CREDIT data center. There keypunch machines are connected to the telephone system by means of COMPUT-A-PHONE translators, supplied by Photo Magnetic Systems, Inc.

A contract for the State of Maryland Department of Motor Vehicles car registration cards has already been completed by them.

COMPUT-A-CREDIT next plans to train homebound handicapped people as well as dependent mothers on welfare. The company hopes this will allow these people to become self-supporting and to be taken off the welfare rolls.

Thorough Study Only Key to Effective MIS, Executives Told

"Instead of developing practical management information systems programs, many companies have rushed head-long into 'cure-all' computer reporting systems, which fail to aid the management decision-making process," Ira S. Gottfried recently told a group of executives attending Industrial Education Institute seminars in London and Manchester, England.

Mr. Gottfried is executive vice president of Norris & Gottfried, Inc., management consultants based in Los Angeles. He is also the author of many articles on management systems.

Exactly what reporting is necessary for management planning and decision making should be determined first, in order to avoid superfluous reports and to pinpoint critical information, Gottfried said.

The management team that tries to use the computer reporting system to get critical decision-making feedback without first determining basic information requirements is disappointed and unfortunately associates the failure with MIS," he said. Indiscriminately programing everything is a practice both "costly and self-defeating," Mr. Gottfried concluded.

LEASCO Will Analyze, Evaluate 5 Manpower Training Programs

An analysis and evaluation of five manpower training programs will be conducted for the Office of Economic Opportunity by the Leasco Systems & Research Corporation of Bethesda, Md. Approximately 10,000 individuals will be studied.

The programs to be focused on are: Neighborhood Youth Corps (NYC) (Out of School Component); Manpower Development and Training Act (Institutional Components); New Careers (NC); Job Opportunities in the Business Sector (JOBS); and the Jobs Corps.

The National Opinion Research Center of Chicago will trace a target group through each program and then compare them with a control group. Results will be weighed against background locale, economic environment, ethnic differences, and other potential influences. The results will then go to the OEO and the Department of Labor where the worth of each program will be assessed.

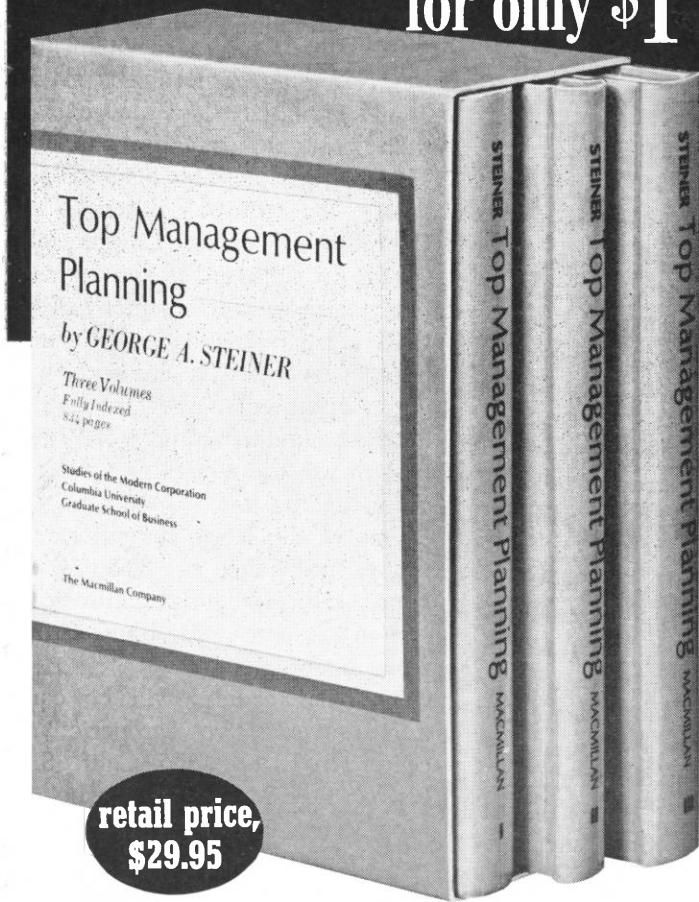
NASA Contract extended

Leasco has also recently had a NASA contract for systems analysis and information handling support extended. The contract, valued at over a million dollars, provides for the analysis of management systems applications to determine impact on existing workload and personnel.

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Management Services: A Magazine of Planning, Systems, and Controls, Vol. 6 [1969], No. 5, Art. 9

Leasco include: financial accounting, using teleprocessing; financial status of NASA programs; Office of Manned Space Flight Pert System; payroll (producing bi-weekly output); personnel reporting, including telephone directory; and personnel management information system. A special library system and a work planning and control system for NASA projects are to be established.

Accounting Executives Must Widen Horizons, Ohio Society Told

The top finance accounting executive of the future must widen his scope from being a "manager of numbers to being a manager of men," Dr. Marvin Schiller told the 1969 Convention of the Ohio Society of Certified Public Accountants.

Dr. Schiller is vice president in charge of the Los Angeles office of A. T. Kearney & Company, Inc., an international management consulting firm.

"Preview for the Seventies" was the theme of the conference, held in mid-June in the Commodore Perry Hotel, Toledo, Ohio. Dr. Schiller's topic was "What Characteristics are Necessary for Success?" Many of his observations came from his work as principal researcher for a project sponsored by the Financial Executives Institute, "Development of Financial Managers." The project's findings will be published later this year.

The formula used by Dr. Schiller to measure the relative effectiveness of executives in management appraisal studies is a combination of compensation, age, level of responsibility, tenure in the organization, industrial affiliation, and company size. A computer was used to make judgments about each man's success.

"There are no successful technicians at the highest levels, just

successful executives," Dr. Schiller told the conference. Successful executives "devote much more of their time to the high-payoff aspects of their jobs. . . . They don't do the work of their subordinate managers; they see their own jobs as big enough, and that they must get away from preoccupation with technical matters."

He found other personal characteristics which differentiated successful and unsuccessful managers were: the top men are more aloof than their less effective colleagues, tending to wait for people to come to them; the successful have a superior degree of maturity, with greater emotional stability and a broader perspective; and they delegate technical work to others.

The educational background most conducive to executive success is one that stresses balance between technical and liberal courses, Dr. Schiller reported.

"An MBA is important, but it's better to have solely a 'liberal education' as an undergraduate, than a highly technical education in both the undergraduate and graduate levels," he said.

As for post-employment training he observed, "Informal—but systematic and organized—management development programs are more effective in developing executives than formal lecture or seminar programs. 'Management-by-Objectives' programs are the kind that provide best results."

Individual emphasized

For executive success the organization should maintain an atmosphere that encourages the individual to take the initiative. He "should mold the company's philosophies, not just be molded by them," Dr. Schiller said. "Ego involvement is a necessity."

He concluded by suggesting, "The path to executive growth for accounting and financial managers is open to all who are willing to change and modify their performance in order to follow a new and more effective pattern."

Medical Insurance

Executives Taught

Better Computer Use

Plans have been made for about 3,000 health insurance executives to learn how to make more effective use of their computers.

The Blue Cross Association and the National Association of Blue Shield Plans have awarded a contract valued at approximately \$125,000 to Computer Sciences Institute, the educational service of Computer Sciences Corporation, for the development of two courses. One course will give senior executives a basic knowledge of computer concepts. The second will equip operating managers with a detailed understanding of how best to use the computer as a decision-making tool.

One of the latest computer additions in this field is a \$2.5 million Honeywell, Inc. communications system linking 150 Blue Cross plans nationwide.

The CSI courses will be conducted over a two-year period at centers in El Segundo, Calif., Silver Spring, Md., and St. Louis, Mo. Some 400 senior executives will attend three-day seminars covering: systems and equipment, programing languages, management information system development, and future trends in the computer software and hardware fields. A five-day course will be given to over 2,400 operating managers including such topics as: the systems approach to analysis and design, file management, the development process for a management information system, and a survey of existing and anticipated computer equipment and software.

Structured learning techniques will be used in teaching both these courses. Each point is covered with instructor's outline, slides, films, and displays. Students have individual response units placed at their seats with which they can indicate the degree of their understanding. This indicates to the in-

INTERNATIONAL AND REGIONAL AVERAGE WEEKLY SALARIES 1969	Mail Clerk—File Clerk	General Clerk—B	General Clerk—A	Accounting Clerk—B	Accounting Clerk—A	Bookkeeping Machine Operator	Offset Duplicating Machine Operator	Telephone Switchboard Operator	Typist—Clerk	Stenographer—B	Stenographer—A	Secretary—B	Secretary—A	Key Punch Operator—B	Key Punch Operator—A	Tabulating Machine Operator (intermediate)	Computer Operator (intermediate)	Programmer—B	Programmer—A	Systems Analyst (intermediate)
TOTAL U.S.	79	88	105	98	122	92	102	94	86	92	104	111	129	90	99	113	123	154	184	196
EASTERN U.S.	79	90	107	98	121	94	102	94	85	90	102	112	133	89	98	112	123	157	186	196
E. CENTRAL U.S.	78	87	105	101	121	95	104	96	86	95	105	114	131	90	104	115	126	151	184	194
W. CENTRAL U.S.	76	84	101	93	119	89	98	89	84	89	98	104	122	86	94	108	119	154	180	197
SOUTHERN U.S.	76	85	102	94	121	87	96	89	82	91	102	104	121	85	95	105	119	146	179	191
WESTERN U.S.	86	98	112	106	129	96	112	102	94	103	114	121	134	103	110	126	132	163	194	207
CANADA	61	68	97	80	110	74	77	73	68	72	86	92	107	73	83	91	109	130	155	159

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Clerical and stenographic salaries in the nation's offices continue to rise. Salaries in 1969 in the categories shown above averaged \$5.00 a week more than in 1968, according to the 23rd Annual Salary Survey Program of the Administrative Management Society.

structor where further clarification is needed.

Another hospital is planning to improve patient care with computerized medical services. The 1100-bed Ottawa Civic Hospital, Ottawa's largest and Canada's third largest, has given Information Industries, Inc., of Wayne, Pa., a five-year contract for a system that will not only include all hospital administrative functions, but also cover room and nurse scheduling, lab tests, statistical analysis, and the use of patients' records in research and statistical studies. The system should be operational by the end of this year.

Mental Health Institute Supports EDP System For Planning Centers

The National Institute of Mental Health, U.S. Department of Health, Education and Welfare has recently awarded a \$161,500 contract to the Central Analytics Corporation, of New York, for development of an EDP system utilizing its INFORMS software package.

The INFORMS package has already been applied to the creation

and use of large data bases for other Federal statistical work. The new contract is for handling of information which supports the planning and evaluation of community mental health centers.

Another study being financed by the Department of Health, Education and Welfare has recently awarded an additional \$300,000 to Leasco Systems and Research Corporation for a study of the supply of and demand for special educators for the handicapped.

Interviews will be conducted with students preparing to enter the field, and with those who were or are presently engaged in it. Personnel motivation and quality will be analyzed, as well as the effect of Federal funds in reducing manpower shortages.

New Software Guide Lists All Services

An analysis of the software industry, a description of available software products and services, and a directory of 50 companies offering career opportunities in the EDP field are all included in *The Computer Industry Guide*.

The 164-page book has recently been published by Resource Publications, Box 381, Princeton, N. J. 08540, a Gulf & Western company. Hardcover, *The Computer Industry Guide* sells for \$9.95 and softcover for \$6.95.

Management Group Honors Five Books Published in 1968

The Academy of Management has awarded its highest honors to five books published in 1968. The books were judged to contribute "significant insights, ideas, information or concepts to managers with major policy responsibilities."

Winning volumes are: *Challenge to Reason* by C. West Churchman, McGraw-Hill Book Company; *The Distribution of Authority in Formal Organizations* by G. W. Dalton, L. B. Barnes, and A. Zaleznik, Division of Research, Harvard Business School; *Management and Machiavelli* by Anthony Jay, Holt, Rinehart and Winston; *The Exceptional Executive: A Psychological Conception*, by Harry Levinson, Harvard University Press; and *Motivation and Organizational Cli-*

Management Services: A Magazine of Planning, Systems, and Controls, Vol. 6 [1969], No. 5, Art. 9
mate, by G. H. Litwin and R. A. Stringer, Jr., Division of Research, Harvard Business School.

Winn, dean of the Wharton School of Finance and Commerce, University of Pennsylvania; Charles S. Hobbs, vice president of Broadway-Hale Stores, Inc., San Francisco; Theodore O. Yntema, professor at Oakland University, Rochester, Mich.; and the late Ralph McGill, at the time of his death publisher of *The Atlanta Constitution*.

Special factors weighed

Initial screening for the awards was done by an advisory board of 35 professors of management and business administration. The Board of Judges consisted of: Willis J.

"The books selected by the Academy this year indicate the growing concern of management for a response to the prevailing social climate as well as a considerable advance in the human responsibilities of executives toward their employees and their communities," Dean Winn said upon announcing the awards.

The Academy is composed of 1100 educators and managers in university and corporate life. The authors were honored at special ceremonies during the Academy's annual meeting in Cincinnati, Ohio at the end of last month.

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GE, IBM Announce New Small Computers

Two new smaller computers have been added to the General Electric Company's line of products.

The GE-105 RTS is a computer designed to serve both as a remote terminal unit for a larger system and work as an independent machine. It can communicate with all computers in the GE-100, GE-400, and GE-600 lines. The new system can reduce the cost of central computer time and communication lines.

The GE-120 is a new addition to the GE-100 family. It is meant for users of small-to-medium sized computers. On a comparative scale the GE-120 fits between the smaller, less sophisticated GE-115 and the more powerful, higher priced GE-130. New software available with the GE-120 includes the Report Program Generator, GE-100 RPG, which, according to the manufacturer, makes the machine compatible with competitive equipment. This enables users of competitive computers to employ the GE-120 without reprogramming.

IBM offers two versions

A new low-cost computer, System/3, has been designed for small businesses by the International

The IBM System/3 utilizes a punched card only slightly larger than a standard credit card.

Besides the punched card system, the computer can also be ordered with direct access disk storage. The card model rental prices begin at \$945, and the disk version's start at \$1,325 a month.

The compact punched card used in System/3 is one-third the size of a traditional 80-column card, but holds 20 per cent more information. The computer is also compact, requiring only 150 square feet of floor space.

Customer shipment will begin for the card system in the first quarter of 1970, and for the disk version in the third quarter of 1970.

French Executives Show Highest Salary Gain in Europe in 1968

Top management in France received a larger net salary gain from 1967 to 1968 than its counterparts in six other western European countries.

The 17th International Executive Compensation Report lists a net salary gain for French executives of 14.7 per cent, as compared with a raise for similar executives in the Netherlands of only 3.7 per cent in the same period.

The report was compiled by the Brussels office of the Executive Compensation Service of the American Management Association in order to determine the latest top management remuneration practices.

Eight positions surveyed

A survey of eight top management jobs in each of 477 companies in seven countries was made. The countries studied were: France, the United Kingdom, Italy, Belgium, the Netherlands, Switz-

erland, and West Germany. To arrive at comparative cost-of-living figures an international spending pattern was developed using Paris as the base.

Total remuneration for Swiss chief executives was found to be the highest among the countries surveyed. In companies that fall in the thirty to fifty-million dollar sales range these men averaged \$35,970 annually. Chief executives in all the surveyed countries but the United Kingdom earned surprisingly close amounts: in France \$34,100, Germany \$33,250, Netherlands \$32,300, Italy \$32,100, and Belgium \$31,840.

However, in the United Kingdom the top man averages only \$26,850. This cannot be accounted for by the U.K. Government's freeze on incomes, significant in 1967, for salaries of top management personnel in 1968 did climb an average of 13 per cent.

The gap between U.K. income and that of other Europeans narrows when tax and retirement deductions are figured in, and again changes when the cost-of-living factors are included. A top executive in the Netherlands may average total remuneration of \$32,300 but after taxes and cost of living factors are applied he receives \$18,230. With the same factors the U.K. executive then comes out with \$18,940.

Handwritten and Typed Data Read by New Optical Scanning Unit

Both handprinted and typed or printed information can be read by a new optical character recognition system developed by Recognition Equipment Incorporated, Dallas, Tex.

It is called INPUT 2 because of its ability to read two types of data.

The system's interpretation of

handprinted is patterned after human brain workings, company President Herman L. Philipson, Jr., explained. INPUT 2 correctly identifies characters written in boxes on the document by noting the relationships of common character features, such as curved lines, vertical and horizontal lines, sharp corners, and line intersections. Its handprinted "vocabulary" consists of numbers one through nine, letters C, S, T, X, and Z, and plus and minus signs. Ideally the characters should fill the box assigned, but if not the newly developed reader electronically converts them to standard size, even if they are only a little larger than one-half the size of the box.

INPUT 2 also cleans up images, fills in weak strokes, ignores smudges, and sharpens contrasts on dirty backgrounds, says Recognition Equipment.

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'Group Technology' Will Be Outlined at European Conference

Group technology, a new approach to batch production of components, will be the subject of an international seminar to be held at the Turin International Centre, Torino, Italy, from September 8 to 13.

Industrialists, professors, and consultants from Czechoslovakia, the Federal Republic of Germany, France, Italy, Spain, Sweden, Tunisia, the United Kingdom, the United States, the U.S.S.R., and Yugoslavia are expected to attend.

The basic aim of group technology is to simplify the material flow system by grouping components into families with similar production requirements, and then grouping machine tools so each family is produced by one machine group.

Costs cut radically

One European valve manufacturing company that has employed group technology experienced these benefits: sales increased 32 per cent; stocks were cut by 44 per cent; throughput time was reduced from twelve to four weeks; and the backlog of overdue orders was reduced from six weeks to less than one.

The company found that the capital investment needed was recovered four times from the savings made in stock reduction alone.

Rather than using a line layout, plants that employ group technology use a functional layout, in which machines are grouped according to function for batch production. Components are divided into groups by one of four methods: by eye, by classification of design features, by classification of production features, and by production flow analysis.

Group technology is best suited for a factory in which many end products are needed, each in comparatively small quantities and

each containing many components made in batches, according to its partisans.

The Turin International Centre was established in 1965 by the International Labour Organisation. Its primary aim is to train key personnel from developing countries in advanced management and educational techniques. The Centre's board includes representatives from thirteen governments, the United Nations, and workers' and employers' organizations.

Burroughs Shows System For Recording EDP Output on Microfilm

A new electronic system which can record computer output on microfilm 40 times faster than a line printer can record the same information has been introduced by the Burroughs Corporation.

The BCOM, Burroughs Computer Output-to-Microfilm, generates records at up to 96,000 characters per second, as data is transferred from computer magnetic tape.

Hard copies of any information desired can be made by a Burroughs electrostatic printer from the BCOM record.

Storage advantage cited

Ray W. Macdonald, Burroughs president, pointed out the compactness and portability of microfilmed records offer storage advantages. "These advantages are particularly important for uses such as archival storage where information is referred to infrequently," he said.

Three different character sizes, and four different readers are available.

Depending upon the degree of capability required by the customer purchase prices for BCOM systems range from \$85,000 to \$125,000, and lease costs from \$1,890 to \$3,290 per month.

New Game Has Dual Role; Can Be Used As Screening Device

The next time a ten-year-old challenges you to a game don't be surprised if instead of playing tic-tac-toe you are designing a flow chart. COMPUT-A-TUTOR is a two-game kit designed by Worldwide Computer Services Inc., to introduce beginners to the fundamentals of computer flow charting.

Worldwide claims that in 15 minutes an average-to-bright ten-year-old child can be taught the introductory version of the game. The company's tests with this game show children can pick up basic flow chart concepts faster than adults can. Then the manufacturer suggests, "This version is also an excellent screening device for programmer trainee applicants."

The advanced game is more competitive and is intended for adults and teenagers. COMPUT-A-TUTOR—both games—sells for \$5.99 and may be ordered from the manufacturer at 280 North Central Park Avenue, Hartsdale, New York 10530.

Burbank Links All City Departments in Computer Network

Burbank, Calif., of television fame, is linking all its major city departments with a computerized network now being developed by Lockheed Information Systems of Sunnyvale, Calif., a part of Lockheed Missiles & Space Co.

Utility billing first job

The first task of the Burbank system will be to computerize the billing of users of city-owned utilities. The next assignment will be a land inventory. This project will eventually be the first multi-de-

partmental operation of the system.

The land inventory will help the daily operations of diverse city departments, aid in planning, and, according to City Manager Joseph Baker, enable the city to analyze its problems in new dynamic ways.

"For example," Mr. Baker said, "we can correlate the number of juvenile crimes in a certain area with the availability of recreational facilities in that area. Or we can look at concentrations of traffic accidents in terms of physical layout of the streets. . . . Obviously, this can be instrumental in solving or preventing problems in showing us how and where tax dollars should be spent."

The project is presently supported by a \$400,000 allocation from the Burbank City Council.

However, City Manager Baker said he hopes that in the future the Federal Government will find the program important enough to support, and will use Burbank as a model for other cities.

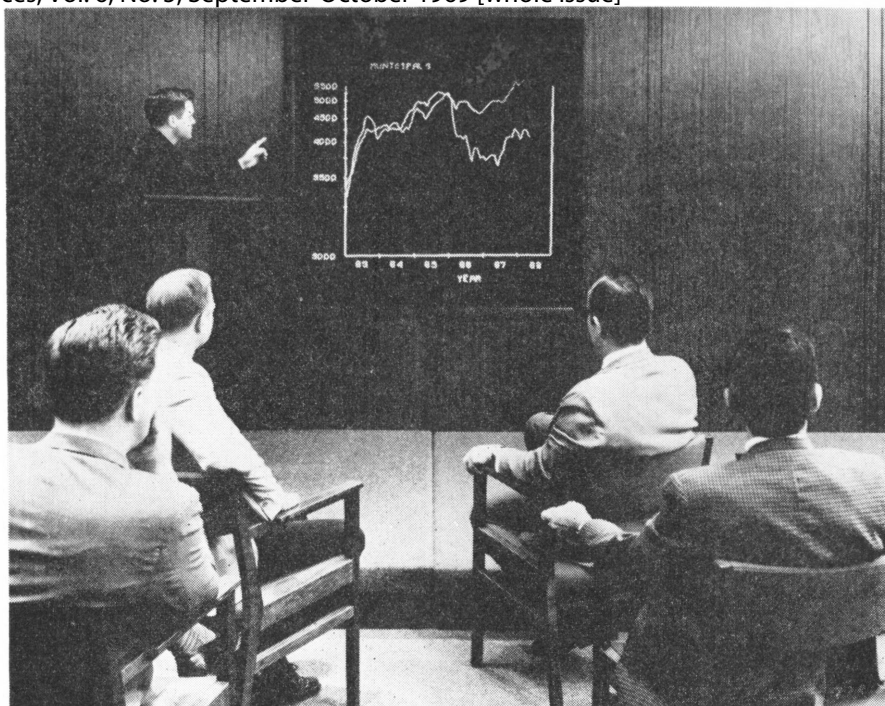
New Firm Formed to Bridge Gap Between Education, Consulting

A new firm which aims to "bridge the gap between management education and management consulting" is being headed by three former Harvard professors and a past vice president of Booz, Allen and Hamilton.

Applied Decision Systems, Inc., of Cambridge, Mass. offers to solve its customers' managerial problems and then provide the training to keep them solved and to update the resulting systems.

Grace & Co. financial partner

The new firm has absorbed the Management Science Center of Sterling Institute, with its personnel and library of seminar programs. W. R. Grace and Company, the



Information stored in a computer can be translated into graphic terms almost instantly by Kollsman Instrument's Delphic II Data Display System. This chart, produced in color from computer storage, shows municipal bond purchases of one bank in comparison with other institutions.

conglomerate, is ADS's financial partner.

Dr. Stanley I. Buchin, formerly an associate professor at Harvard, is the firm's president. Other top ADS men are Dr. Paul A. Vatter and Dr. John E. Bishop, Harvard professors, and Harvey N. Shycon, formerly with Booz, Allen and Hamilton.

Programs to Weigh Budget Alternatives Offered for Computer

A program designed to analyze budget decision alternatives has been developed by Economatics, of Pasadena, Calif.

PACER (Planning and Controlling Expected Revenues) assesses the profitability of each product line, facility, and department within a company. The new program, the manufacturers say, can evaluate desired strategies based upon such activities as production levels, inventory levels, and expected sales.

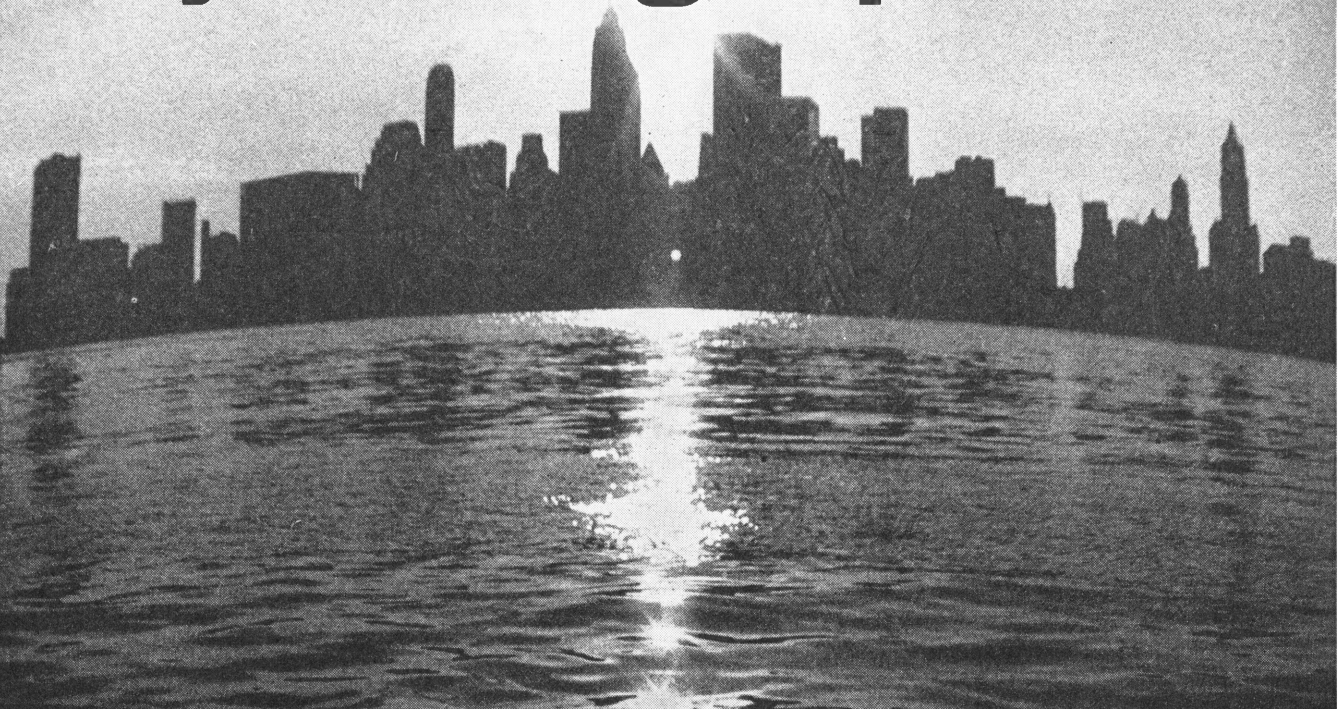
Payroll System Can Also Give Personnel Reports, Labor Data

Total payroll, personnel reporting, and labor distribution capability for single-plant or multi-division companies can all be computed with the Corporate Payroll System now being introduced by Information Systems Leasing Corporation, of Jenkintown, Pa., the company claims.

CORPAYS is a modular, general purpose payroll system which can produce hourly, salary, commission, and incentive payrolls on a weekly, bi-weekly, semi-monthly, or monthly basis. It will compute Federal, state, and municipal taxes, multi-rate commission structures, and other similar calculations. CORPAYS is also said to provide a complete set of reports, including verification reports and payroll information.

The CORPAYS package can be used on any third generation computer with a minimum of 32K core memory.

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Is it better to buy or lease the equipment needed in business? The answer will depend on a number of related factors, each of which can vary with the individual company. Here's a guide—the eight criteria used in one company—

A LEASE-OR-PURCHASE DECISION MODEL FOR THE XYZ CORPORATION

by Jack R. Charrin

Continental Oil Company

WHENEVER the managers of a business decide to acquire new equipment, they must decide whether it is better to buy the equipment or to lease it from a leasing company. The decision is a choice among financing methods since equipment is seldom purchased outright out of working capital.

Leasing, in general, has both advantages and disadvantages as compared to older and more conventional methods of financing equipment acquisitions such as bank loans. These pros and cons have been widely discussed.

Unfortunately, such discussions are applicable to specific corporate decisions only in a general way. Even for a particular company, it is impossible to state flatly that leasing is to be preferred to borrowing—or vice versa. Each acquisition must be considered on its own merits, in the light of criteria pertinent at that time, every time the need for decision arises.

This article presents—in the form of an actual case study—a demonstration of the type of analysis that is required. It evaluates leasing versus purchasing on the basis of eight criteria deemed significant to

the particular company being analyzed: the effect of each alternative on its working capital position, balance sheet, income statement, bank credit, debt restrictions, tax liability, equipment profitability, and costs.

The model used for the study was an actual company, and all data, including the data furnished for the lease-purchase comparison, were actual data.

A similar analysis could be prepared for any lease-or-purchase decision. The data would vary among companies, and so might the choice of some of the criteria and/or the

Financial Statement Summary

(in thousands of \$)

NAME		ADDRESS					FISCAL YEAR ENDS	
XYZ CORPORATION		HOUSTON, TEXAS					12/31	
STATEMENT SUMMARY								
Date of Statement:	12/31/61	12/31/62	12/31/63	12/31/64	12/31/65	12/31/66		
Uncertified - Certified:	Certified	Certified	Certified	Certified	Certified	Certified		
Current Assets	\$4,267.2	\$4,967.4	\$5,194.0	\$4,825.4	\$5,781.1	\$4,824.4		
Current Liabilities	2,312.6	2,936.5	2,876.8	3,298.6	4,739.1	4,564.1		
Working Capital	1,954.6	2,032.9	2,317.2	1,526.8	1,042.0	260.3		
Current Ratio	1.8	1.7	1.8	1.5	1.2	1.1		
Non Current Assets	3,657.4	3,540.3	3,327.1	4,488.6	5,375.7	5,362.7		
Non Current Liabilities	-0-	-0-	-0-	-0-	-0-	-0-		
Total Debt	2,312.6	2,936.5	2,876.8	3,298.6	4,739.1	4,564.1		
Deferred Income	5,612.0	5,573.2	5,644.3	6,015.4	6,417.7	5,623.0		
Total Worth	-	-	-	-	-	-		
Contingent Liabilities								
OPERATING SUMMARY								
Period covering data below	12 months	12 months	12 months	12 months	12 months	12 months		
Revenues								
Net Sales for above period	\$11,183.4	\$11,278.8	\$11,264.9	\$11,755.3	\$12,503.7	\$12,534.7		
Net Profit Before Depreciation & Tax	1,783.2	1,248.5	1,459.2	1,648.3	1,443.7	636.1		
Depreciation	(1,215.6)	(1,348.4)	(1,254.4)	(1,068.9)	(1,214.1)	(1,190.7)		
Tax	(199.9)	⁴⁾ 61.2	(133.7)	(197.9)	(122.9)	(135.7)		
Net Profit (Loss)	367.7	(38.7)	71.1	381.5	106.7	(690.3)		
Dividends Paid or Withdrawals	-	-	-	-	-	-		
Adjustments	-	-	-	³⁾ (10.4)	²⁾ 295.5	¹⁾ (104.4)		
Net to Surplus for Period	367.7	-	71.1	371.1	402.3	-		
ANALYZED BY (Initials & Date)								
EXPLANATIONS:								
1) Deferred Tax Accounting on Inter-Company profit								
2) Non-recurring income								
3) Foreign Exchange loss								
4) Refund								
Source: XYZ CORPORATION Financial Statements 1961-1966								

TABLE II

Lease-Versus-Purchase Working Capital Gain

Year	1 Purchase Net Cash Out	2 Lease Net Cash Out	3 Freed Working Capital Plus Cumulative Earnings	4 10% Return on Column 3 Totals	5 Tax at 50% of Column 4	6 Cumulative Lease Gain (3 + 5)	7 10% Present Value Factor	8 Present Value of Cash Inflows
1	\$191,915	\$ 64,512	\$127,403	\$ 12,740	\$ 6,370	\$133,773	.909	\$121,600
2	183,750	64,512	119,238 133,773					
			253,011	25,301	12,650	265,661	.826	219,436
3	191,917	64,512	127,405 265,661					
			393,066	39,307	19,654	412,720	.751	309,953
4	(49,584)	64,512	(49,584) 412,720					
			363,136	36,314	18,157	381,293	.683	260,423
5	(49,584)	64,512	(49,584) 381,293					
			331,709	33,171	16,586	348,295	.621	216,291
6	(49,584)	64,512	(49,584) 348,295					
			298,711	29,871	14,936	313,647	.564	176,897
	\$418,830	\$387,072	\$298,711	\$176,704	\$88,353	\$313,647		\$176,897

Explanations:

Column 6. XYZ will gain \$313,647 in working capital at end of lease period.

Column 7. Present value factor is XYZ's investment opportunity rate.

Column 8. Present value worth of working capital gain is \$176,897.

Sources: See Table VI

weight attached to each of them. The method presented here, however, is believed to be generally applicable.

The problem

XYZ Corporation faces a lease-or-purchase financing decision within the next three months. The decision to acquire the new equipment has been made. Competition and expanding geographical operations make the acquisition necessary. XYZ Corporation desires to analyze the present situation in light of the corporate needs over

the next three- to five-year period.

The financing decision involves \$700,000 worth of income-producing capital equipment. Two alternatives are possible. XYZ Corporation can either purchase the equipment through a three-year bank loan or lease it for six years from a leasing company.

Definitions

The terms used in the study are defined as follows:

Financial lease—A contract under which the lessee agrees to make a series of payments to the lessor which, in total, exceed the purchase price of the asset acquired.¹

Operating lease—All other leasing contracts, and those typically cancellable by the lessee upon giving due notice of cancellation to the lessor.²

Lessee—The renter of the equipment, i.e., XYZ Corporation.

Lessor—The organization that holds title to the leased equipment and that invoices the user (lessee) for the rental.³

Income-producing equipment—Equipment that produces a product or renders a service which provides revenue to the owner or user.

Equipment—In this case it is specialized oil-well-servicing equipment. There are seven units costing \$100,000 each, for a total cost of \$700,000.

Present Value—The maximum amount a firm could pay for the opportunity of making the investment without being financially worse off,⁴ or, the value today of money due at a future time.

Eight criteria have been selected



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¹ R. F. Vancil, "Lease or Borrow—New Method of Analysis," *Harvard Business Review*, September-October, 1961.

² *Ibid.*

³ F. K. Griesinger, "Pros and Cons of Leasing Equipment," *Harvard Business Review*, January-February, 1954.

⁴ R. W. Johnson, *Financial Management*, Allyn and Bacon, Inc., Boston, 1965, p. 189.

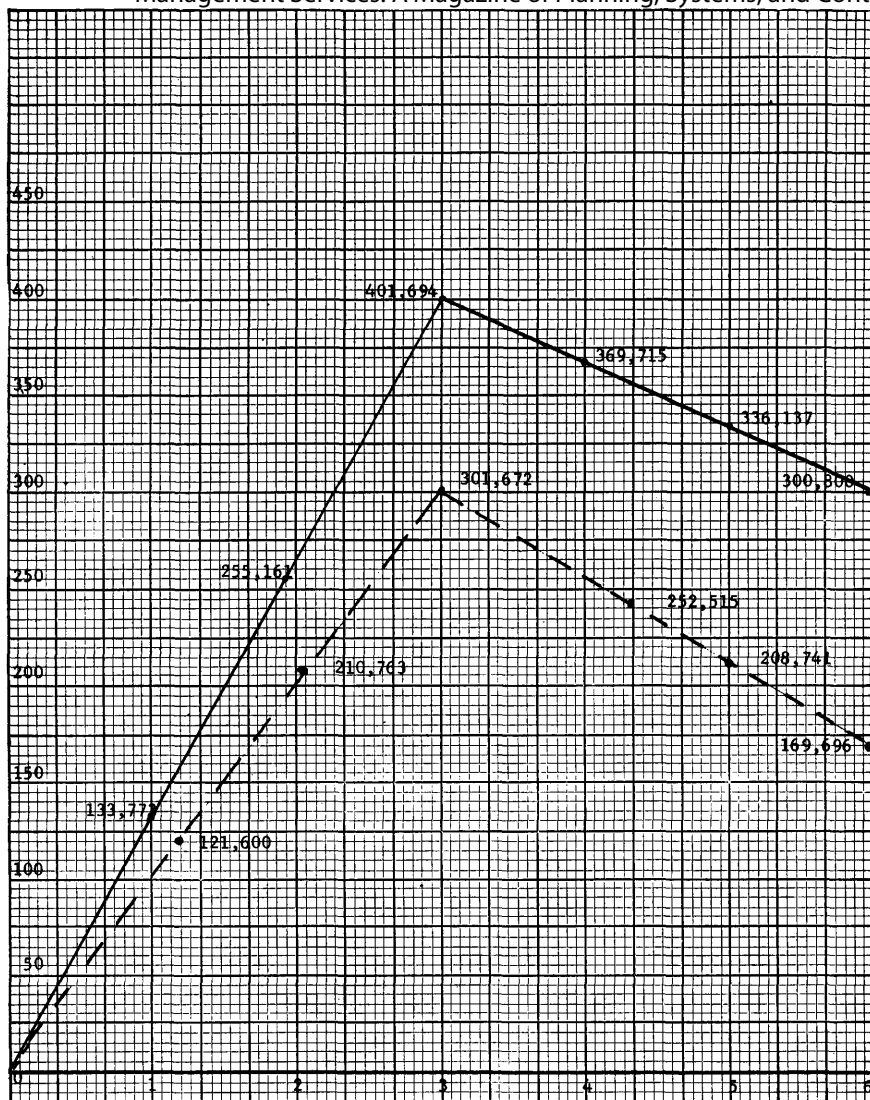
Table II on page 21 compares the effects of purchase and lease on working capital for XYZ Corporation. By leasing the equipment, the company gains \$313,647 in working capital at the end of the six-year period. A present value factor is applied to the cumulative lease gain in Table II, Column 6, relating these figures to the present worth of future dollars.

The figure at the left shows the working capital advantage of leasing before and after application of the present value factor. There is a rapid rise in the first three years followed by a decline in the last three years. This is primarily the result of higher purchase payments over a relatively short term compared to the lease rentals. The fact that lease rentals are fully deductible and purchase payments are not contributes to the rapid working capital gain. The decline results from the depreciation charge in the last three years. Lease rentals continue while purchase payments stop. This causes the lease gain in working capital to decline.

The net effect, however, is a freeing of additional working capital over the six-year period. Working capital means just that; it must be kept working to justify the additional leasing cost. It is assumed that the company will invest the additional working capital in profitable projects returning a minimum 10 per cent before taxes. This return is measured by dividing net profit after taxes and depreciation by working capital. Table I provided the two figures for the years 1961 through 1966.

Balance sheet effects

The appropriate treatment of leases on the balance sheet has been debated by financial institutions that seek credit information and accountants who prepare financial statements. C. R. Reed summarizes the results as follows: "Despite sincere attempts to achieve uniformity by accountants,



Working Capital Movement Over Six-Year Period
 (Based on Data from Columns 6 and 8, Table II)

as pertinent. These criteria are generally applicable to any lease-or-purchase decision. However, modifications would have to be made to adapt the model to individual needs. For example, the method of depreciation may vary, the interest rate may change, and the lease rate may fluctuate. However, the approach described here can be adapted to adjust to these changing factors.

Working capital

Maintaining adequate working capital is important to most companies. Working capital is defined as the funds available after meeting all current obligations (liabilities) during the course of a year.

XYZ Corporation shows a need for working capital, as indicated from the analysis in Table I on page 20. Working capital has decreased from \$2,317,200 in 1963 to \$260,300 in 1966. Working capital provides funds for investment projects important to the company. XYZ Corporation has an active research program, which requires large sums each year.

Leasing has the advantage of providing increased working capital, especially in the first few years. This additional working capital may be invested in profitable projects. The lease provides this working capital advantage because the rentals are fully deductible as expenses while purchase payments are not. Tax deductions on a pur-

FINANCIAL STATEMENT ANALYSIS

5-553A

NAME	(In thousands of \$)					FISCAL YEAR ENDS
XYZ CORPORATION	Houston, Texas					12/31
Date of Statement:	12/31/61	12/31/62	12/31/63	12/31/64	12/31/65	12/31/66
Uncertified - Certified:	Cert.	Cert.	Cert.	Cert.	Cert.	Uncert.
Cash on Hand and in Bank	\$ 366.9	\$ 428.1	\$ 675.8	\$ 459.9	\$ 432.5	\$ 310.2
Notes Receivable						
Accounts Receivable	2,402.8	2,628.6	2,597.4	2,145.0	2,086.0	2,246.1
Reserve for Credit Losses (Red)						
Inventory	1,396.3	1,639.6	1,695.2	1,860.5	1,906.5	1,862.3
Other Receivables	101.2	273.1	225.6	360.0	702.0	405.8
Contract Receivables	-	-	-	-	654.1	
Cash Sur. Value Life Ins.						
TOTAL CURRENT ASSETS	\$4,267.1	\$4,969.4	\$5,194.0	\$4,825.4	\$5,781.1	\$4,824.4
Land and Buildings and))						
Machinery & Equipment, Furniture & Fixtures)	\$8,144.4	\$8,807.1	\$9,072.9	\$10,633.4	\$12,156.4	\$12,469.8
Reserve for Depreciation (Red)	(4,643.7)	(5,428.3)	(5,949.1)	(6,494.1)	(7,200.6)	(7,289.4)
Deferred and Prepaid Expenses						
Due from Officers & Employees						
Reserve & Holdback with Finance Co.						
TOTAL ASSETS	\$7,924.6	\$8,509.7	\$8,521.1	\$9,314.0	\$11,156.8	\$10,187.1
Notes Payable to Bank (Secured)	-	-	-	-	-	267.6
Notes Payable to Bank (Unsecured)						
Notes Payable, Merchandise						
Notes Payable - Others	700.0	1,405.0	1,405.0	1,850.0	3,000.0	2,720.0
Accounts Payable Trade	651.1	437.1	507.2	516.6	789.8	502.5
Due to Officers & Employees						
Accrued Expenses	492.6	529.6	533.8	463.3	548.3	515.8
Taxes Due & Reserve for Taxes	131.6	33.6	99.2	161.1	69.1	27.5
Accounts Payable - Other	230.7	422.4	220.5	101.1	-	305.7
Minority Interest in						
Subsidiaries	106.6	108.8	111.1	156.0	158.8	165.2
Deferred Taxes				50.5	173.1	59.8
TOTAL CURRENT LIABILITIES	\$2,312.6	\$2,936.5	\$2,876.8	\$3,298.6	\$4,739.1	\$4,564.1
Real Estate Mortgages - When Due?						
Deferred Income						
Capital Stock - Preferred	560.0	560.0	560.0	560.0	560.0	560.0
Capital Stock - Common	500.0	500.0	500.0	500.0	500.0	500.0
Individual or Partnership Investment						
Eamed Surplus	4,552.0	4,513.2	4,584.3	4,955.4	5,357.7	4,563.0
Capital Surplus						
Treasury Stock (Red)						
Intangibles (Red)						
TOTAL LIABILITIES & WORTH	\$7,924.6	\$8,509.7	\$8,521.1	\$9,314.0	\$11,156.8	\$10,187.1
Explanations:	Source: XYZ Corporation Financial Statements 1961 through 1966					

bankers, and others, with capitalization of the leased asset at one extreme, complete omission of it at the other, and footnotes of various kinds somewhere in between.”⁵

This article does not attempt to offer a solution to that problem. Under XYZ’s present method of treatment of lease obligations, the company’s balance sheet will reflect a more favorable debt to equity ratio if it chooses to lease. XYZ’s 1966 year-end balance sheet, for example (shown in Table III on page 23), would reflect the results shown in Table IV at the left before and after \$700,000 equipment financing.

The lease does not affect the company’s balance sheet. The balance sheet would contain a footnote describing the lease obligation. The company’s debt to equity ratio remains at .8:1 when leasing while the ratio changes to almost 1:1 when purchasing. A creditor may or may not take

TABLE IV
Effect of Financing on Balance Sheet

Before and After Lease (no change):			
Current Assets	\$ 4,824,400	Debt	\$ 4,564,100
Fixed Assets	5,362,700	Equity	5,623,000
Total Assets	\$10,187,100	Total	\$10,187,100
After Purchase:			
Current Assets	\$ 4,824,400	Debt	\$ 5,264,100
Fixed Assets	\$ 6,062,700	Equity	5,623,000
Total Assets	\$10,887,100	Total	\$10,887,100

TABLE V
Comparison of Deductible Expenses

Deductible Expenses	Year 1-2	Year 3-6
Interest	\$ 81,667	\$ 16,333
Depreciation	198,334	396,668
Totals	\$280,001	\$413,001

LEASE

Rentals	\$258,048	\$516,096
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⁵ C. R. Reed, “Leasing and Its Effect on Financial Statements,” *Bulletin of the Robert Morris Associates*, April, 1966.

TABLE VI
Lease-or-Purchase Comparative Analysis
EQUIPMENT COST—\$700,000

Year	PURCHASE						LEASE				
	1	2	3	4	5	6	7	8	9	10	11
	Principal Payments	Interest	Gross Depreciation	Investment Credit	Tax Saving 50% of (2 + 3)	Net Cash Out [(1 + 2) - (4 + 5)]	Cumulative Cash Out	Rentals	Tax Saving 50% of Rentals	Net Cash Out (8-9)	Cumulative Cash Out
1	233,333	49,000	99,167	16,334	74,084	191,915	191,915	129,024	64,512	64,512	64,512
2	233,333	32,667	99,167	16,333	65,917	183,750	375,665	129,024	64,512	64,512	129,024
3	233,334	16,333	99,167		57,750	191,917	567,582	129,024	64,512	64,512	193,536
4			99,167		49,584	(49,584)	517,998	129,024	64,512	64,512	258,048
5			99,167		49,584	(49,584)	468,414	129,024	64,512	64,512	322,560
6			99,167		49,584	(49,584)	418,830	129,024	64,512	64,512	397,072
	700,000	98,000	595,002	32,667	346,503	418,830	418,830	774,144	387,072	387,072	387,072

Explanations:

- Column 2. Interest for each year is due annually on remaining loan balance at 7% per year.
- Column 3. Six-year straight line depreciation is used. Salvage value is 15% or \$105,000.
- Column 4. Two-thirds of \$700,000 at 7% spread equally over two years
- Column 5. 50% of interest and depreciation will be recovered through tax deduction. 50% rate taken as average corporate tax rate.
- Column 6. To Table II, Column 1
- Column 10. To Table II, Column 2

Bank Rate is an effective rate of 7%.

Lease company rate is \$15.36 per \$1,000 per month or \$129,024 per year, for six years, all inclusive charge. Factors such as equipment residual value, money cost, depreciation method, lease term, and investment credit are used in a formula to return a minimum 2% on average earning asset.

Rates used are estimated and are subject to change under various economic conditions.

Sources: Bank X, XYZ Corporation, and ABC Leasing Company.

the lease obligation into account. At first glance the balance sheet presents a more favorable debt to equity ratio. However, it should be recognized that this particular advantage may be temporary and somewhat misleading. The company may or may not want to capitalize a lease obligation.

Income statement effects

The company should consider the effect of both leasing and purchasing on the income statement. If the lease period is too short, operating expenses will be overstated; if it is too long, they will be understated. In this particular case, the lease period corresponds to the depreciable life of the equipment; therefore, the operating expenses are neither overstated nor understated. However, because deductible expenses under leasing will be less than deductible expenses under purchasing during the first two years of the six-year period, the before-tax earnings will be less under the purchase than under the lease. During the remaining four-year period, deductible expenses will be greater and before-tax earnings will be less under the lease than under the purchase. Table V on page 24 illustrates these points. (The figures are taken from Table VI, which appears on page 24.)

During the first two years, earnings will be \$21,953 less under the purchase. During the next four years, earnings will be \$103,095 less under the lease. The six-year period will result in \$81,142 less earnings under the lease.

Bank credit line

XYZ Corporation can use the lease as a credit expansion tool. Through leasing rather than purchasing, the company keeps its present bank credit line free for possible future loans. A \$700,000 loan would seriously draw down any available credit line.

Therefore, leasing the equipment, by maintaining the company's borrowing capacity with the

TABLE VII

XYZ Corporation's Economic Justification for Capital Expenditure

Estimated Equipment Cost		\$700,000	
<u>Annual Sales:</u>			
2—Offshore logging units		\$240,000	
5—Land logging units		<u>900,000</u>	
	Total Annual Sales		\$1,140,000
<u>Annual Operating Cost:</u>			
2—Offshore logging units		\$210,000	
5—Land logging units		<u>690,000</u>	
	Total Operating Cost		\$ 900,000
Gross Operating Profit			\$ 240,000
Selling and Administrative Expense			<u>15,000</u>
Annual Profit before Taxes			\$ 225,000
Estimated Taxes 40%			<u>90,000</u>
Annual Profit after Taxes			\$ 135,000
Annual Depreciation			<u>116,000</u>
Annual Payout Amount—Cash Flow			\$ 251,000
Payout Period from Approximately 1/1/67			2.9 years
Return on Investment			19%

Source: XYZ Corporation

bank, would have a beneficial effect on its credit line.

Debt restrictions

A company may be prevented from assuming additional long-term debt by loan covenants. Leasing under the conditions of this case would not place restrictions on the company's need to assume additional debt. Based on the past history and overall financial condition of XYZ Corporation, the terms of the lease would allow management to exercise its own judgment in assumption of additional debt.

Under its present debt structure, however, XYZ is restricted from taking on additional debt. There are no restrictions against leasing equipment. Therefore, leasing offers a flexible means of financing the equipment.

To the extent that lease rentals are fully tax-deductible as operating expenses while only depreciation and interest are deductible under the purchase method, leasing offers an advantage. From Table VI, Columns 5 and 9, a comparison of tax savings between leasing and purchasing indicates that leasing saves \$40,569. This saving results because the amount of the rentals is

higher than the total of depreciation plus interest. If the six-year lease period were shorter than the depreciable life of the equipment, a faster equipment write-off would be possible, which would defer taxes. But in this particular case, both the lease period and depreciable life are the same; therefore, that possible tax advantage does not exist.

Equipment profitability

As is shown in Table VII on this page, the equipment will net \$135,000 annual profit after taxes. A return of 19 per cent on investment is projected. The figures are based on the historical earning capacity of the equipment.

Whether the company leases or purchases the equipment, the net profit of \$135,000 will be earned, assuming that the current economic situation continues for the foreseeable future. Therefore, the company must decide whether the equipment creates profits because of its ownership or because of its use. If the company decides that profits lie in use, the lease should be considered a possible alternative to the more traditional purchase. The relatively high rate of

Management Services: A Magazine of Planning, Systems, and Controls, Vol. 6 [1969], No. 5, Art. 9
return of \$135,000 net after taxes compared to the \$64,512 net after tax rental indicates that leasing would offer an attractive financing alternative.

Cost

In any lease-versus-purchase comparison, the area of cost is an important consideration. As a general statement, it can be said that leasing is more expensive than purchasing when all factors are considered. However, in spite of leasing's higher dollar cost, the profits generated on freed working capital often outweigh the additional cost.

From Table VI, Column 8, XYZ Corporation would pay \$74,144 in finance charges through leasing. Added to this figure is the estimated equipment residual value which XYZ gives up. The residual value of the type of equipment involved is difficult to estimate because of its specialized nature and limited marketability. However, an approximate value at the end of the six-year lease would be 20 per cent, or \$140,000. The total dollar leasing cost is estimated at \$214,144 ($\$140,000 + \$74,144$), compared to \$98,000 in interest charges for purchasing (Table VI, Column 2). However, this \$116,144 higher leasing cost difference is offset by the earnings on freed working capital totaling \$176,704 (Table II, Column 4). While the figures are estimates, they are realistic enough to support the comparative analysis.

Conclusions

These significant conclusions for XYZ can be drawn from this analysis:

1. The lease provides working capital advantages for XYZ Corporation.
2. XYZ Corporation can use the additional working capital for profitable alternative investments.
3. The lease cash flow is superior to the purchase cash flow.
4. The actual financing cost of the lease is higher than the cost of

bank financing, but profits on the freed capital offset the higher cost.

5. The income statement leasing effects are unfavorable from an earnings standpoint, but the balance sheet leasing effects are favorable.

6. Debt restrictions, tax advantages, bank credit line effects, and equipment profitability criteria are important considerations.

It is recommended, therefore, that XYZ Corporation should consider leasing as a method of financing the \$700,000 equipment cost.

The evidence in this case indicates that leasing the equipment from a leasing company offers definite advantages over financing the purchase of the equipment through a bank loan. This is not necessarily the case for other companies or for other decisions of XYZ. It must be emphasized that these findings are based on evidence collected under particular business conditions and analyzed from a particular company's financial data. While the company is similar to many others, certain peculiarities and variables exist for each company. For example, the interest or leasing rate, i.e., money cost, varies according to the economic conditions and credit standing of the borrower. However, the approach of this study can be adopted to take these variables into account.

The decision model presented in this article and the eight criteria on which it is based should contribute toward a better understanding and awareness of the factors involved in a lease-or-purchase decision. The model attempts to present significant criteria in an easy-to-apply approach. XYZ Corporation provided an actual situation to which the decision model could be applied. The model can be adapted to meet an individual company's needs. It must be re-emphasized that any company considering a lease-or-purchase decision must analyze its individual needs in light of the criteria presented. No generalization can be made as to whether lease or purchase is a better financing method.

As a general statement, it can be said that leasing is more expensive than purchasing when all factors are considered. However, in spite of leasing's higher dollar cost, the profits generated on freed working capital often outweigh the additional cost. Thus, in the case of the XYZ company, which could use additional working capital for profitable investments, leasing was recommended.

The single information flow system—as compared with the total systems approach—depends on all data being located in one integrated file to meet all demands. Here's a study of how it might work in a hospital to meet a wide variety of demands—

A SINGLE INFORMATION FLOW SYSTEM FOR HOSPITAL DATA PROCESSING

by Belverd Needles, Jr.

Texas Technological College

MANY DATA processing specialists believe that the single information flow approach to EDP will be the method of the future.¹ Under this approach parallel data processing systems arranged in series would be replaced by a single

¹ For example, see A. L. Baumann, Jr., "Single Information Flow Philosophy," *Data Processing Year Book*, American Data Processing Inc., Detroit, 1963; H. B. Joplin, "The Accountant's Role in Management Information Systems," *Journal of Accountancy*, March, 1966; A. F. Moravec, "Basic Concepts for Planning Advanced EDP Systems," *Management Services*, May-June, 1965; and Richard E. Sprague, *Electronic Business Systems*, Ronald Press, New York, 1962.

coordinated system. The object would be to create a complete information pool—rather than specialized pools—from which management could retrieve desired information economically.

This article reports the results of a study² of the applicability of the single information flow concept to hospitals—specifically to short-term general hospitals. In order to see

² The author is indebted to the American Hospital Association, Chicago, Illinois, for the financial support of the study on which this article is based. However, the conclusions are the author's own and do not represent actual or implied positions of the American Hospital Association.

whether a general hospital information system could be designed on this basis, the author, first, developed criteria and information requirements for a single information flow system; second, analyzed each function of a short-term general hospital on the basis of these criteria; and, third, conducted intensive studies of two medium-size to large hospitals, interviewing the people representing each function in depth.

The overall conclusion of the study was that the single information flow concept can be applied to hospitals—with certain modifications. The general hospital information system developed as a re-

sult of the study utilizes a single integrated data store for the system as a whole. Not all input to and output from the system needs to be on line, however. On line input and output are desirable for the portion of the system that deals directly with patient billing records. Certain other functions, such as payroll and purchasing, can be handled by supporting systems since it was found that in these areas the cost of on line communication and processing was not justified by timeliness requirements.

The model hospital information system that resulted from this study is described in detail in this article.

Single information flow

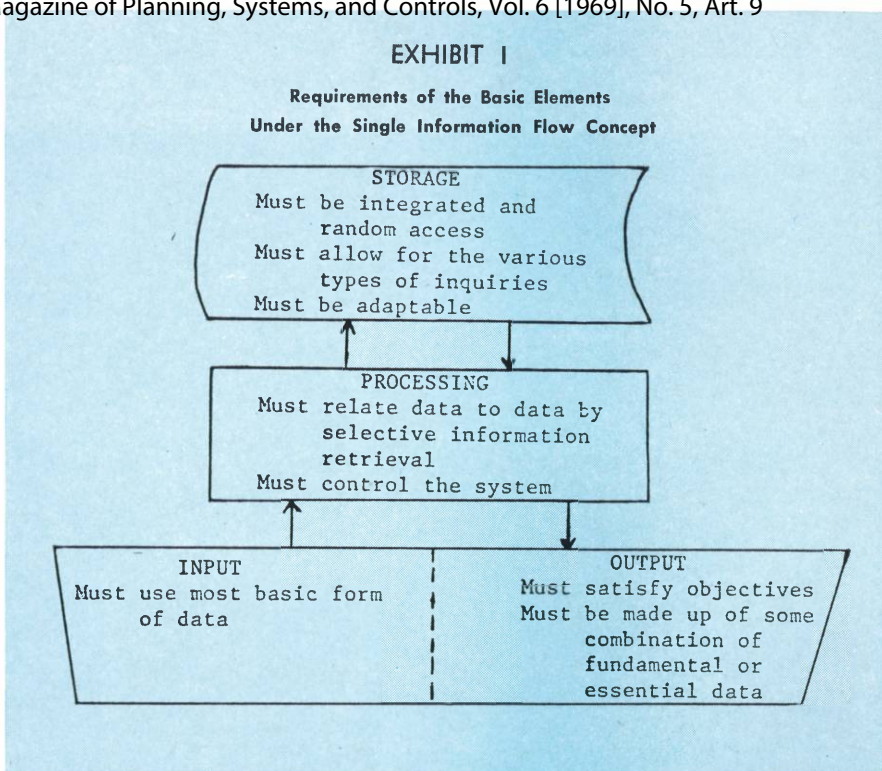
The single information flow concept of data processing contrasts sharply with the older total systems approach. In the total systems approach the final goal is the application of automated data processing to a conventional accounting system; that is, major functions such as payroll, inventory control, trial balance preparation, and production control are treated as subsystems with separate data files and scheduling.³

In a single information flow system all information essential to the conduct of the business would be part of a single, completely interdependent information flow. The shift in thinking of data processing systems designers from the total systems approach to the single information flow concept represents a trend "from the mechanization of mere data handling towards a complete integration of all major information systems within a company into a single operating system."⁴

The goal is to enter a single

³ For a more thorough discussion of the characteristics and merits of the two approaches see Moravec, *op. cit.*

⁴ L. G. Ifft, "Integration of Data Processing and Its Impact on Accounting," *Management Accounting*, September, 1962, p. 19.



piece of information into the data processing system only once in its history; from then on it is available to serve all requirements until its usefulness is exhausted.⁵ The key to this type of system is a basic understanding of how information is going to be used. Information should be stored in such a way that the relevant—and only the relevant—data can be retrieved in a timely manner when needed.

Distinction between approaches

Success in the single information flow approach requires understanding and acceptance of the basic conceptual difference between it and the total systems approach. This basic difference lies in the relationships among the data in the files. In the total systems approach the files are independent. In the single information flow approach, however, all data in all "files" are so interdependent that separate files do not exist. There is a single large integrated file.

Because of this interdependency of all data, the system must provide for selective information re-

⁵ Moravec, *op. cit.*, p. 53.

trieval. It must include random access storage for efficient retrieval of any necessary combination of data. In the total systems approach data in each file are originally arranged in the way that will facilitate preparation of the reports required for each function. In the single information flow approach the same piece of data may be related to several completely different sets of data in different ways. The system must satisfy these different requirements while preserving the integrity of the data.

The requirements of the various elements of the single information flow system—output, input, processing, and storage—are presented in Exhibit 1 above.

Output requirements

Every system is designed for a purpose. The starting place for the design of a system, therefore, is a statement of the objectives or goals of the system. The output of the system should aid in meeting these objectives. Several basic questions must be answered in the design of any system: What information do the various members of the organization need? Why do they need this information? How do

they expect to use the information?

There is a constraint that limits the absolute amount of data that can be entered into a single information flow system: The system should accept and process only fundamental data which are necessary for the operation of the organization. Secondary data desired by some department must be processed off line. This limit on the amount of data that can enter the system also places a limit on the output. Thus, it is necessary to have some criteria for determining which of the possible outputs related to a certain objective are actually essential. The choice of outputs, in turn, will determine the fundamental inputs necessary to produce those outputs.

Input

The basic requirement in planning the input for the system is that the data must enter the system in their most basic form. This is important in determining the sources of the data and in permitting the use of these data in all ways desired. For instance, the average length of a patient's stay in the hospital would not be entered directly into the system because its components, number of patient days and number of inpatient discharges, are also used in the computation of other indicators such as gross patient revenue and operating expenses per patient day. In addition, these component items may be needed for still other reports without being combined with other measures.



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He has won the manuscript contest conducted by the Illinois National Association of Accountants twice. Mr. Needles was formerly a member of the research staff of the American Hospital Association.

Basically, the data processing function relates pieces of data to each other with the goal of producing the desired output. The data must be integrated in such a way that an efficient way of addressing and retrieving data can be established. Through this process of relating pieces of data to each other, the processing function relates input to output, source to use.

Processing and storage

In order to accomplish its objective, the processing function must have control over its system. Proper controls, including adequate software, ensure that information is delivered when needed in the horizontal distribution to the various departments and that effective feedback is accomplished by filtered vertical distribution of information by exception reports to the proper levels of management. The system should be adaptable to changes in conditions that affect information needs.

In the actual integrating of the essential data the system designer must recognize the needs of the processing function. He also must take into account the interrelationships of the data and the various types of situations in which they might be retrieved, such as for routine reports, specific inquiries, reaction or control reports, and solving of special problems. In setting up the file organization he must consider the need for future expansion of the data store, the need for remembering or forgetting of data, the need for updating of certain accounts, and the need for handling of reports that contain the same information but cover different fiscal periods.

Three steps are required to develop a system which meets the stated requirements. First, the specific output data requirements must be stated. Second, the inputs or data necessary to produce the output must be established. Finally, the output and input characteristics must be described. When

these steps have been completed the system designer will have sufficient information for developing a data file and for designing a general system that will generate data for entry into the file.

Included in the system developed in this study as output requirements for the typical hospital were individual insurance reports, Medicare cost reports, other insurance reports such as those for Blue Cross and commercial insurance, internal reports, financial statements, budgeting requirements, and medical records. Also included in the study were the hospital data sharing plans of Hospital Administrative Services, Cost Allocation Program, and Professional Activity Study.⁶

Output characteristics

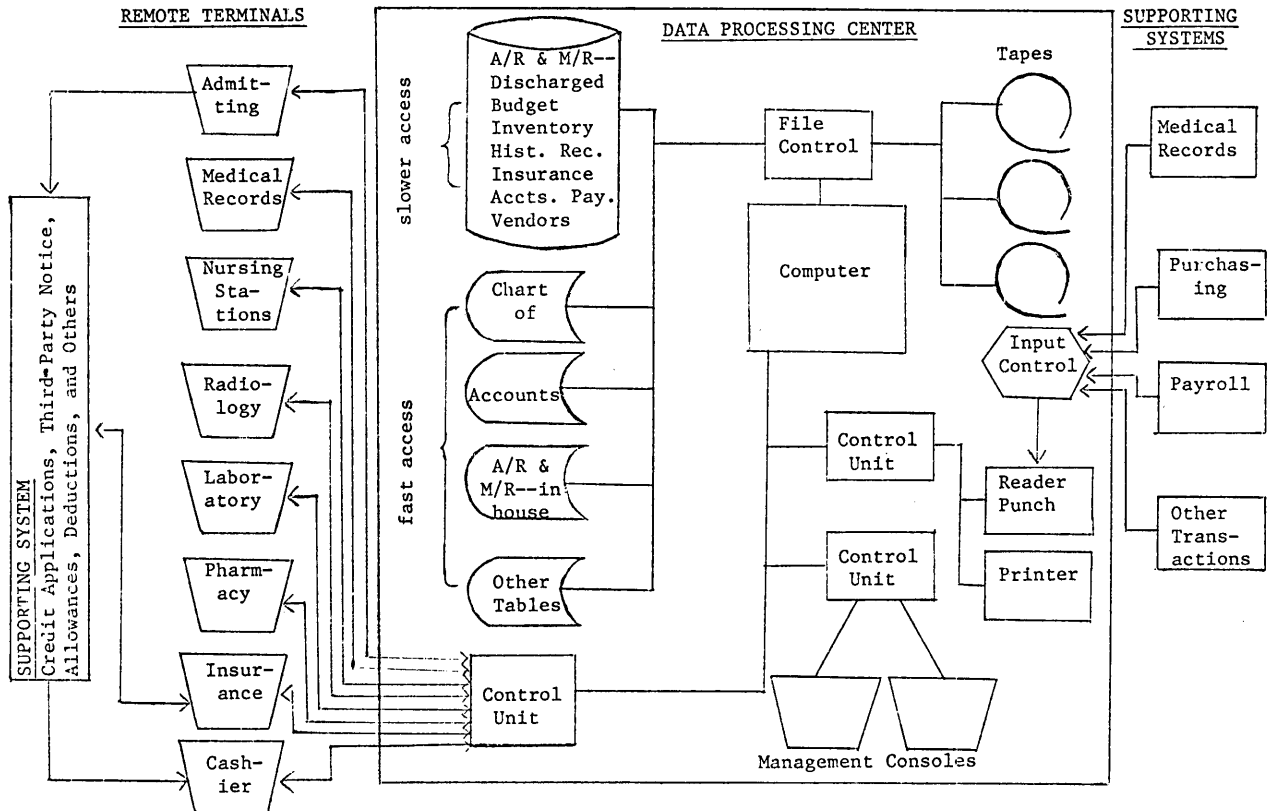
Five categories of characteristics were considered in examining these reports and their data requirements. First, the reasons for the output were considered. In most cases, in this study, the objectives of the output were determined by the authority requesting it. Second, the nature and special characteristics of the output were considered. This category includes all characteristics not specifically covered in the other categories. Examples are the form of presentation required for the output, the relationships among a particular output and other outputs, and an indication of how long and in what form the data should be held.

Third, the response times needed by various functions were studied. Response time is the time a system takes to respond to a given inquiry, that is, the interval between an event and the system's response to that event. The decision to use data transmission links

⁶ Hospital Administrative Services and Cost Allocation Program are services of the American Hospital Association; they deal with cost, revenue, and statistical information. The Professional Activity Study is a service of the Commission on Professional and Hospital Activities, Ann Arbor, Michigan; it deals with medical records data.

EXHIBIT 2

General Hospital Information System



was made because of the response time required. Similarly, a decision to use random access file units is often the result of the need to maximize the difference between the value and cost of the required response time.

Possible response times can be divided into six categories:⁷

Immediate—Systems controlling a technical process may need to give a very fast response to certain events. It is unlikely that this type of response will be needed in a hospital system.

Conversational—In this case, the response time must be geared to human reaction time. This response time and the next type of response time listed are the types most often required in a hospital system where terminal units are used.

⁷ For a more complete discussion of these response times see James Martin, *Design of Real-Time Computer Systems*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1967, pp. 43-44.

As soon as convenient—Transactions from terminals which may need to be processed quickly, within minutes or seconds if possible, but are not geared to the speed of a human conversation fall in this category.

Deferred, on line—Jobs from the computer room and/or from distant terminals which can wait in a queue of jobs to be processed in an on line manner on a priority basis are in this category.

Within one day—This classification is for jobs which must be done on a daily basis.

Long-time available—Functions which have no urgency and can take place in a weekly, or longer, batch cycle are in this category.

The fourth and fifth characteristics are the number of output requests per time period and the timing and frequency of the output requests. These characteristics together with the input characteristics aid in determining the features of the system and in esti-

imating the load that will be placed on the system at given times.

Input characteristics

Several input characteristics are important in the single information flow system. The first set of characteristics arises out of the source of the information. The source is the place in the organization where a basic component of information originates through an event or transaction. The event does not have to be financial in nature but can be statistical, as when laundry arrives to be processed and cleaned at the laundry department. Once the source is determined, relevant characteristics should be specified such as how the data are generated, what people are involved, under what conditions the event occurs, and what unique circumstances are present.

The second set of characteristics may be classified under document

information. Basically, documents are pieces of memory or data storage for an organization. These pieces of memory can be transferred to relevant people within the organization by routing the documents. The significant characteristics of a document are the data on it and the flow of those data within the organization. The use of documents and the flow of data in many cases will be greatly changed with the single information flow system because of the use of on line communication. These characteristics, when considered with the respective output characteristics, determine the load requirements of the system; when considered with the first two input characteristics, they aid in making such decisions as where input/output terminals should be located and how the supporting systems should be designed.

General system design

The system developed as part of this study is presented in Exhibit 2 on page 30. It consists of remote terminals, supporting systems, and a data processing center containing a single, unified data store set up under a plan that integrates the various information needs of hospitals. It is a summary-level system in that it is meant to be general enough to be applicable to any short-term general hospital, and it is a system designed to be as flexible as possible. The system departs from the single information flow model in that some of the data, those not related directly to patient charging and billing, enter the system through supporting systems rather than through remote terminals. The data storage file, however, is integrated and has a random access configuration.

Input/Output terminals

Remote terminals are located at the admitting office, at the cashier's office, in the medical records department, and at places where

charges arise such as nursing stations and professional services departments. The functional analysis indicated that at least a minimum of medical care information (i.e., admitting and current diagnoses, surgical procedures, and discharge date) should be in the patient accounts for insurance purposes. A hospital that incorporates only these minimum requirements into the accounting records might eliminate the medical records terminal and enter this information through nursing station terminals. On the other hand, a hospital might elect to enter the complete medical record of each patient in the form of a case abstract into the accounts. Input terminals in the medical records department would then be essential.

The admitting, cashier, and insurance consoles are directly involved with the accounts receivable and billing procedures. Bed control and patient location are controlled through the admitting terminal. Therefore these terminals should have output capabilities. Admitting personnel must be able to retrieve information concerning patient accounts, and bed control is reported as an output at this terminal. The nursing stations and professional services departments enter daily census data, any charges for services rendered to the patients on the floors or in the departments, and possibly medical care data as mentioned earlier.

The management consoles are essential to realizing the full value of the system and especially of the data storage file. These terminals can be located in such positions as the administrator's office and controller's office as well as the data processing center. They allow management to have direct access to the hospital's records in order to request specific predetermined and programmed reports, to make specific inquiries, and to study relationships among various groups of data for such purposes as making budget versus actual comparisons.

The terminals specified here are

the minimum required to operate the system; some hospitals may want terminals in other locations as well. The specific capabilities of each terminal, however, must be determined by each hospital to meet its own needs and to fit the environment at the place of installation.⁸

Supporting systems

The proposed system has supporting systems which embrace the following areas:

1. Medical records
2. Purchasing
3. Payroll
4. Other transactions
5. Credit applications, third-party notifications, deductions, and others.

Basically, the purpose of the supporting systems is to route information concerning events, transactions, and the hospital's operations into the data processing center, where they can be entered into data storage. They may also be used to route documents outside the hospital. For instance, the purchasing system sends requisitions and checks to suppliers, and the employees are paid through the payroll system. Intermediaries are notified and confirmations of coverages are received from them through the subsystem that includes third-party notification.

These supporting systems cover hospital information that can be delayed long enough to be processed in the data processing center, thus economizing on costs of hardware, software, and personnel. The supporting system involving credit and insurance is an exception in that it is closely tied to the on line portion of the general system. The purpose of this supporting system is to process the bills

⁸ For a summary of experimental systems and terminals in eight hospitals see Arthur E. Rikli, Scott I. Allen, and Samuel N. Alexander, "Study Suggests Value of Shared Computers," *The Modern Hospital*, May, 1966, pp. 100-108. Also see Robert M. Smith, "Better Patient Care—Through Electronics," *Management Services*, May-June, 1968, pp. 52-57.

EXHIBIT 3

The General Plan for the Chart of Accounts for Hospitals

of patients who have insurance. The hospital should develop classifications of patient status—Medicare, Blue Cross, other insurance, self-pay, or other and eligibility for policy discounts, charity discounts, or any other allowances—so that the admitting personnel can recognize and classify each case at the time of admission. When a patient with insurance is admitted, the admitting personnel will enter the information necessary for preparing a notification of admission for the Social Security Administration, Blue Cross, or other intermediary. The computer will print out this information for the insurance personnel, who will then forward the notice to the proper intermediary. Once the confirmations of insurance benefits have been returned, the specific details will be entered through the insurance terminal unit into the patient's record to be retrieved for billing purposes when the patient is discharged or is billed on an interim basis. It is possible that some time in the future direct communication with the intermediaries may supplant the third party notification part of this system.

The payroll, purchasing (including the inventory system), and other transaction-supporting systems will be available through random access retrieval as soon as they have been entered into storage.

The first phase of the medical records supporting system is relatively standard for most hospitals. The necessary forms are prepared by the admitting office upon admission and go with the patient throughout his stay in the hospital. When he is discharged, the completed set of forms is routed to medical records. Normally, the final diagnosis and other final entries are recorded by the doctor after the forms have reached the library. If the medical records are to be integrated into the data storage plan of the general system, the forms, once completed and sent to medical records, must be coded by

A. Overall Numbering System

110-199 Assets

- 110-114 Operating Fund
- 120-122 Specific Purpose Fund
- 130-132 Endowment Fund
- 140-146 Plant Fund
- 150-155 Construction Fund
- 160-199 Other Funds

217-299 Liabilities

- 217 Operating Fund
- 227 Specific Purpose Fund
- 237-238 Endowment Fund
- 247-248 Plant Fund
- 257-258 Construction Fund
- 267-299 Other Funds

219-299 Capital Accounts

- 219 Operating Fund
- 229 Special Purpose Fund
- 239 Endowment Fund
- 249 Plant Fund
- 259 Construction Fund
- 269-299 Other Funds

310-599 Revenue Accounts

- 313-359 Revenue from Patient Services
- 360-399 Revenue from Other Nursing Services
- 402-499 Revenue from Other Services
- 500-539 Deductions from Revenue
- 540-599 Other Revenue

600-999 Expense Accounts

- 600-699 Patient Services
- 700-799 Other Professional Services
- 800-899 Other Services
- 900-979 Fiscal and Administrative Services
- 980-999 Unassigned Expenses

B. Further Subclassification of Balance Sheet Accounts

Third Digit

- 0 Cash
- 1 Investments
- 2 Receivables
- 3 Inventories
- 4 Prepaid Expenses
- 5 Land, Buildings, and Equipment
- 6 Accumulated Depreciation
- 7 Current Liabilities
- 8 Non-Current Liabilities
- 9 Fund Balance

C. Further Subclassification of Revenue and Expense Accounts

- 310-359 Revenue from Patient Services
- 310-339 Medical, Surgical, and Pediatric
- 340-342 Intensive Care
- 343-345 Psychiatric
- 346-349 Newborn and Premature Nurseries

360-399 Revenue from Other Nursing Services

- 360-364 Operating Rooms
- 365-369 Recovery Rooms
- 370-374 Delivery and Labor Rooms
- 375-376 Central Services and Supply
- 377 Intravenous Therapy
- 378-379 Emergency
- 380-389 Other

402-499 Revenue from Other Services

- 402-409 Laboratory
- 410 Blood Bank
- 411 Whole Blood
- 412-413 Electrocardiograph
- 414 Electroencephalograph
- 421-429 Radiology
- 430-434 Pharmacy
- 435 Anesthesiology
- 436 Inhalation Therapy
- 437 Physical Therapy
- 438 Occupational Therapy
- 440-469 Other (e.g. Recreational Therapy, Home Health Care, and Social Service)
- 480-489 Clinics

EXHIBIT 3 (Cont.)

500-539	Deductions from Revenue
500-509	Contractual Adjustments
510-519	Policy Discounts
520-528	Charity Discounts
529	Bad Debts
530-539	Other (Including Administrative Adjustments)
540-599	Other Revenues
540	Tuition
541	Telephone
542	Meals
543	Rooms
544	Miscellaneous Supplies Sold
545	Purchase Discounts
546	Miscellaneous Operating
547	Contributions and Grants
548	Patient Surcharge or Equalization Charge
550-554	Miscellaneous Non-Operating
600-699	Patient Service Expense
600-609	Nursing Administration
610-639	Medical, Surgical, and Pediatric Nursing Units
640-642	Intensive Care Nursing Units
643-645	Psychiatric Nursing Units
646-649	Newborn and Premature Nursing Units
660-664	Operating Rooms
665-669	Recovery Rooms
670-674	Delivery and Labor Rooms
675-676	Central Service and Supply
677	Intravenous Therapy
678-679	Emergency Service
685-699	Nursing Education and Other
702-799	Other Professional Services Expense
702-709	Laboratory
710	Blood Bank
711	Whole Blood
712-713	Electrocardiograph
714	Electroencephalograph
721-729	Radiology
730-734	Pharmacy
735	Anesthesiology
736	Inhalation Therapy
737	Physical Therapy
738	Occupational Therapy
740	Social Service
741-769	Other (e.g. Recreational Therapy and Home Health Care)
770-772	Medical Services and Staff
773-776	Medical Records and Library
777-779	Research
780-789	Clinics
800-979	Other Services Expense
800-829	Dietary
830-849	Plant and Equipment
850-859	Housekeeping
860-869	Laundry and Linen
870-879	Personnel Quarters
900-979	Administration and General (e.g. Accounting, Admitting, Cashiering, Credits and Collections, Data Processing, Receiving and Stores, Executive Office, Personnel, and Purchasing)
980-999	Unassigned Expenses
980-982	Depreciation—Building
983-985	Depreciation—Equipment
986-989	Insurance
990-991	Taxes
992-993	Employee Benefits
994	Interest
995	Loss on Disposal of Fixed Assets
996-999	Rentals of Land and Buildings

Adapted from *Chart of Accounts for Hospitals* (American Hospital Association, Chicago, 1966).

a trained librarian in a manner suitable for input.

The exact make-up of the data storage area depends on the specific equipment used as well as on the programing techniques employed. This was not included in the study.⁹ However, some generalizations can be offered concerning the type of storage in which various groups of data should be contained and the relationships among the groups of data.

Remote, on line terminals are placed in the functional areas whose operations require response times in the conversational or as-soon-as-convenient categories. The data files for these functions must, therefore, be arranged in random access files for rapid retrieval. The following groups of data should be retrievable with a conversational response time:

1. Chart of accounts for the current fiscal period
2. In-house accounts receivable subsidiary file
3. Charge tables
4. Medical records for in-house patients.

Undoubtedly, there are accounts that do not have a high activity level but do not demand enough storage space to justify splitting the chart of accounts among different types of storage. Revenue accounts, cash, the in-house accounts receivable subsidiary file, and the charge tables all interact in the on line portion of the system. Medical records, if they are included in the random access part of the system, should be associated with the in-house accounts receivable subsidiary file, as should bed control and patient location.

Slower random access on an as-soon-as-convenient basis is required by the following categories of data:

1. Accounts receivable subsidiary file for patients who are discharged but have not paid

⁹ For a detailed discussion of this subject see James Martin, *op. cit.*, pp. 485-510.

2. Medical records for discharged patients
3. Operating budget
4. Historical records
5. Insurance coverage files
6. Accounts payable subsidiary file
7. Inventories
8. Other files as needed, such as list of vendors.

A hospital may find it desirable to put the insurance coverage table in the faster-access-storage group, particularly if there are many random inquiries or requests for data in these tables where a conversational response time is desirable. In this system these insurance tables are placed in slower storage because it is assumed that there will be some warning in the form of a discharge notice when a patient is to be discharged. Thus, the coverages for a particular patient can be retrieved from the insurance tables based on the code in his account at the time the discharge notice is received from the nursing station, and the patient's bill can be ready when the patient or person paying the bill reaches the cashier.

Data storage plan

The overall classification scheme
 —The chart of accounts developed in this study is based on the American Hospital Association's *Chart of Accounts for Hospitals*, already in use in many hospitals. This structure of accounts can be adapted to the needs of this system by means of subclassifications. The general plan of the chart of accounts for hospitals is presented in Exhibit 3 on pages 32 and 33.

Subclassifications—The subclassification of accounts is represented by the fourth and fifth digits of the account number, i.e., the two digits in the tenths and hundredths positions, and is the focal point for determining the basic form in which the data will be in storage.

An important issue is the handling of statistical measures. Hospital statistics, in general, can be divided into two broad groups,

EXHIBIT 4	
Hospital Statistics and Departments To Which They are Relevant	
Operating Statistics	
Statistic	Department(s)
Admissions	Patient Services
Discharges	Patient Services
Total Patient Days of Care	Patient Services
Beds	Patient Services
Deliveries	Delivery Room
Newborn Patient Days	Nursery
Bassinets	Nursery
Number of Meals Served	Dietary
Pounds of Laundry	Laundry
Number of Surgical Operations	Operating Room
Radiology Examinations	Radiology
Laboratory Tests	Laboratory
Outpatient Visits	Outpatient
Manhours	For Each Department
Allocative Statistics	
Statistic	Departmental or Other Cost Which is to be Allocated
Number of Meals Served	Dietary
Pounds of Laundry	Laundry
Actual Depreciation of Building and Fixed Equipment	Depreciation Expense
Dollar Value or Depreciation of Equipment	Depreciation Expense
Square Footage of Departments	Housekeeping (if hours are not used) Depreciation (if above is not used)
Housekeeping Hours of Service	Housekeeping
Number of Personnel Housed	Housing Facilities
Medical Records Hours of Service	Medical Records
Social Service Hours of Service	Social Service
Nursing Education Hours of Service	Nursing Education
Intern-Resident Hours of Service	Intern-Resident Costs
Requisitions	Central Services and Supply
Pharmacy Costed Requisitions	Pharmacy
Nursing Service Manhours	Nursing Services

operating statistics and allocative statistics. Both types were considered essential to hospital management by those interviewed in the study. The primary purpose of operating statistics is to show a level of activity and thus serve as a gauge of efficiency. Allocative statistics, on the other hand, serve as the basis for allocation of the cost of service departments to revenue departments for cost finding purposes. Exhibit 4 on this page contains a list of the statistics which the study revealed were essential to a short-term general hospital and of the department(s) with which they are associated.

A reasonable way to provide for storage and retrieval of these statistics is by the use of subclassifications of the operating accounts.

For revenue accounts, the following subclassifications resulted from the study:

Fourth Digit

- .0-1 Inpatient
- .2-3 Outpatient
- .4-5 Inpatient Statistics
- .6-7 Outpatient Statistics

Fifth Digit

- .x1 Self-Pay
- .x2 Blue Cross
- .x3 Medicare
- .x4 Title 19
- .x5 Other Welfare
- .x6 Workmen's Compensation
- .x7 Commercial Insurance
- .x8-.19 Others

To illustrate how this classification works, consider the account

number 320.03. This is a revenue account (first digit) for a medical, surgical, or pediatric unit (second and third digits). It represents an inpatient (fourth digit) who has Medicare benefits (fifth digit). The corresponding statistic, Medicare inpatient days, for this account would be found in the account numbered 320.43.

The subclassifications for the fourth digit of the expense accounts are as follows:

- .0 Salaries and Wages
- .1 Other Direct Expense
- .2-5 Manhours
- .6-7 Other Statistics.

These accounts are subdivided further as follows:

Salaries and Wages

- .01 Regular
- .02 Paid—Not Worked
- .03 Overtime
- .04 Fees—Physician

Other Direct Expense

- .11 Supplies—Billable
- .12 Supplies—Non-Billable
- .13 Services Purchased

Manhours

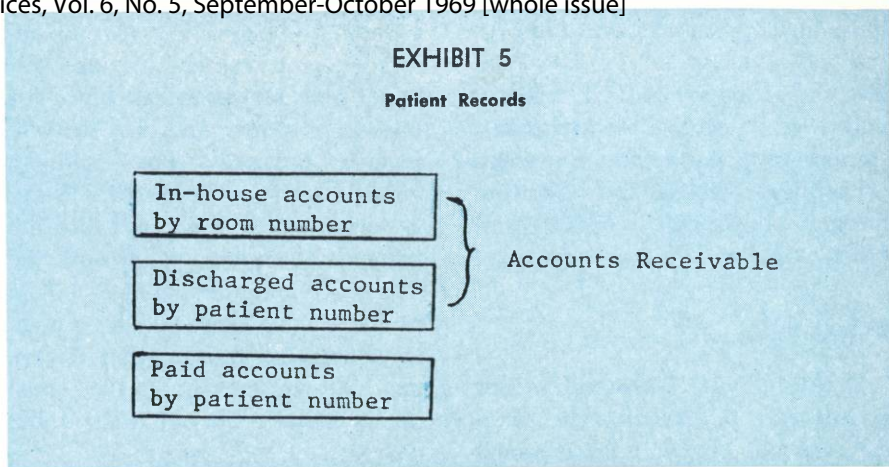
- .20-39 Productive
- .40 Paid—Not Worked

Other Statistics

- .60-79 By Department Served.

When the salaries and wages computations for the pay period are made, the amounts paid and the manhours are posted to the proper accounts by the computer. Some hospitals may want to assign employee benefits such as social security to specific cost centers instead of using an account in the unassigned expenses (992-995), as is done in this classification scheme. In that case, the suggested subclassification can be expanded by using the digits that have not been designated. Similarly, the other direct expense category can be expanded if the hospital desires. The billable supplies account should represent a cost of goods sold.

The twenty positions for the productive manhours category permit the manhours worked to be



subdivided by department served in those cases such as housekeeping where allocations are made by the number of hours of service. The same is true of the other statistics accounts, for example, if the number of personnel housed is needed for allocating the personnel quarters expense. Often the other statistics category will not be needed because the statistics are located elsewhere in the system. For instance, the number of laboratory tests is needed, but the statistic is already accumulated by various breakdowns in connection with the related revenue account. In the computation of a productivity figure such as salaries and wages expense per laboratory test, the application programs should retrieve the number of laboratory tests from the revenue accounts.

Subsidiary accounts

A suitable structure for the patient records subsidiary file is shown in Exhibit 5 above.

The in-house accounts receivable subsidiary file is an integral part of the on line system and should be kept in random access storage with a conversational response time. Discharged patients, on the other hand, do not require the fastest and most expensive storage because the level of activity is not as high as for in-house accounts.

Furthermore, many accounts will be paid by check and thus can be handled on an as-soon-as-convenient basis. The accounts for pa-

tients who have paid should be put in less costly magnetic tape storage.

The in-house accounts receivable subsidiary file should be stored by bed number to make it easy to tie in bed control with this file; this also will make it easier to request information from a patient's account because normally the bed number would already be known by the person making the request. The file for discharged patients, however, should be based on the patient number because the bed number is no longer relevant after the patient has been discharged. Whether the hospital should maintain separate subsidiary files for each control account, i.e., Medicare, Blue Cross, self-pay, and other, or whether it should use a comprehensive file with codes in the individual accounts for the four subclassifications is a matter of choice; either procedure can be used.

A large amount of information must be accumulated about each patient. Exhibit 6 on page 36 summarizes the essential data for each patient account in the subsidiary files. Creditworthiness information is not included in the list because of the high percentage of patients who have insurance. When it is needed, this type of information can be handled off line.

The subsidiary files for accounts payable, plant and equipment, inventory, and other accounts are essentially similar to those needed by any business enterprise and thus are not discussed here.

The account classifications that

have been presented are suited to the task of accumulating data from day-to-day operations. A hospital may wish to extend the integrated storage plan to include the areas of medical records, the operating budget, historical records, and other accounts.

Medical records

If the individual hospital wishes to integrate into the system medical care data beyond those which must be available for insurance purposes, these data can be combined with the accounts receivable

subsidiary ledger. This avoids redundancy in storage because services can be recorded both for billing purposes and for medical records purposes. For example, when a chest or respiratory X-ray is performed, it is entered into the patient's account together with the charge. When the patient's bill is prepared, the X-ray will be shown. If a doctor inquires what X-rays the patient has had, the same data will be retrieved without the charge.

The storage problem is complicated by the fact that any time a patient re-enters the hospital his

previous medical records must be retrieved. It is not feasible to keep the records for discharged patients in random access storage because of their quantity and the low level of activity for these records as a whole. The hospital may wish to enter each patient's record on punch cards or magnetic cards or tape at the time of discharge. The past record could then be re-entered into the patient's current file if necessary.

Operating budget

The general design of the system calls for the operating budget to be kept in random access storage with a response time of as-soon-as-convenient. In order that both volume and efficiency variances can be determined by management, the projections shown in Exhibit 7 on page 37 should be stored on a monthly basis by department.

Projected totals are stored rather than rates because the inclusion of the level of activity makes it possible to compute either the projected rate or the projected total if the other is known.

The classification scheme displayed earlier can be used for storing the budget. Since the budget projections are made for each month of the fiscal year, provision must be made for storing twelve figures for each account number in order to indicate the month. An account in the budget can be distinguished from a current account by the file reference since they will be stored in different files.

For example, budgeted regular salary expense for the dietary department for the first month of the fiscal year would be indicated as follows:

F 8 0 2 . 0 1 0 1

In place of the F would be the file reference number. The next five digits are the normal account number, and the last two digits indicate that the figure stored in this location is for the first month of the fiscal year. The budget for the year-to-date would be obtained

EXHIBIT 6

Essential Data for Each Patient Account

<p>Identification Data:</p> <ul style="list-style-type: none"> Room Number Hospital Number Name Address Sex Date of Birth Bill to (Name and Address) Admission Date Time Doctor Blue Cross Number Social Security Number Other Insurance Company Policy Date Receivable Classification Previous Admission Year <p>Medical Data:</p> <ul style="list-style-type: none"> Admitting Diagnosis Discharge Date Discharge or Current Diagnosis Surgical Procedures <p>Insurance Data:</p> <p>This section will vary depending on the type of insurance the patient carries. For Blue Cross and most commercial insurance, coverage codes are available. The computer can refer to the codes in the drum storage and compute the payment due from each party. Unique cases must be computed separately by the cashier at discharge. Medicare patients must be handled differently. The data that must be in storage for Medicare are listed below:</p> <p>Medicare Insurance Data:</p> <ul style="list-style-type: none"> Effective Date—Hospital Insurance Effective Date—Medical Insurance Hospital Days Remaining—Full Hospital Days Remaining—Coinsurance Lifetime Reserve Days Remaining Medical Plan Deductible—Met or Not Met Remaining Inpatient Deductible Pints Remaining Blood Deductible Extended Care Facility Days Remaining—Full Extended Care Facility Days Remaining—Coinsurance Three Days Hospital Stay Requirement—Met or Not Met 14 Days Transfer Requirement—Met or Not Met Home Health Representative Visits Remaining—Hospital Insurance Home Health Representative Visits Remaining—Medical Insurance Psychiatric Days Remaining 	<p>Service, Charge, and Payment Data:</p> <ul style="list-style-type: none"> Accommodations Intensive Care Self-Care Operating Room Anesthesia Blood Administration Pharmacy Radiology Laboratory Medical, Surgical, and Central Supplies Physical Therapy Occupational Therapy Speech Therapy Inhalation Therapy Other
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EXHIBIT 7

Operating Budget

Account Classification	Projections
Revenue	Volume of Services
	Total
Deductions from Revenue	Total
Other Revenues	Total
Salaries and Wages Expense	Manhours
	Total
Physicians' Fees	Total
Supplies—Billable	Units or Level of Activity
	Total
Supplies—Non-Billable	Units or Level of Activity
	Total
Unassigned Expenses	Total

on a monthly basis by adding the amounts for the months of the fiscal year which have passed.

Historical records

The historical records of the operations of a hospital can be broken into four groups. These are as follows:

1. The record of operations for the current fiscal year
2. The record of operations for the preceding fiscal year
3. The record of operations for previous years
4. Records of individual transactions and other detailed records.

The system design provides for the first two groups of items to be stored on slower random access storage. Their classification can follow the scheme discussed for the operating budget. The file number will indicate which group of records is involved, and the last two digits of the number will indicate which month is involved. Year-to-date totals can be obtained by adding the totals for the previous months. For the current month, the total will be accumulated in the current account.

Records for years earlier than the preceding one will be stored on magnetic tape. Individual transactions and other control items also will be kept on magnetic tape for future use in checking and auditing. The structure and use of these tape files should be carefully

worked out by the individual hospital in consultation with the hospital's auditors.

The chart of accounts for current operations presented in this article provides for the minimum data a hospital must accumulate to fulfill its reporting requirements. The storage plan, however, has been developed in a way that allows management flexibility in the application of the plan to specific operations. The addition of accounts depends on the needs of the hospital. Management must balance additional storage costs against additional benefits.

Implications

Several generalizations useful to those interested in applying this type of system to organizations can be stated. First, the data storage plan is successful in integrating most of the various data needs of the hospital organization. Second, all data do not have to enter the system from the source through remote terminals. The need for remote terminals depends on required response times, levels of activity, and interfunctional relationships. If certain functions do not require remote communication, the advantages of integrated data storage do not have to be foregone. Supporting systems can be developed for these functions to communicate data quickly enough for data processing.

Third, the computer system can

be used for handling routine decisions, controls, and reports in hospitals without special batch runs. Insurance benefits can be computed automatically by placing coverage files in random access storage; the accounts receivable subsidiary file can be scanned for delinquent accounts; daily censuses can be prepared automatically, and patients can be automatically charged for rooms; effective bed and patient location control can be maintained by the admitting office; and information for third-party notices can be automatically printed out in the insurance department.

Fourth, the data storage plan is flexible. In addition to the adaptations and expansions already mentioned, the system can be useful in providing routine departmental analyses, in aiding the making of decisions that cross organizational lines, and in meeting unexpected information needs.

Fifth, the communication network embodied in the system can reduce the manhours spent in communication in addition to improving medical care and utilization of hospital facilities. Specific examples are the communication of services rendered and charges directly into the patient's account in accounts receivable, the automatic communication of information for insurance notices and subsequent entry of confirmed benefits, the entering and retrieving of certain medical data from the patient accounts, the retrieval of information through management consoles, and the maintenance of patient location and bed control. Other examples of potential uses of the communication capabilities of the system are the ordering of laboratory tests, X-ray examinations, inhalation therapy, and intravenous therapy through terminal units in the nursing units and the transmitting of the results of laboratory tests and X-rays to the places where they are needed. The scheduling and communicating of doctors' orders also can be programmed into the system.

Many a CPA firm, well qualified to perform management services, simply does not recognize needs revealed in its performance of audit and tax services. It thus handicaps both itself and its clients—

RECOGNIZING MANAGEMENT SERVICES OPPORTUNITIES

*by Jordan L. Golding
Peat, Marwick, Mitchell & Co.*

THE DECEMBER, 1968, issue of *The Kentucky Accountant* referred to management services as "that area of practice where the horizons are unlimited." Certainly, management consulting is one of the fastest growing phases of our profession and, indeed, a very profitable part of our practice. While the area of management consulting offers unlimited opportunities for the CPAs that are engaged in such practice, it also offers severe penalties for those who choose to ignore what has now become an integral part of our professional practice.

We have often been asked to comment on how one goes about recognizing management services opportunities and, yet, we feel that this particular point can be answered very simply: We are convinced that the recognition of such opportunities is identical with the recognition and understanding of clients' needs.

It is doubtful that any audit-oriented accountant believes that auditing is a mechanical function. On

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the contrary, auditing has become more and more sophisticated and more challenging as the complexity of business operations increases. Thus, the CPA on an engagement has to be ever alert for changing circumstances in his environment.

Similarly, the practice of taxation is hardly confined to the mere mechanical processing of government forms, but rather is totally integrated with the ability to comprehend and make recommendations with respect to client tax planning and avoiding of serious tax pitfalls.

As long as the profession is so heavily involved in clients' affairs via the audit and tax aspects of our practice, it is almost impossible not to be aware of other operational problems that exist within the client's organization. These problems may consist of the need for a more modern cost accounting system, improved pricing policies, inventory controls, systems work, or the consideration of the feasibility of some form of modern data processing within the organization.

The client may also have need for other types of special studies: in connection with expansion or contraction of the business, acquisitions or mergers, going public, and a host of other more esoteric types of situations where the client may require outside professional advisory services.

There are those in the profession who say that this may very well be true, but really it is only applicable to the larger firms. Nothing could be farther from the truth. The need for consulting services affects the entire profession in both small and large firms, and including the individual practitioners. The needs have been equally intense with both small and large clients. The only variable seems to be the degree of complexity.

The day has long passed when the small client looked upon his auditor as a pencil pusher who merely informed him as to how well

his business had operated during the recent year; and the large publicly held clients no longer look upon their auditors as merely members of that organization which comes in once a year, as a necessary evil, to pass an opinion on the financial statements for the benefit of stockholders and other third parties.

The point was made very well by Leonard Savoie, executive vice president of the AICPA, in the December, 1968, issue of *The CPA* in his article entitled "Marketing Myopia." In it Mr. Savoie stated:

An accountant who thinks merely in terms of providing the company's management the same old audit based on the same old loosely defined practices is product-oriented. Unfortunately, his product is *obsolete* and old rules are not good enough to satisfy the public.

The small firms that ignore this marketing problem within the profession will find that if they do not keep pace with the growth of their clients and their clients' ever-changing needs then their clients will seek the full range of services that other firms provide. For larger firms, the same problems exist and are compounded by the fact that if they do not recognize their clients' needs, or are not in a position to provide services to handle the clients' problems, then the opportunities will slip by the boards; they

may find that if not displaced by another accounting firm, then certainly they will have outside consulting organizations involved with their clients' problems.

But how does a CPA go about recognizing opportunities in management services work with his clients?

We have audit staffs who are on the client's premises, on a monthly, quarterly, semi-annual, or annual basis. Certainly, these men should be bringing back comments with regard to the adequacy or inadequacy of internal control, or other conditions that exist within the client's organization that might need improvement. The partners and managers involved in these audits are, or should be, in reasonably frequent contact with the client so that they are aware of the fact that certain conditions exist that should be of concern to the management of the client's company. Even without communicating with client management, the review of working papers may exhibit problems created by growth, operating losses, changing product mix, inconsistent margins, skyrocketing expenses, that bear out the fact that further investigation might be prudent on the part of the CPA firm. Losses, stagnation, and growth are all indicators that maybe something more can be done for the client to improve his operation.

We should like to be specific and cite some of the situations or op-



The CPA who does not keep pace with the growth—
—of his clients will soon find those clients seeking other advisors.

portunities that can be easily recognized by many CPAs. The list certainly is a sampling and doesn't attempt to be comprehensive or all inclusive. By the same token, we do not mean to imply that all accountants are capable of or possessed with capabilities within their firm of administering the following types of management services engagements. Nevertheless, we think you will find them a representative sampling of management services opportunities.

A. INTERNAL CONTROL REVIEW

A key element in any audit engagement is the internal control review, which very often reveals shortcomings in the internal control system of the client. Many of the deficiencies that auditors uncover are elementary in nature and can be remedied by discussion with the corporation management.

On the other hand, other situations are more complex and lead to the type of management services engagements that will be described later on.

B. INFORMATION SYSTEMS

Does the current reporting system provide management with adequate information on which it may base its business decisions? For example, in reviewing the annual results of the client do the following shortcomings appear?

1. Is the chart of accounts adequate to provide sufficient breakdowns in various sales or expense classifications to make the reporting system meaningful?

2. Does the client have adequate information about product lines? Very often in the growth of a company, product mix changes, and accordingly conglomerative information sometimes hides serious shortcomings because there is not adequate information shown by important sub-categories.

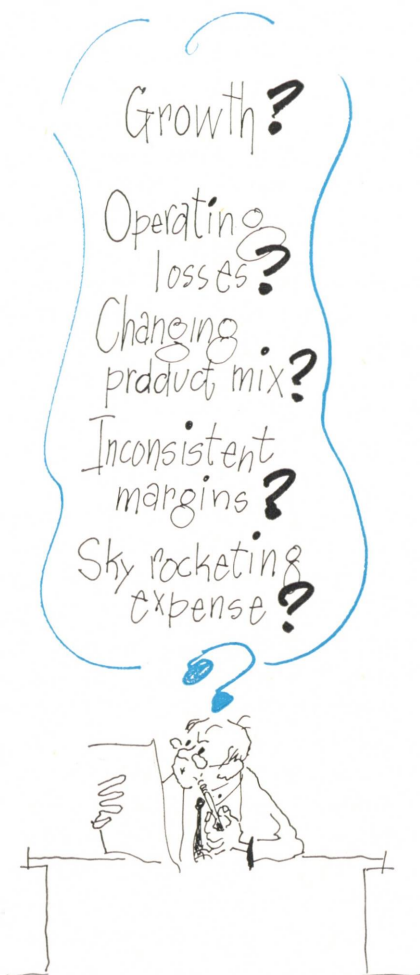
3. Likewise, is there adequate costing or gross profit by product lines? All too often, such gross profit analysis by major product classifications is not available and the business finds itself in a deteriorating position before it is even aware of the fact that it has a problem. Proper product costing information will flag such serious situations before there is serious erosion of profits.

4. Does the present information system provide for adequate expense and overhead classifications by realistic cost center?

5. Does the company have budgetary control over its expense classifications, or does it merely compare this year's expenses with last year's without setting a goal for the current or forthcoming year?

6. Has the flow of paperwork so increased that data processing of some sort is now an item that should seriously be considered by management? If so, there is an opportunity here for a feasibility study.

On the other hand, if the company already has a data processing system, is it properly being utilized and is the internal control adequate? All too often companies have converted to data processing, but are not getting the true value from the computer system. Experience has shown that many clients have invested in expensive data processing equipment, only to use such equipment as high-speed print-



The review of working papers can reveal problems caused by growth, operating losses—a variety of factors.



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ing presses or adding machines.

C. RETAILING

If the client is in the retail business many special problems arise that should be reviewed each and every year. For example:

1. Cash

a. Is the control over cash adequate? Should more sophisticated cash registers that are capable of simultaneously accumulating management information be considered?

2. Inventory Control

a. Does the company have an inventory control system? If so, does it control the inventory or does it merely keep records without, in fact, controlling inventory?

b. How does the stock turn compare with industry standards?

c. Are there automatic reorder points on the stock levels if an inventory control system is in effect?

d. What kind of controls and management information does the business have over markdowns?

3. Delivery

a. Does the store have an adequate delivery system that takes into account the geographic distribution of its delivery routes so as to minimize overtime and, at the same time, to accommodate customers?

b. Does the company have a locator system and a picking sequence system so that material handling of the merchandise is minimized, in an effort to reduce labor costs to a minimum?

c. Does the company have cost information for the order filling process?

d. Is there adequate control over delivery costs? Are the loading of the delivery trucks and routing done on an efficient basis?

E. MANUFACTURING

1. Cost Controls

a. Does the company have adequate information as to its fixed and variable costs with respect to manufacturing activities?

b. Are the cost centers realistic? Do they provide adequate information as to cost of producing the product?

2. Inventory Levels

a. Is there adequate control over:

1. Raw materials
2. Work in process
3. Finished goods inventory levels?

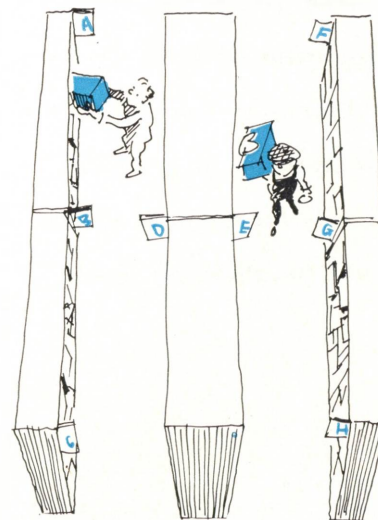
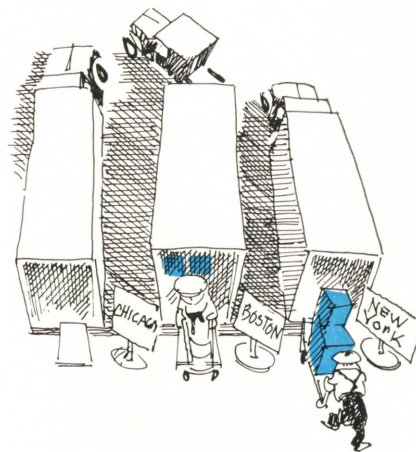
F. PERSONNEL

Very often a company exists without adequate regard to people who are in the company and are contributing to its success, or failure.

1. Is there a high rate of turnover that is symptomatic of other problems with respect to personnel policies?

2. Have compensation levels gone out of control? For example, often salesmen's commission rates are set at an early stage and later on turn out to be unrealistic with respect to the competitive situation within an industry. This can also be true with respect to inside personnel.

3. Is there a lack of appreciation of the fringe benefits or are



In warehouse distribution problems obvious factors to check are the actual physical storage of the merchandise and the efficiency of loading and routing of delivery trucks.

D. WAREHOUSE DISTRIBUTION

Many of the considerations in this area also apply to those multi-unit retail operations that run one or more warehouses.

1. Physical Layout

a. Are the racking and actual physical storage of the merchandise accomplished so that damaged merchandise is minimized?

the fringe benefits in fact inadequate?

4. Are there adequate employee records?

5. Can the client honestly say that he has a loyal group of employees and, if not, what is this symptomatic of?

6. Has the company been able to satisfactorily recruit the kind of personnel it requires?

7. The Incentive System: Are there proper incentives, both in present compensation and deferred compensation?

G. PROFIT PLAN

Does the company have a long-range plan for growth, one that has been reduced to written form and that possibly spells out goals for the next five to ten years?

Business is in a constant state of change. Companies move ahead, companies fall behind, and some just stagnate and hold their own position. In any event, whether it be in a state of growth, decline, or stagnation, the requirements of the business are also changing. Even stagnation itself is a problem: If the business cannot move forward, it is effectively falling behind its competitors.

In any event, irrespective of the direction of the business, it offers opportunities for the CPA to assist the client in adjusting the company to the business climate so that he can conduct its affairs in a more profitable manner.

We should always be on guard, however, to make sure that we are not solving symptoms but rather that we are getting to the heart of the basic problems. All too often what appears to be a problem may be a symptom of something larger and it is this larger area that should be attacked first.

We do not mean to suggest that we offer management services work where none is warranted; however, the point is that we must ever be alert to the fact that the client may indeed need help without knowing we are in a position

to serve him on that particular basis, or more important, he may recognize the need for assistance but not be aware of the fact that the CPA firm is in a position to provide such corrective services.

The communications gap

Often I have found myself at a social gathering on a Saturday evening and a nonclient approaches me and asks for some off-the-cuff advice with respect to data processing, budgetary, or other type work. In many instances, I am aware of who the accountant is for the particular account, and I generally reply by asking: "Haven't you spoken to your own CPA about this matter?" The shocking response has all too often been that either his accountant is too busy to be involved, or else that the client is unaware that the accountant provides such services. With regard to the latter point, I have known on many of these occasions that the accountant in fact did provide the services and provided them on a very competent basis. It would certainly indicate that the CPA in question either did not recognize the client's need, or if he did recognize it, he never communicated his services to the company in question.

In such instances, the CPA is fumbling the ball away to the opposition. If we are supposed to be professional men who are competent in advising our clients on the successful administration of their own affairs, then certainly we should be the first to keep our own practices on the most businesslike basis. Muffing opportunities is not one of those qualifications.

Let us move on to another problem of our time. On almost any day of any week the financial pages of our newspapers carry the news of all types of corporate mergers and acquisitions. Some of these involve two giant corporations, both offering stock that is publicly traded. On the other hand, often a large publicly held company acquires a local, closely held

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firm, maybe one of your clients. Why are these family businesses being gobbled up?

In some cases there are good solid business reasons for the so-called "merging-out" of a family business. On the other hand, there are many instances where the local business has had many years of profitable operation but somehow has either lost its purpose, sense of direction, or is otherwise floundering in today's more competitive economy.

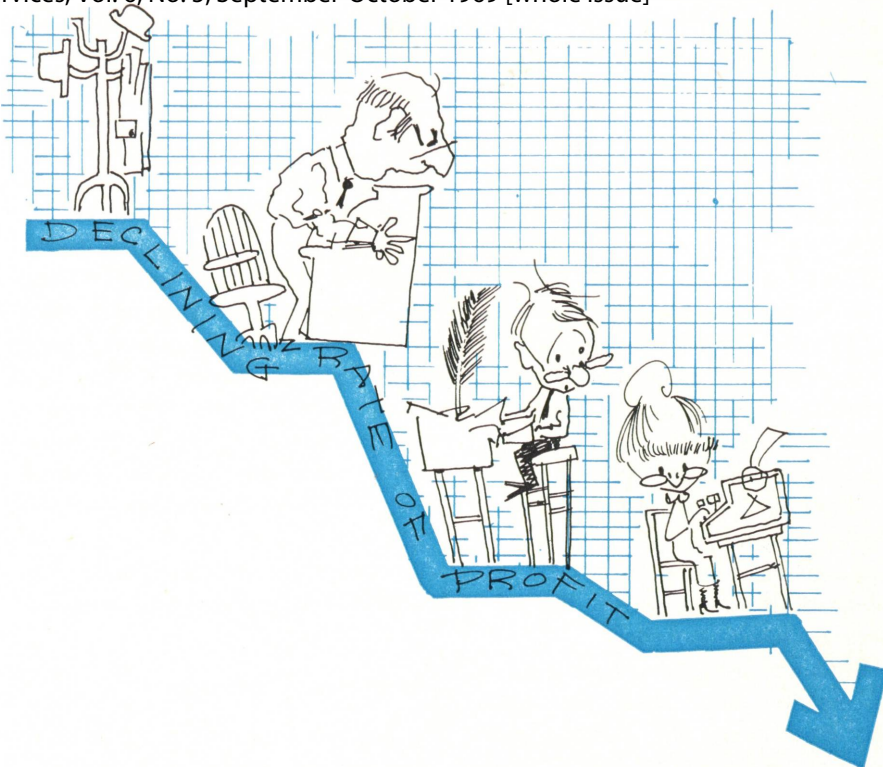
Maybe this segment of the acquisition fever of today is a symptom of lost opportunities for CPA firms. Perhaps if the accounting firms that are losing these clients were recognizing opportunities for giving the business new vitality, either via long-range financial planning, better cost control, pricing and marketing analysis, organizational studies, planning for succession of management, or even making special studies as to the feasibility of going public, maybe these clients would be doing the acquiring rather than being acquired.

In all too many cases, the accountant, who is the closest outsider to the management, is passing up golden opportunities through default. More important, he is losing a client by his failure to perform needed services.

Auditors' key position

General George S. Doriot, president of American Research and Development Corp., has said: "The businessman stands naked before his accountant." Nothing could be more true, and, because of this close relationship, the accountant should be able to spot almost every opportunity that management itself fails to recognize.

The training of audit staff to recognize the opportunities for improving the client's operations not only benefits the accounting firm from the standpoint of creating management services engagements, but also the client because the latter has enhanced his own operation; furthermore, it also stimulates the staff men to widen their hori-



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zons of vision. To the extent that the staff accountant is capable of such an approach to a broader scope of accounting, then his job becomes more interesting and more rewarding, and, accordingly, he becomes more valuable to the firm.

Once having defined the problem and recognized the need, the question then becomes one of communicating what you have found to the client. Obviously, this can be done verbally; however, a better approach may be the so-called management letter or formal presentation that many firms now use in calling the client's attention to shortcomings that may exist in his accounting or related needs. This is usually done at the completion of an audit, when the partner, manager, and senior on the job put their heads together and summarize the management results of the audit that highlight shortcomings in either internal control or the related accounting problems. The advantage of the written management letter is that it has a lasting effect with the client. If the rec-

ommendations are communicated verbally, often they are forgotten in the turmoil of day-to-day routine problems. The suggestions and deficiencies that are set forth in writing permit you to leave behind on the client's premises your thoughts and recommendations regarding the problems that you have uncovered, and also the recommendations as to how you would suggest the company proceed to remedy the situation.

It would therefore seem that in summary we have a two-part problem. One is the recognition of client needs, and secondly the communication with the client.

Consulting should be a separate formal engagement for which the practitioner should be paid separately. If consulting is truly an integral part of our profession, then it should be practiced on a professional basis. That is, it is not merely off-the-cuff advice based on failure to do adequate fact-finding prior to making recommendations or implementation.

For example, in auditing our cli-

ents we develop our working papers, we gather our facts, we present a statement, with or without qualifications. But these financial statements are backed up by working papers that document how we have arrived at our conclusions. By the same token, each tax planning situation has its idiosyncrasies. In estate planning we gather details regarding total assets, nature of the assets, number of potential beneficiaries, and the basic objective of the client for whom we are doing the planning.

Similarly, in consulting we must gather our facts, make our analysis, and come up with our recommendations and, possibly, the subsequent implementation.

But also, because consulting engagements can often be quite time-consuming, the client should have an understanding as to how much time will be involved on our part and what his costs will be. Thus, we have the proposal letter, which really is a letter of understanding between the CPA and the client with respect to the nature of the engagement, the degree of responsibility to be assumed by the CPA, and the approximate cost of the job. All these are spelled out in the AICPA booklet entitled

"Guidelines for the Management of a Management Advisory Engagement."

Granted, many CPAs, especially those in smaller practices, are quite familiar with their clients' affairs and are in a position to give reasonably sound advice in a limited number of circumstances without this involved formal process. Nevertheless, the more important problems such as the installation of a cost system, an organizational study, budgetary and forecasting work, and data processing feasibility studies cannot be done off the top of your head, but should be structured on a formal basis. This is the professional approach!

Analogous situations

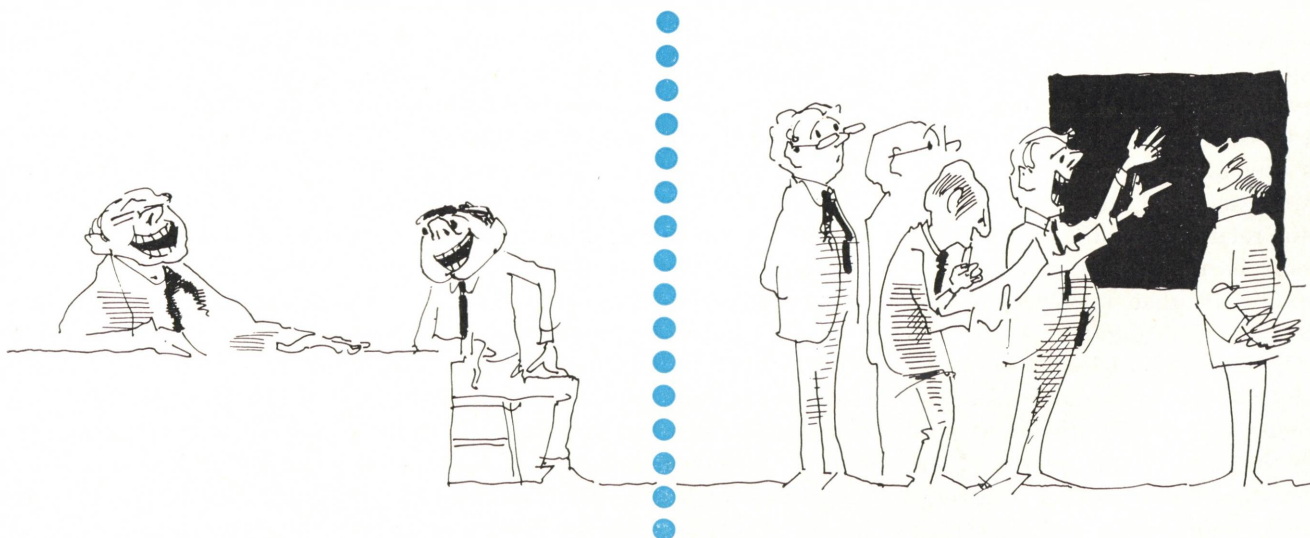
When I have talked on this subject before professional groups, I have often been confronted, in the question period, with a remark such as:

"What you say is fine, but I run a very small practice and my client pays me \$200.00 a month, for which he expects a monthly estimated profit and loss statement, an annual financial report, together with his corporation and personal tax returns. I cannot possibly be

paid for the type of work that you describe over and above my fee."

This occurs in both small and large cities. Smaller practitioners who have smaller clients are often on a monthly or annual retainer. The answer, however, lies not in the area of management consulting, but rather in the management of an accounting practice. Does this small practitioner who receives a regular retainer of \$200.00 a month mean to imply that he will undertake a major litigation on a tax question with the Internal Revenue Service without any additional charge to his client? If so, then maybe we are talking about practice management and nothing else. If he is a professional, and if he is capable of representing the client before the Appellate Division of the Internal Revenue Service, then he should be paid over and above his monthly retainer for such specialized services. The same holds true in consulting.

The hardest thing in the world seems to be breaking away from bad habits. The flat retainer without any adjustment for extra work is a professional bad habit. It is easy to stand up and give many reasons why that particular client will not pay more for his services,



The consultant can communicate his finding and recommendation to the client verbally of course, but a much better and more professional approach is the management letter or formal presentation.

but such a comment always reminds us of a remark in a book review which appeared in *The New York Times* in June of 1968. The reviewer, discussing a book on the fall of Singapore, referred to one of the generals involved in the defense of that installation. The reviewer in turn quoted Ian Morrison of *The London Sunday Times* who described the gentleman as follows:

"Having a mind that saw the difficulties of any scheme before he saw the possibilities and so refused to prepare defenses along the northern coast as the Japanese advanced because this would affect internal morale."

Certainly, it is not easy to break old habits, but management consulting offers unlimited horizons and the opportunity also to restructure CPA practices so that you can capture the opportunity to perform greater services to your clients, to grow in size, to offer greater opportunities to your staff, and to generate more profits. Like our clients, we must never forget we are in a business to make a profit.

Building a consulting practice

There may be some who say, "Fine, I agree with everything you have said, but really, how do I get started?"

For one thing you may have some bright juniors or seniors on your staff who have shown an inclination, and a scope of vision, that indicate that they might make excellent consultants with a little additional training. On the other hand, there may be a total void of such talent in your organization and you may have to hire from the outside. In any event, the American Institute is cognizant of the problem and has already developed professional development courses in the area of starting a management services practice.

Often, specialized help in developing competence in computers and other technical areas is available from former employees of

computer manufacturers. In any event, there is a supply of talent both within and without your organization. It should be utilized.

There is another benefit to be had from structuring a formal management consulting department within your organization. Not only do you offer a wider range of services to your clients, help your clients grow, and improve the profitability of your own practice, but you may also enhance the image of your firm to the point where you make it a more attractive organization from the standpoint of recruiting talent, not only from the consulting standpoint but also for the firm as a whole, including the auditing and taxation sections.

Recruiting aid

The young men out of college are looking for opportunity. And opportunities are greater when the firm is growing faster. The bright young graduate in an accounting college is more likely to be attracted to a fast-moving progressive firm than he is to one that is confined strictly to an audit practice that may be stagnant or may be losing clients because of its lack of total services.

In conclusion, the development of a sound consulting practice offers exciting opportunities to the growth-oriented CPA firm. To ignore the challenge may result in loss of clients, or, at best, the failure to be in a position to play an integral part in assisting clients to improve their own profitability.

Recently we had the privilege of attending the annual meeting of the National Retail Merchants Association in New York. At that time the NRMA Gold Medal Award was presented to Mr. William M. Batten, chairman of the board of the J. C. Penney Company.

We would like to close by quoting a few of the words spoken by Mr. Batten in accepting the award:

"To ignore change is the second fastest way to suicide . . . to fight change is the fastest way."

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Dollar-value retail LIFO, which allows a firm to determine the approximate LIFO cost of its ending inventory when only selling price information is available, has one major disadvantage: differing cost ratios in the store's product mix. Here's a mathematical solution to problems faced in—

DOLLAR-VALUE LIFO RETAIL INVENTORY PRICING

by Roy Ageloff, A. Wayne Corcoran, and Richard H. Simpson

University of Massachusetts

THE POPULARITY of LIFO among firms that keep inventories on the retail basis has led to the use of a procedure similar to dollar-value LIFO¹, which is termed dollar-value retail LIFO. This approach allows the firm to convert the ending inventory at retail to

the prices prevalent at the beginning of the period so as to obtain the real increments or decrements in the inventory and, therefore, estimate the ending inventory on a LIFO basis. The purposes of this article are to present a mathematical statement of this dollar-value retail LIFO procedure for both the entire aggregated inventory and for the case where the firm has separate inventory sections.

In addition, the article presents a computer program for these same procedures.

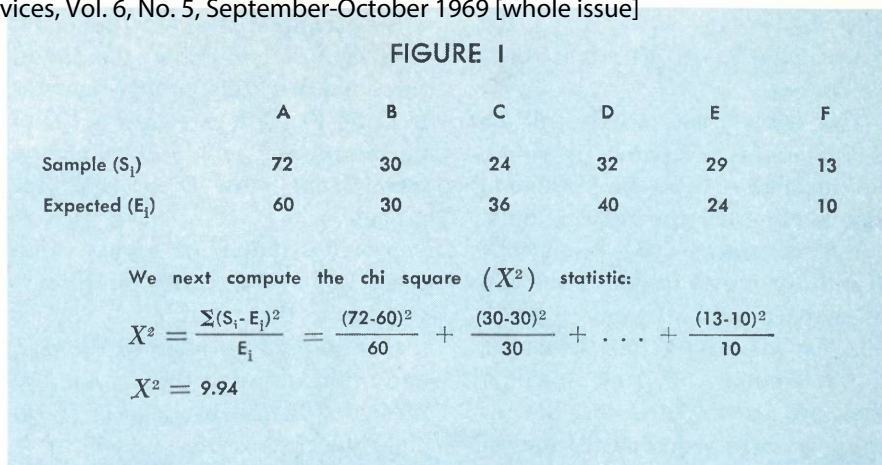
Retail inventory method

The basic advantage of the ordinary retail inventory method is its ability to value ending inventory at estimated cost when only selling price data are available. In addition, the retail method can be used to estimate the inven-

¹ The interested reader can find an excellent collection of articles on dollar-value LIFO in J. J. McAnly, *Dollar Value LIFO . . .*, Ernst & Ernst.

tory when a physical count has not been taken. The retail method consists of deducting the goods sold valued at sales price from the goods which were available for sale valued at sales price. The result is the goods not sold (ending inventory) valued at sales price, which is then converted to estimated cost by applying the cost-selling price ratio (termed the cost ratio). This ratio is calculated by dividing the sum of beginning inventory, freight-in, and purchases (all at cost) by the sum of beginning inventory, purchases, and net markups (all at retail). The use of this ratio results in an inventory stated at estimated lower of cost or market. In dollar-value retail LIFO the markdowns are included in the denominator, and this will result in an inventory stated at estimated cost.

How accurate is the retail inventory method? The first complication which arises whenever this method is used is that it is usually necessary to determine cost ratios by department since rarely is there any uniformity in the relationship between selling prices and costs among different departments. The second complication results because the retail inventory method is built on an average reflected in the cost ratio and on the assumption that the product mix will have the same relationship throughout; hence, there is ample opportunity for the ending inventory calculation to miss the mark. Suppose among a shoe store's product mix which bears an overall cost ratio of 70 per cent there are shoes that have a cost ratio of 80 per cent and shoes that have a cost ratio of 40 per cent and there are three pairs of 80 per cent shoes for each pair of 40 per cent shoes. Suppose further that the preponderance of sales in a given period is of 40 per cent shoes. Obviously, the overall cost ratio will not yield an accurate ending inventory; it would only yield accuracy when the sales mix was in the 3 to 1 proportion. The assumption is that merchan-



dise is purchased in proportion to expected sales, and it is usually taken for granted that purchasing proportions and sales proportions are the same. However, where it is impossible to segregate merchandise into homogeneous groupings, it would be wise to test the alignment of the product and sales mixes.

This alignment of product and sales mixes may be checked by employing a chi-square test.* For example:

A shoe store buys six categories of shoes (A, B, C, D, E, F), each of which has a different cost ratio. The total dollars spent in purchasing shoes are allocated in the following manner:

- | | |
|-------|-------|
| A 30% | D 20% |
| B 15% | E 12% |
| C 18% | F 5% |

(If these percentages were not readily available, they could be generated rapidly through the use of statistical sampling procedures.) The decision is made to select at random 200 sales of shoes and determine from which category each sale was made. In the tabulation above we find these sample results (S_i). In addition, the tabulation contains the expected results (E_i) which have been generated by multiplying each category percentage by 200. (See Figure 1.)

*The chi-square test is a widely used statistical test of the agreement between real world observations and an *a priori* hypothesis.

Next, a confidence level should be selected. A confidence level of 95 per cent is usually considered adequate in economic research; therefore this will be the acceptance level.

The degrees of freedom in this situation are one less than the number of categories (that is, $6 - 1 = 5$). A chi-square table is then consulted and we find that $X^2_{.95}$ at 5 degrees of freedom is 11.1. Since the computed chi-square (9.94) is less than the chi-square obtained from the table (11.1) there is no reason to believe that the product and sales mix proportions differ (this conclusion is valid as long as $X^2 \leq X^2_{1-\alpha}$). Therefore, the alignment is satisfactory.

Test in audit

It would seem advisable for auditors to perform a chi-square test as a regular audit step of any type of retail inventory system.

The popularity of LIFO for income tax purposes has led to the modification of the retail method so as to obtain a cost ratio for only those goods acquired during the period. This is necessary in order to determine the real increase or decrease in the inventory that occurred during the period. In addition, end-of-the-period prices must be converted by the use of an index of price change to beginning-of-the-year prices.

In the case where the inventory is determined by counting the goods, the index of price change

must be a late index since the goods have been priced at year-end prices.

The other case, which will be illustrated in this paper, is where the inventory is to be estimated completely from the register data. In this situation the index should be an average index, rather than a late index, because the inventory available for sale and retail deduction dollar amounts (which includes sales) are accumulated over the entire year and not just at the end of the period. (The customary treatment seems to be to use an end-of-the-period index rather than an average index because it is usually much simpler to obtain an index only at year end rather than also attempt to construct an average index.) The next step is to re-inflate the LIFO layers by utilizing

a beginning-of-the-year price index. To use an end-of-the-period price index at this point would introduce FIFO layers into a LIFO inventory, and would certainly be inconsistent with the LIFO approach.

An illustration of dollar-value retail LIFO will clarify the discussion up to this point.²

In Exhibit I on page 49 the cost and retail data for three years are presented while in Exhibit II on page 49 the ending inventory is estimated at retail for each of the three years. The following steps are used to estimate the dollar-value retail LIFO inventory for 1973:³

1. Calculate the cost ratio for the goods acquired during the period: $(\$540 + \$30) \div (\$890 + \$100 - \$40) = \$570 \div \$950 = 60\%$

2. Convert the ending inventory, which is stated at an average of the prices prevalent during the period, to base period prices by dividing the ending inventory by the average price index and multiplying by the base period index:⁴

$$(\$162 \div 108\%) \times 100\% = \$150$$

$$\text{or } \$162 \times \frac{100\%}{108\%} = \$150$$

3. Determine the real inventory increase in terms of base period prices by subtracting the beginning inventory from the ending inventory, both at base period prices: $\$150 - \$144 = \$6$

4. Restate the inventory increase in terms of beginning period prices by multiplying by the beginning of period price index: $\$6 \times 102\% = \6.12

5. Convert the inventory increase from sales price to estimated LIFO cost by multiplying by the cost ratio: $\$6.12 \times .60 = \3.672 , the 1973 LIFO layer

6. Find the ending inventory at estimated LIFO cost by adding the inventory increase (1973 LIFO layer) to the beginning inventory: $\$90 + \$3.672 = \$93.672$, the estimated ending inventory at retail LIFO for 1973.

Making the estimate

In 1974, dollar value retail LIFO can now be estimated as follows:

1. Cost-selling price ratio: $\$600 \div \$900 = 66\text{-}2/3\%$

2. Convert ending inventory to base period prices:

$$\$182.85 \times \frac{100\%}{115\%} = \$159$$

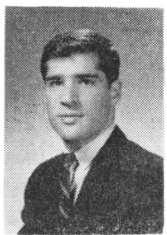
3. Determine the real inventory increase: $\$159 - \$150 = \$9$ (In base period dollars)

4. Restate the inventory increase in terms of beginning period prices: $\$9 \times 110\% = \9.90

5. Convert the inventory increase to LIFO cost: $\$9.90 \times .66\text{-}2/3 = \6.60 , 1974 LIFO layer

6. Find the 1974 ending inventory at estimated retail LIFO by adding the inventory increase (1974 LIFO layer) to the beginning inventory of 1974: $\$93.672 + \$6.60 = \$100.272$

In 1975 the inventory falls, which will result in the latest LIFO layer (1974) being completely consumed,



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² A more concise mathematical explanation is presented on page 33.

³ Some of the assumptions which underlie this illustration are that sales and purchases occur evenly throughout the period, and that the beginning inventory of 1973 has already been restated in terms of the average cost of purchases of the prior period. It is necessary to restate the beginning inventory because it is assumed that the conventional retail system had been used in the prior period. In the conventional retail method, the markups are used in calculating the cost ratio, but not the markdowns, and this of course results in an inventory figure which approximates the lower of cost or market. It is necessary, then, to convert this beginning inventory figure to a cost basis by including both markups and markdowns when calculating the cost ratio. One further assumption is that the price index was 100 when LIFO was adopted.

⁴ Since the base period index in this case is 100, it is, of course, not necessary to multiply by the base period index. However, if the base period index were any other number but 100, it would be necessary to perform this action or the answer derived would be meaningless.

Exhibit I

PROBLEM DATA

(000 omitted)

	<u>1973</u>	<u>1974</u>	<u>1975</u>
Beginning inventory - cost	\$ 90	\$?	\$?
- retail	144	?	?
Purchases - cost	540	565	335
- retail	890	910	520
Freight-in	30	35	15
Net markups	100	40	25
Net markdowns	40	50	45
Sales and other retail deductions	932	879.15	507.65
Price index - beginning of period	102%	110%	118%
Price index - average for period	108%	115%	120%

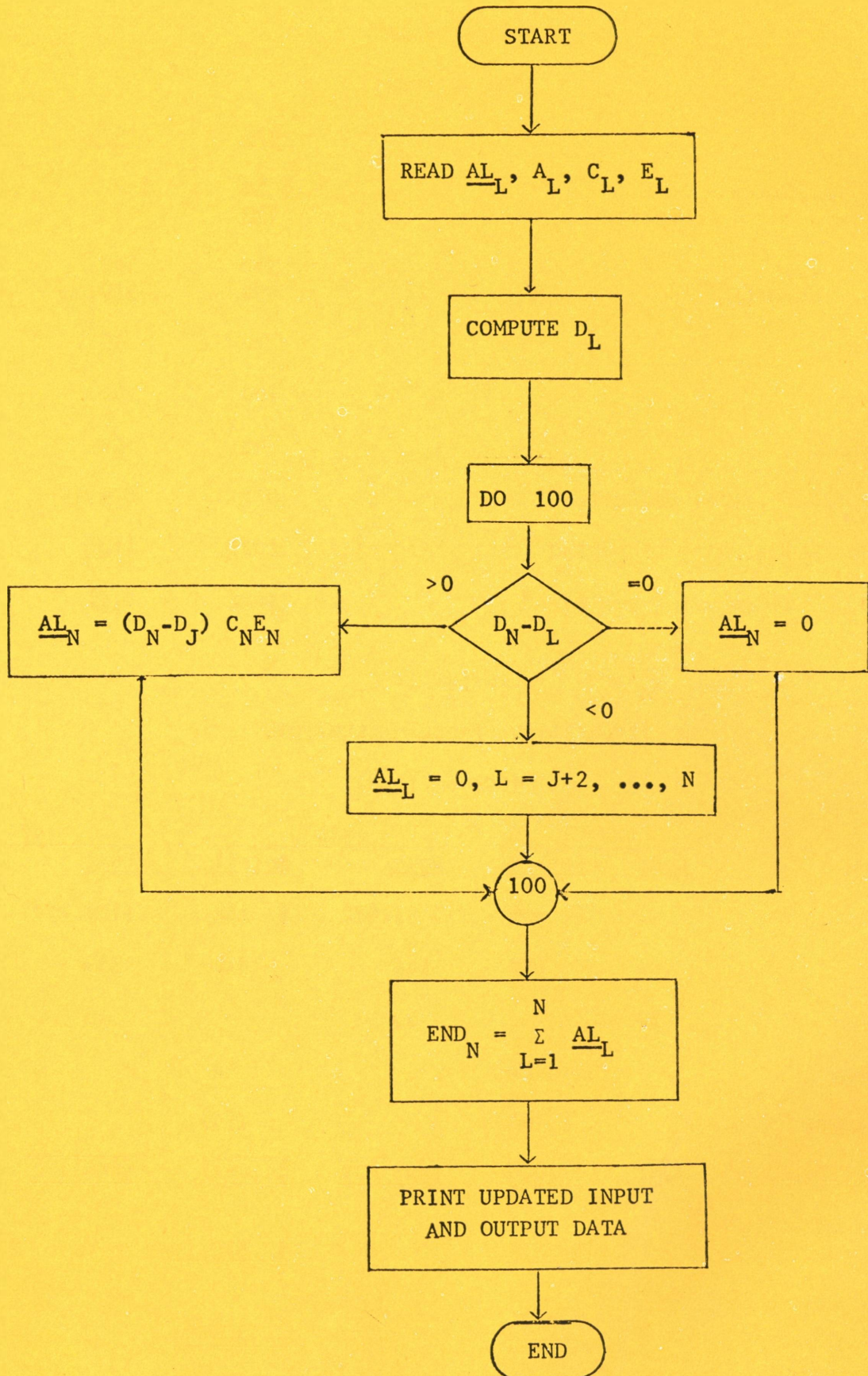
Exhibit II

ILLUSTRATIVE PROBLEM SOLUTIONS

(000 omitted)

	<u>1973</u>		<u>1974</u>		<u>1975</u>	
	<u>Cost</u>	<u>Retail</u>	<u>Cost</u>	<u>Retail</u>	<u>Cost</u>	<u>Retail</u>
Opening inventory	\$ 90	\$ 144	\$ 93.672	\$ 162	\$100.272	\$182.85
Purchases	540	890	565	910	335	520
Freight-in	30		35		15	
Net markups		100		40		25
Net markdowns		(40)		(50)		(45)
GOODS AVAILABLE	<u>\$660</u>	<u>\$1,094</u>	<u>\$693.672</u>	<u>\$1,062</u>	<u>\$450.272</u>	<u>\$682.85</u>
Sales and other re- tail deductions		\$ 932		\$ 879.15		\$507.65
Estimated ending in- ventory at retail		<u>\$ 162</u>		<u>\$ 182.85</u>		<u>\$175.20</u>

FIGURE 2



and a portion of the 1973 layer also being eliminated. The computations for 1975 follow:

1. Cost-selling price ratio:

$$\$350 \div \$500 = 70\%$$

2. Convert ending inventory to base period prices:

$$\$175.2 \times \frac{100\%}{120\%} = \$146$$

3. Determine the real inventory decrease:

$$\$159 - \$146 = \$13$$

Since the real inventory increase of 1974 was \$9, (selling price) in base period dollars, it follows that the 1974 layer is completely eliminated, as is \$4 of the 1973 layer (to make up the \$13 decrease): \$6 (1973 layer at retail) - \$4 = \$2, the remaining 1973 layer at retail

4. Restate the remaining 1973 layer in terms of beginning 1973 prices:

$$\$2 \times 102\% = \$2.04$$

5. Convert this remaining 1973 layer to estimated LIFO cost:

$$\$2.04 \times .60 = \$1.224$$

6. Find the 1975 ending inventory at estimated retail LIFO by adding the remaining 1973 LIFO layer to the beginning inventory of 1973:

$$\$90 + \$1.224 = \$91.224$$

Mathematical approach

At this point it should be mentioned that the difficulty in explaining dollar-value retail LIFO can be considerably eased and shortened if the problem is presented in mathematical terms. Let us temporarily ignore any need to treat various items or departments separately; this will leave us with the basic dollar-value LIFO problem. Mathematically, we have:

KEY: D_L = Deflated ending inventory at retail for year L ; $L = 1, 2 \dots, N$ (N stands for the current year and $L = 1$ represents the base year). D_J = First deflated ending inventory that is exceeded by D_N . $BULGE_L$ = Inflated ending inventory for year L . END_L = Ending inventory at \$ LIFO for

year L . AL_L = Uninvaded layer of cost for L . AL_L = Layer of cost added to inventory in year L . A_L = Average index of inflation for year L . C_L = Cost ratio for year L . E_L = Early index for year L .

(1) $D_L = BULGE_L \div A_L$
Compare D_N with D_L , for $L = N-1, N-2, \dots, J$.

Case I: $D_N - D_L > 0$

(2) $AL_N = (D_N - D_J)$
 $C_N E_N$

Case II: $D_N - D_L = 0$

(3) $AL_N = 0$

Case III: $D_N - D_L < 0$

Continue comparing D_N to each previous year until year J in which $D_N - D_J > 0$ (observe that when this situation occurs you are in year $J + 1$).

Then (1) apply formula 2 for year $J + 1$ to determine AL_{J+1} and (2) set $AL_L = 0$ for $L = J + 2, J + 3, \dots, N$.

To obtain ending inventory:

(4) $END_N = \sum_{L=1}^N AL_L$

The whole process may be represented in the simplified computer flow chart in Figure 2 on the left.

Disaggregated inventory sections

In many cases it is not desirable to use a single cost ratio for the entire inventory because the inventory as a whole is too dissimilar. When this situation prevails, it is better to segregate the inventory by homogeneous groups, perhaps departments, and use separate cost ratios to estimate the LIFO inventory cost for each group. An annotated computer program for accomplishing this is presented in Exhibit III on pages 52 and 53.

The same problem we have previously discussed (the estimation of the dollar-value LIFO retail inventory for three years for one department) is presented in Exhibit III with the addition of similar data for a second department which has been in existence for one

year longer than the first department. Exhibit III does not show how the input data were actually punched but this was done in accord with FORMAT statement 200. To avoid future input data punching it would be desirable to have the output data punched as a result of the programed instructions. To assure the acceptability of the data (output of one period must coincide with the format of the input for the next period) it would perhaps be wise to refer both the input READ and the output PRINT (or PUNCH) statements to FORMAT statement 200 (thereby eliminating FORMAT statement 202).

It would be in keeping with the purpose of this program to have the output data of one time period punched in order to serve as part of the input data for the ensuing time period. This can be illustrated for the year 1975 with Department 2 data as follows.

The first four rows of data in Exhibit IV on page 53 could have been punched out by the computer in 1974, the previous year. Then the fifth row containing 1975 input data would be punched (inserting zeroes in the last two columns since the amounts in these columns are to be calculated by the program).

Conclusion

A mathematical statement of dollar-value retail LIFO has been developed for both the entire aggregated inventory and for the case where the firm has separate inventory sections. In addition, a computer program for these same procedures was presented. As can be seen, knowledge of both mathematics and the computer can eliminate the computational dog-work from the dollar-value retail LIFO procedure, and allows the method to be explained simply and concisely. The increased emphasis on both mathematics and the computer can be to the advantage of the accountant if he becomes more aware of developments in these fields.

EXHIBIT III

Computer Program for Disaggregated Inventory Sections

```

C   $ VALUE LIFO // RETAIL METHOD
C   LL * DEPARTMENT CODE
C   BULGE * INFLATED ENDING INVENTORY FOR YEAR L
C   A * AVERAGE OR YEAR END PRICE INDEX
C   E * EARLY INDEX FOR YEAR L
C   C * COST RATIO FOR YEAR L
C   END * ENDING INVENTORY AT $LIFO COST
C   AL * LAYER FOR YEAR L
C   D * DEFLATED INVENTORY
C   L = PERIOD NUMBER
C   II * NUMBER OF DEPARTMENTS
C   IDEPT * SPECIFIC DEPARTMENT BEING UPDATED BY THE COMPUTER
C   DIMENSION BULGE(9,9), A(9,9), E(9,9), C(9,9), D(9,9), END(9,9), AL(9,9)
1  SUME(9)
   II=2
   DO 130 IDEPT =1, II
   READ 90, N
90  FORMAT (I2)
C   IN THIS FORMULATION THE YEAR OF ADOPTING LIFO IS YEAR 1
190 DO 100 L=1,N
   READ 200, LL, BULGE(LL,L), A(LL,L), E(LL,L), C(LL,L), END(LL,L), AL(LL,L)
200 FORMAT (I2, 6F10, 4)
100 D(LL,L)=BULGE(LL,L)/A(LL,L)
   M=N+1
   DO 110 J=1,M
   JPM=J+2
   JPREV=J-1
C   IF *, WE HAVE A LAYER FOR YEAR N OR REVISED LAYER FOR J AS CASE MAY BE
C   IF 0, ENDING INVENTORY WILL EQUAL PREVIOUS YEAR *NO LAYER FOR YEAR N
C   IF *, WE CONTINUE SEARCH UNTIL 0 OR * CONDITION OCCURS--REVISION OF LAYERS
C   EACH YEARS CARD IS UPDATED, IF THE YEAR NO LONGER HAS A LAYER,
C   THEN 0 APPEARS
   IF (D(LL,N)=D(LL,JPREV)) 10,20,30
10  AL(LL,J)=0
C   WE MUST NOW PROVIDE FOR INVADING THE BASE YEARS INVENTORY
   IF (D(LL,N)=D(LL,1)) 11, 11, 110
11  AL(LL,1)=D(LL,N)*C(LL,1)*E(LL,1)
   GO TO 110
30  AL(LL,J)=(D(LL,N)-D(LL,JPREV)) *C(LL,J) *E(LL,J)
   GO TO 115
110 CONTINUE
   GO TO 115
20  END(LL,N)= END(LL,JPREV)
   GO TO 125
115 DO 116 KI =1,II
   SUME(LL) = 0.
116 CONTINUE
   DO 120 KI = 1,N
C   WE NOW SUM LAYERS TO FIND NEW INVENTORY VALUATION
   SUME(LL)= SUME(LL) + AL(LL,KI)
120 CONTINUE
   END(LL,N) = SUME(LL)
201 FORMAT (2X, *DEPT.*, 5X, *BULGE*, 9X, *A*, 9X, *E*, 8X, *C*, 7X, *END*,
18X, *AL*)
   PRINT 201

```

```

125 DO 126 L=1,N
C   FOR NEXT PERIODS RUN, OUTPUT CARDS REPLACE INPUT
126 PRINT 202,BULGE(LL,L),A(LL,L),E(LL,L),C(LL,L),END(LL,L)
1)
202 FORMAT (72X,12,5X,6F10.4)
PRINT 127
127 FORMAT (7777)
130 CONTINUE
STOP
END
    
```

DEPT.	BULGE	A	E	C	END	AL
1	144,0000	1.0000	1.0000	0,6250	90,0000	90,0000
1	162,0000	1,0800	1,0200	0,6000	93,6720	1,2240
1	182,8500	1,1500	1,1000	0,6670	100,2720	0,0000
1	175,2000	1,2000	1,1800	0,7000	91,2240	0,0000

DEPT.	BULGE	A	E	C	END	AL
2	220,0000	1,0000	1,0000	0,6360	140,0000	112,4357
2	302,4000	1,1200	1,0500	0,7500	179,3750	0,0000
2	410,0000	1,2000	1,1300	0,6000	227,9650	0,0000
2	198,0000	1,1200	1,1500	0,7000	112,4357	0,0000
2	318,0000	1,0600	1,1000	0,6670	202,8380	90,4023

Exhibit IV
Input Data

Year	Dept.	Ending inventory at retail	Average Index	Early Index	Cost Ratio	Ending inventory at \$LIFO	Uninvaded portion of inventory cost layers
1971	2	220.0	1.0000	1.0000	.636	140.0	112.4357
1972	2	302.4	1.1200	1.0500	.750	179.375	0.
1973	2	410.0	1.2000	1.1300	.600	227.965	0.
1974	2	198.0	1.1200	1.1500	.700	112.4357	0.
1975	2	318.0	1.0600	1.1000	.667	0.	0.

Part 1

Time sharing and 'dedicated services' called most significant recent automation developments by keynote speaker; quality control and auditing of EDP also stressed at Midwest meeting

AICPA COMPUTER CONFERENCE IN CHICAGO ATTRACTS LARGEST ATTENDANCE TO DATE

A Management Services Staff Report

TIME SHARING, quality control in computer operations, and the auditing of EDP were among the main emphases at the AICPA-sponsored Fifth National Conference of Computer Users, held in Chicago, May 19-21.

The meeting, which drew the largest attendance yet recorded for an AICPA computer conference, was the first in a new series of annual automation meetings. Up until now, such conferences have been held semi-annually.

The keynote for the conference was set by Isaac Auerbach, president, Auerbach Corporation, when he described time sharing and "dedicated services" as being two of the most important developments in EDP in the recent past.

No data processing equipment or concept has any use unless it is adequate to meet the user's need, Mr. Auerbach said. The stress must always be on the user.

The CPA's role in data processing is unique because he is both

an advisor and a critic to his clients—the potential users, he continued.

"The most important development in EDP during the past year has been the realization that technology for technology's sake is not enough. We now realize that the real future of automation lies not in the development of better black boxes, but rather in learning how to better use the developments we already have," he said.

"Perhaps the most significant developments of the recent past have been the rise of time sharing and the concept of dedicated services. Dedicated services may eventually be the largest part of information services. Dedicated services remove the handicap of management's unfamiliarity with EDP concepts and terms."

Dedicated services is a concept wherein computer services geared to the needs of one particular industry are developed, and marketed to companies within that industry.

Time sharing, properly used, he said, is an interpretive computer service that significantly extends the use of the computer as a problem solving device, just as time sharing's conversational mode significantly extends the number of potential users. Actually today, more than 70 per cent of time sharing users have in-house computers.

The problems that exist in the field will have to be solved mainly by the next generation, he maintained. Those who invent devices are never the ones who make the best uses of them. Those who have grown up accepting the computer as a *fait accompli* are not in awe of it, and consequently will be able to make the greatest breakthroughs in its use.

Time sharing and dedicated services give better responses to users' needs than any other EDP developments.

To a query as to whether remote batch processing was practicable in the near future, the computer

expert replied that FCC cooperation on lowering communications costs could make such processing extremely practicable.

The second session of the conference's opening day, considering the computer input problem, first from the practitioner's viewpoint and then from the standpoint of the system supplier, was moderated by Jerome Farmer, J. K. Lasser & Co. The first speaker, Vance Genzlinger, Plante and Moran, said that his firm believed it was wrong for CPAs to believe they must correct errors in input data supplied by their clients.

"It's better to give the client feedback so he can correct his own errors," he said. "This means that the computer has to be programmed to flag errors for feedback to the originating department."

He said his firm has each client prepare all his own rate data for computer input. Plante and Moran gives the client a list of errors found in his data by the computer, after the run.

James Mann, Elmer Fox & Co., said that although 85 manufacturers offer nearly 300 different types of input devices, these should not be accepted blindly. "Thorough analysis and the choice of the best of the alternatives available is still the best approach to the input problem," he said.

Claude Robinson, of Manning, Perkinson and Floyd, last of the speakers on the first part of the panel, said that small installations in particular simply don't have enough time to get and train good personnel. Thus, effective and stringent input controls are essential. A firm must know what its data processing personnel are involved in and what their activities are. This is best accomplished, he feels, by getting one knowledgeable man, putting him in charge of EDP personnel and letting him serve as liaison between the EDP and the accounting staff.

This leads to better management control and understanding of the entire EDP process, he said.

This entire problem becomes

acute in smaller cities where the pool of well qualified programmers and other EDP personnel is small.

He said his firm had found that the best choice for a liaison officer between the accounting staff and the EDP staff was a CPA who had learned EDP, and he recommended that firms without such personnel train one of their accountants in EDP systems and procedures. At a lower level, a keypunch operator with some bookkeeping experience can also be invaluable, he said.

The second part of the panel, composed of manufacturers' representatives, understandably talked mostly about their own particular input devices.

Closed-circuit TV used

The assistant director of the IRS Regional Service Center, Kansas City, Mo., Emil A. Marecki, spoke on "The IRS, Its Computers and You" at the luncheon session. He outlined the way in which regional IRS service centers are organized and the role they play.

The afternoon session was something of a novelty at AICPA computer conferences. Five closed-circuit television sets were set up in the Grand Ballroom of the Palmer House so that all members of the audience were able to follow the action on at least one set. The screens displayed excerpts from two of the new AICPA video-tape computer courses which were developed by the Canadian Institute of Chartered Accountants. The courses from which excerpts were shown were "Computer Concepts" and "Control and Auditing of EDP Systems." Jerome Mauze, project manager, Professional Development Division, AICPA, introduced the presentations and provided a narrative linking the excerpts. He emphasized the practical approach of the courses, and said they were designed to dispel many of the current myths about computer applications. Each course includes classroom instruction, discussion, and problem solution as well as "hands on" computer experience.

Throughout, the unique characteristics of the computer—its speed, its immense storage capacity, and its logic—were emphasized. These together mean that simply computerizing traditional functions like Payroll, Accounts Receivable, and Accounts Payable is wasting the capacity of the computer, the presentation asserted. It is only when the computer is used for management and control purposes that it begins to add new dimensions to modern business.

The "Computer Concepts" presentation outlined the history of computing devices and discussed the various types of number systems. It showed how the computer can perform the same duties as simple mechanical machines but in computer fashion. Input and output devices, and sorting, as well as direct and random access storage systems were discussed. Machine language and assembly language were covered; then the higher-level languages were outlined.

Throughout, the unique characteristics of the computer—its speed, its immense storage capacity, and its logic—were emphasized. These together mean that simply computerizing traditional functions like Payroll, Accounts Receivable, and Accounts Payable is wasting the capacity of the computer, the presentation asserted. It is only when the computer is used for management and control purposes that it begins to add new dimensions to modern business.

The excerpts from the first course ended with discussion of areas where mathematical techniques are being used in business, a discussion of the cost and other factors involved in a yes-or-no computer decision, and the uses of a service center and time sharing.

The "Control and Auditing" course excerpts illustrated the types of controls best adapted for a computer environment, displayed excerpts from a programing control application, and offered a checklist for use in designing a good system.

The excerpts concluded with a discussion of auditing procedures for a computer system. It was stated that verifying the controls in any program was essential, first through identification of the program control points in the documentation for the program, and then through testing the controls themselves. There are several ways of doing this, it was pointed out. One of the most common has been through the use of test decks of cards. CPAs were advised against this for these reasons:

1. Test decks are difficult and time-consuming to create.
2. They may distort the master file.
3. They may require testing of all related master runs.
4. They may use valuable computer time.
5. They suffer because of the absence of true operating conditions.

Use of decision boxes in the client's flow chart is another method of control, but it was maintained that that too had its disadvantages. A third alternative was suggested: considering all of the firm's operations for the previous month as one vast test deck, coupled with a review of the error report for the same period. This is the fastest way to check computer controls as long as the error reports themselves are checked to ensure that the error was actually made, the course excerpt asserted.

The excerpts from the second course concluded with a discussion of systems gaps that occur in the average audit trial and what the auditor can do to repair them.

Subsequent afternoon and evening sessions of the first day were devoted to concurrent discussions by suppliers regarding hardware, software, and service capabilities. A reception was held for all attending the meeting in the late afternoon.

The next session, devoted to aspects of time sharing, was opened by Carmen Spinelli, J. K. Lasser & Co., who spoke on "Using Time

Sharing to Extend the Results of a Generalized Audit Approach."

Time sharing can radically reduce the cost of an audit, and permits a more effective audit job, Mr. Spinelli said. He gave as an example a client of his firm's which carried an accounts receivable balance of \$2.5 million in subscription income. The client had its accounts receivable files on a unit record system. In performing the audit, Lasser decided to use statistical sampling, and to use a computer accounts receivable package. Its first step was to have all subscribers' cards reproduced and then put on tape. Then a statistical sample from the entire universe of subscribers was selected from the tape records for individual investigation.

From that point on, the entire process of the audit was performed on a computer, but Lasser, for purposes of comparison, noted the amount of manual time that would have been required if a computer had not been used. These are their results:

For preliminary investigation and discussion, the differences favored the manual approach: only four hours manual time would have been required compared to the 10 hours of computer time actually used. But from that point on, the difference was radically in favor of the computer usage. Comparative figures are shown below.

The second team of speakers on the time sharing program, Nicholas Baumkirchner and Donald Adams,

	<u>Manual</u>	<u>Computer</u>
Footing accounts receivable file and audit of file contents	35	3
Selecting confirmation sample and preparing list	28	1
Preparing confirmations, stuffing, and mailing	31	2
Accumulating and appraising sample results	45	21

of Peat, Marwick, Mitchell & Co., discussing "Advanced Audit Techniques Utilizing Time Sharing," again used slides to illustrate many of their points. Mr. Adams demonstrated the economies of time sharing by showing how a company's financial statement could be made more meaningful by comparing each figure shown with the average figure for its industry. After showing a rather exhaustive list of such comparisons for the company he disclosed that computer costs for the entire analysis had been 30¢.

Mr. Baumkirchner said that at Peat, Marwick, time sharing is used for the source and application of funds statements for clients and requires only the entry of the proper figures.

Time sharing is also used very heavily in the firm's own staff training program, he continued.

To questions from the floor, Mr. Spinelli said that time sharing equipment was extremely useful in debugging programs to be put on an in-house computer because the in-house computer is tied up so much more than a time sharing computer facility, and debugging can take so much machine time.

Speaker lists AICPA aids

Opening the second day of the meeting, Noel Zakin, manager, Computer Technical Services, AICPA, said that the great growth of EDP is progressively bringing the level of automation among the CPA's clients to smaller and smaller firms. This in turn increases the responsibility of every CPA to be in a position to give the very best advice on EDP installations and applications and to watch auditing procedures more carefully than ever, adapting to the environment as required, he declared.

The AICPA is helping the practitioner cope with EDP's challenge through the following mechanisms: the "Auditing and EDP" book; the "Auerbach Computer Notebook for Accountants" service; the new video-tape and other Professional

Development courses; the new CPAUDIO programs — many of which cover aspects of automation; *Journal* and *Management Services* articles; and through efforts of the Committee on Computers and Information Systems and its various subcommittees.

"EDP has just begun to expand," he declared, "and every expansion will affect CPAs and their clients. The power of the computer is not as a bookkeeping device but as an aid to management decision making."

In response to questions from the floor, Mr. Zakin said that the AICPA video-tape presentation would cost about \$25 a participant per course.

He said that the video-tape course will be offered freely around the country at locations where computer installations will permit those taking the course to have a hands-on interaction with the computer.

New accounting approach urged

The final speaker of the Tuesday morning session was John W. Wagner, associate professor of accounting at the University of California at Los Angeles, who spoke on what he believes to be a recasting of accounting philosophy called for by the new abilities of the computer.

Dr. Wagner's thesis is that accounting under manual methods has traditionally been output oriented, systems where the questions are designed in advance to be answered by the system. Such an arrangement restricts input data to those necessary to answer the preconceived questions.

"Under the circumstances this is a very practical approach to answering our information requirements but it is also a rather restrictive one," he said. "If at some future time we wish to answer a question not contemplated in our original system, we cannot do so except by some special analysis which must again refer to the source data."

An "input" oriented system, on the other hand, is hampered by no

such arbitrary restrictions since it is more interested in classifying data in terms of various type of input rather than classifying it in relation to some preconceived type of output.

Flexibility increased

"With the input approach," he continued, "any question is permitted that some combination of the input accounts can answer."

The use of an input oriented chart of accounts assumes the availability of new capabilities, he said. "Among these are an ability to handle much more detail than is usually practical in a manual system, an ability to combine this detail, as desired with a high degree of clerical accuracy and, finally, an ability to do this with extreme speed, preferably in a fraction of a second.

"This is where the computer comes into the picture," he declared. "It can meet these requirements and so it can make such a system a practical possibility."

Nor do accountants have to become computer technicians in order to make full use of the machines, Dr. Wagner said.

"I would contend, contrary to a number of studies on the subject, that accountants do not need a great deal of knowledge about specific pieces of computer hardware or skill in programming," he continued. "I doubt seriously that computer specialists are going to develop the sophisticated accounting systems of the future. I think instead these systems will be developed by accountants who have familiarized themselves with the conceptual implications of the computer. It is the expert accountant who knows enough about accounting to give wings to his imagination on what he would like a new accounting system to do. It is the computer expert who can then install it. Ability to communicate with the computer experts is the real requirement and responsibility that all accountants should strive to meet." (*To be continued.*)

what people are writing about

BOOKS

Processing Securities Transactions by H. V. PETRILLO, CPA, and C. L. BULLOCK, CPA, The Ronald Press Company, New York, 1969, 294 pages, \$12.

The well publicized back office problems of the stock brokerage firms have made them prime candidates for the services of data processing consultants. This guide to brokerage paper work is almost detailed enough to provide the basis for a manual of operating procedures.

A great deal has been written about information systems for business. But most of this material assumes that the business involved is a manufacturer—or sometimes a retailer or wholesaler. None of it is directly applicable to the brokerage business, which is unique in its data processing requirements.

In this book, which may be, as the publisher claims, the only one of its kind, two partners of Haskins & Sells have put together a comprehensive description of the administrative procedures of brokerage firms. Their focus is not on accounting—although one chapter is devoted to that subject—but rather on transactions and the ef-

fort required to record them and report them to customers, management, banks, other brokers, etc.

The book describes the activities and organization structure of a typical brokerage and then explains the work of each back office department—wire and order, purchases and sales, margin, cashier, stock record, dividend, customer bookkeeping, control and auditing, and service departments. There also are chapters on transactions involving clearing corporations and clearing brokers; firm trading; underwriting; and commodities trading. Manual, mechanical, and electronic methods of handling transactions are discussed.

REVIEW EDITORS

In order to assure comprehensive coverage of magazine articles dealing with management subjects, MANAGEMENT SERVICES has arranged with fifteen universities offering the Ph.D. degree in accounting to have leading magazines in the field reviewed on a continuing basis by Ph.D. candidates under the guidance of the educators listed, who serve as the review board for this department of MANAGEMENT SERVICES. Unsigned reviews have been written by members of the magazine's staff.

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The text is illustrated by 42 sample forms, records, statements, and flow charts, which for some reason are repeated in an appendix. Other appendixes provide a set of sample journal entries showing the effect of various typical transactions on the general accounts and subsidiary records and an index to regulatory requirements.

The result is a manual that unquestionably will be of great value to brokerages and their consultants.

The Accountant in Management by R. I. TRICKER, B. T. Batsford Ltd., London, England, 1967, 423 pages, 84 shillings (\$10.08).

In Britain, as in the United States, the role of the accountant in management is changing rapidly, and there, as here, many accountants are ill prepared for their new responsibilities. Mr. Tricker offers them some orientation.

A lengthy discussion with managers about their ideas on accounting and their opinions of accountants is, Mr. Tricker writes, "probably the most shattering experience that can befall an accountant, except perhaps publishing a balance sheet that does not balance." It was this experience, he says, that inspired him to try "to draw together some of the aspects of evolving management science, information technology, and behavioural science and to apply them to a conceptual model of the business, then to see where the man trained in traditional accountancy fitted in."

Mr. Tricker's thesis, familiar by now to every American accountant, is summarized in the book's concluding paragraph as follows:

"The accountant in tomorrow's management may well be more manager than accountant, with an awareness of a wide spectrum of concepts, methods, and techniques. His orientation will not be historical, cautious, and narrow. . . . He

will be a man in the forefront of change . . . a man at home in the information era."

Mr. Tricker sees three major tasks for the management accountant: the provision of appropriate information for managers' decisions, the management of funds flow, and participation in the management process. To carry out these tasks the accountant will need to be familiar with behavioral science, computers, and quantitative methods, he says.

Every American accountant, of course, has read this a dozen times by now. Mr. Tricker's version of the standard sermon differs from the ones published in the United States in two significant respects.

The first is his style. Mr. Tricker writes clearly, forcefully, and gracefully in a manner singularly free of redundancy, pretentiousness, and gobbledegook (or, as he calls it, mumbo-jumbo).

The second is his content. In addition to exhorting the accountant to higher things, Mr. Tricker chooses to offer what amounts to a short course in management. He started, he says, not by asking the question, "What can the accountant offer business?" but by inquiring, "What does the business need?" Thus, instead of simply listing the things that the accountant will need to know and do in the future, he first analyzes in some detail what it is that managers know and do. The object is to sketch a "framework that . . . will be meaningful and useful to the accountant in rethinking his role."

None of this is new. (As Mr. Tricker writes in his preface, "I make no claims to be pushing back the frontiers of knowledge. . . . I see my role as urging the settlers to move into and capitalise on the areas being discovered.") But it has seldom been so well put.

Management of Organizational Behavior: Utilizing Human Resources by PAUL HERSEY and KENNETH H. BLANCHARD, 1969, Pren-

tice-Hall, Inc., Englewood Cliffs, New Jersey, 147 pages, \$6.95 cloth-bound, \$3.95 paperbound.

The results of the various studies that have been conducted on the behavior of people in organizations are ably summarized in this little volume. If it doesn't add up to much that is really helpful in management, that is hardly the fault of the authors.

Social science is a major vehicle by which management theorists have sought to provide "principles" of management. (Management, in this case, is defined as "working with and through individuals and groups to accomplish organizational goals.")

Skill in working with and through other people is the common denominator that is crucial to success at all levels of management, according to these authors. "To help the manager understand why people behave as they do and to increase his effectiveness in predicting future behavior, directing, changing, and controlling behavior," Professors Hersey and Blanchard have attempted to integrate all the findings of the social sciences into a "conceptual framework" that the reader can apply while working with people in his own environment.

The emphasis is on motivation, behavior, and leadership within organizational settings. All the major studies—from Hawthorne on—and all the major theories—X versus Y, the Managerial Grid, Tri-Dimensional Leader Effectiveness, etc.—are covered. (The bibliography is 21 pages long.)

This is material with which everyone involved in management should be familiar—although the precision-minded accountant will probably be impatient with it. These authors' account clearly shows (although it does not emphasize) the obviousness or inconclusiveness of much of this research. This version, clear, concise, and relatively free of sociological jargon, is a good summary of it.

Putting MIS to Work: Managing the Management Information System by NORMAN L. ENGER, American Management Association, New York, 1969, 255 pages, \$10.50.

Computer systems are becoming more costly and complex; they are becoming more and more crucial in everyday business operations; and the effort to provide industrywide performance standards is merely inching along. All this, the author argues, means that management must exercise tighter control to make sure these systems really work.

Tales of horrible goofs by computers are probably less common, in proportion to the number of computers in operation, than they used to be in the early days of electronic data processing. But they are not as funny as they used to be.

The standard stories of checks with a few extra digits and dunning letters for nonexistent bills pale into insignificance beside some of the examples of computer failure Mr. Enger cites in this book: the seven-figure loss that had to be written off when a computer misapplied cash payments and scrambled millions of dollars' worth of accounts receivable records; the food wholesaler that sued a computer manufacturer for \$53,000 after the machine completely lost track of orders and inventory; the aircraft manufacturer that became liable for millions of dollars in penalties for contract completion delays when its computer simply stopped running for several days.

The reason, of course, is that the computer is now coming into its own. No longer used just to speed up isolated clerical operations, it is becoming the key element in massive information systems that reach into every corner of a company's business. This means that a failure of hardware, software, or control conceivably could be serious enough to wreck an entire company.

In these circumstances, Mr. Enger points out, much tighter control procedures are needed than have been typical in the past. He deals with three major problem areas in detail: the need for comprehensive error detection, audit, and security procedures; the need for improved standards of software performance and dependability; and the need for greater hardware reliability with less downtime. His treatment of the first category is much more concrete and less mechanical than the typical review of computer control techniques for auditors and should be of considerable value to CPAs. He also discusses the quality of manufacturer support, management's responsibility in systems implementation, and the impact of the approaching fourth generation of computers on management information systems design.

Nearly every chapter ends with a checklist. There are checklists for management information system design (objectives versus performance); system controls (for error detection, audit, and security); software selection; hardware reliability; evaluation of vendor support; and management responsibility in the design of management information systems.

This book has its weaknesses. Some of the checklists deal with subjects not really suited to the checklist format, and none of the checklists is as detailed as the accountant would probably like. Mr. Enger is somewhat vague about which management he is assigning responsibilities to; sometimes it seems to be general management and sometimes the manager of the data processing group. On the whole, however, this is a useful book for the consultant, auditor, or business executive.

Report Writing for Management by WILLIAM J. GALLAGHER, Addison-Wesley Publishing Company, Inc., Reading, Massachusetts, 1969, 216 pages, \$6.50.

Among the many books written on this subject this one is unusual for its effort to guide the executive who orders the report as well as the man who must prepare it.

The title of this book, says Mr. Gallagher, is deliberately ambiguous. It is intended to suggest that the book is designed "not only for those who submit reports to various levels and types of management but also for managers who write, review, or only request reports."

This second group, the author points out, "has been sadly neglected." For them, the book "fixes their place in the system, points out their responsibilities, and offers guidelines for effective interaction with those who prepare reports."

Another useful chapter—this time from the report writer's point of view—deals with planning the research, collecting the information, analyzing the information, and reaching conclusions. From then on, the material is conventional—organizing the report, writing, revising, conciseness, clarity, grammar, style, and publication mechanics.

Since the author's principal experience has been with Arthur D. Little, Inc., the book is slanted toward the kind of semitechnical business research reports that that firm specializes in. As all books on this subject should be—though they aren't always—this one is well written—clear, well organized, highly readable, and generously illustrated with horrible examples drawn from the author's own experience.

Briefly listed

Man and the Computer: Technology as an Agent of Social Change by JOHN DIEBOLD, Frederick A. Praeger, New York, 1969, 153 pages, \$5.95.

This collection of updated versions of four speeches and one article deals with the technological revo-

lution and its future effects, the technological gap between Europe and the United States, management education for the computer age, and the effect of the computer on educational methods. The last-named chapter is the most specific. In general, the approach is more philosophical than informative.

Technological Forecasting and Long-Range Planning by DR. ROBERT U. AYRES, McGraw-Hill Book Company, New York, 1969, 237 pages, \$12.50.

This book discusses the advantages and disadvantages of various methods of forecasting future trends and specific developments in various areas of technology—extrapolation, model building, and intuition—and suggests how to use the results in planning. Although the book is peppered with mathematics, much of it is intelligible to the nonmathematician.

How to Run a Conference by MARION BIEBER, George Allen & Unwin Ltd., London, 1968, 124 pages, 21 shillings (\$2.52).

This handbook is intended as a guide for anyone who may be called upon to organize a conference, seminar, or study group. Topics discussed include the conference budget, planning, transportation and accommodations, physical facilities, translation, public relations, and records.

Standard Dictionary of Computers and Information Processing by MARTIN H. WEIK, Hayden Book Company, Inc., New York, 1969, 336 pages, \$10.95.

More than 10,000 hardware and software terms in general use in the data processing field are defined in this reference book, actually a sort of cross between a dictionary and an encyclopedia. The formal definitions—all, according to the author, “consistent with the best professional usage approved by technical society, government,

national, and international standards bodies”—are followed by brief essays providing additional background information in the subject area of the definition and by cross references directing attention to other closely related concepts. The author, who is deputy chief of the data management division of the U. S. Army Research Office, is chairman of the subcommittee on terminology and glossary of the committee on computers and information processing of the United States of America Standards Institute.

MAGAZINES

Cost/Progress — A Pattern for Operational Planning by WILLIAM E. SOUDER, *Managerial Planning* (formerly *Budgeting*), January-February, 1969.

Failure rates of 50 per cent or more are not uncommon in industrial research and development laboratories. While not denying that R&D work is uncertain by its very nature, this author puts much of the blame on lack of managerial control. He outlines a control system that can help administrators spot potential failures early.

Research and development administrators typically control their departments by means of budgets—comparing actual dollars spent with budgeted dollars—or personal involvement—“just talking to people on the project and knowing what is going on”—or a combination of the two methods.

Actually, as Mr. Souder points out, neither is satisfactory. The rate at which money is being spent on a project means nothing without some measure of the progress that is being made. And personal involvement often degenerates into authoritarianism at one extreme or laissez-faire at the other.

What is needed, Mr. Souder argues, is an approach that is more quantitative (in terms of progress

per dollar spent), more decentralized (to the lowest possible level), and more integrated (with continuous exercise of planning and control by the same person or persons).

In an effort to improve the R&D control process in the organic research and development laboratories of Monsanto Company, the author studied current and completed projects. He found that the “eventual failure or success of a research project was in no way related to the total dollars spent on it. Nor was the eventual failure or success correlated with whether or not the project was over or under its budget at various stages in its life cycle. What appeared to be more important was the amount of progress per dollar spent.”

So he developed a system for reporting progress in terms of the component steps in the project that have been completed to date as well as the money spent. In essence, the system calls for preparation of PERT-like diagrams of the jobs to be completed in the course of a project (events or “nodes” on the diagram), the dates forecast for their completion, and the forecast spending on a time continuum. Results are reported by computer.

The system, which is described in some detail in the article, is self-operating; project leaders prepare their own diagrams, with help from a staff analyst, and fill out their own monthly report data forms.

Now in operation throughout the department, the system is working well, Mr. Souder reports. He says the project managers like it because it gives them cost-effectiveness measures and because it allows them to determine the causes of overruns early enough to take corrective action.

A New Application of Calculus and Risk Analysis to Cost-Volume Profit Changes by THOMAS

A. MORRISON and EUGENE KACZKA, *The Accounting Review*, April, 1969.

Calculus and risk measurement are increasingly being used in the solution of business problems. The authors suggest an approach to cost-volume-profit analysis integrating calculus and risk measurement in such a way that the most profitable combination of changes may be selected.

All companies face pricing decisions. Profit may be increased by appropriate changes in price, cost, or volume. The decision maker is faced with the selection of that combination of price, cost, and volume which yields the greatest contribution to profits. His selection process is complicated by the fact that these variables are interdependent; an increase in price leads to a decrease in volume, a decrease in price to an increase in volume. Changes in cost that affect quality also affect sales volume.

Professors Morrison and Kaczka suggest a new approach that enables the decision maker to select the maximum profit combination. The approach can also be applied to determine: (1) the indifference points for each change in price or cost, (2) the added profit, (3) the optimal product mix, and (4) the opportunity cost of not having the capacity to produce the volume required for maximum profits.

Traditional method

The authors suggest that the traditional method of cost-volume-profit analysis is limited and may be misleading in certain cases. The traditional analysis employed by the businessman is to examine several discrete cases for either price-volume changes or cost-volume changes and select that combination which leads to the highest profits. The method is appropriate for the selection of the most favorable alternative, but what of the almost infinite number of cases not considered? To the extent that

cases are not considered, alternatives are restricted, and the decision maker faces the likelihood that a combination which would produce greater profits has been foregone.

The traditional approach may also be misleading. For a selected price-volume relationship the traditional approach may indicate that a continued price increase is warranted. This is a false interpretation of the relationship involved. The authors present data to confirm the position that the contribution margin per unit is not a constant and that beyond a specified point further increases in price will result in declining profits.

Calculus approach

The beauty of the use of calculus is that it allows the decision maker to find points of minimum cost and maximum revenue and, in this case, the price-cost-volume combination for maximum profits. The calculus approach is first applied by the authors to a situation in which a price increase is to be made. The question is: What is the optimal percentage increase in price required to produce the maximum contribution to profits for a given relationship between price and volume?

Cost-volume relationships are developed in simple equation form, and calculus is employed to determine the optimum formula. The analysis leads to the conclusion that only the following relationships need to be considered:

- (1) The original contribution percentage
- (2) The percentage in volume for each change in price
- (3) (Only if the relationship changes) the point at which the change occurs and the Y axis intercept of the line expressing the new relationship.

The authors proceed to develop numerical examples to illustrate the model. The improvement over the traditional discrete case is evi-

dent. Where the discrete case leads to an increase in profits, the new approach gives that combination which maximizes profits.

In those situations where the percentage change in volume to the percentage change in price is not constant over the range of price changes, the points of change must be determined and the corresponding percentage relationship substituted in the formula for the price change considered. The decision maker may then select the highest profit combination of the several percentage relationships assumed. For price decreases the equation is only slightly different, and the authors present the derivation of the optimal formula in this situation and proceed with an illustration of the selection of the optimal price decrease to maximize profits.

Price changes are only one way of affecting the volume of sales and profit. Increases in variable costs which lead to increases in product quality also lead to increased volume. In this case the decision maker is faced with that combination of percentage change in variable cost which leads to the percentage change in volume such that profit is maximum. Again the authors develop the equation expressing the relationship involved and derive the formula for profit maximization. The appropriate formula for a decrease in cost is also indicated. Numerical examples are presented to illustrate the methodology.

Incorporation of risk

To this point the authors have considered the percentage change in volume as given, a relationship determined from experience and settled upon for the analysis. In the real world such an exact knowledge of the volume behavior is unlikely. This means that the decision maker is uncertain about the change in volume for any change in either price or cost, and this uncertainty should be taken into consideration in the analysis. The authors suggest that an approxi-

mation for the error in estimate can be made through the application of classical statistics. The standard error of the estimate is given by a normal distribution with a mean of zero and a standard deviation of σ . Risk theory is integrated into the previous formulation and a probabilistic model developed. By algebraic manipulation of the probabilistic model the decision maker may determine not only the maximum profit but also the probability of the profit's being equal to, less than, or more than that which the firm now enjoys.

R. D. LOSSETT

University of Southern California

Computerized Financial Data Banks: Transition from Conceptual Design to Reality by MICHAEL R. TYRAN, *Management Accounting*, September, 1968.

The computerized "data bank" is generally conceded to be the key to the integrated management information system. This author describes the system now being developed in his company.

Too many companies, Mr. Tyran points out, are utilizing third generation computer equipment simply by "emulating" programs from their old computers. Since many of those programs, in their turn, were little more than electronic translations of earlier manual or mechanical procedures, these companies are falling farther and farther behind in reaching what should be their goal—to get full mileage from sophisticated equipment in "harnessing," interpreting, and controlling their financial and operating data.

The data processing system that is now being developed at the Pomona Division of General Dynamics Corporation is based on the data bank concept. (This author defines a data bank as "a predetermined file record location which serves as a depository for information.")

The data bank concept of storage and integration of financial information is not new in theory, Mr. Tyran notes, but its "mechanical application and practice is still a challenging endeavor." To utilize it, he says, the systems designers must find answers to the following questions:

How can the flow of data into the computer files be accelerated?

What compressed identities could be more effectively used in the input process?

What controls are necessary to police the reliability of data from source of input to eventual output?

How can multi-file updates and program streamlining be used to reduce processing?

How should manual data processing be integrated with the mechanical operation?

What is required to establish a complete network for mechanical information flow that will perform the accumulating, recording, updating, summarizing, and reporting of data without continual physical surveillance?

How should data be organized in the storage files for instant and specific retrievals?

In this article Mr. Tyran outlines the basic criteria that his division has found essential for evaluating answers to these questions.

How to Spot Executives Early by ROBERT C. ALBROOK, *Fortune*, July, 1968.

Three big companies think they have found a way to pick young men of high potential. It seems to work—but you have to know what to look for.

How do you find the young man of high potential and start him on the managerial ladder before his ambition sours and his talents fade? Three major U.S. enterprises—the Bell Telephone System, Sears, Roebuck and Company, and Humble Oil and Refining Company—believe they have found effective answers

to that question. Humble Oil and Refining, in addition to probing the managerial candidate's school and other activities, also gives its successful and less successful managers a biographical quiz in order to determine the types of histories most conducive to success within the Humble organization. Sears and Bell, on the other hand, rely heavily on the performance of potential executives during realistic management games.

Success claimed

To date, Sears, Bell, and Humble all claim outstanding success with their programs. The Sears program was begun in the East, but all sections of the country are now considering its adoption. The use of Bell's techniques has spread to fifteen of the operating companies and has resulted in a reported improvement in the caliber of supervisors. Humble's success is evidenced by Standard Oil of New Jersey's encouraging its other operating companies to adopt the same methods.

Bell's techniques

The Bell System is probably engaging in the nation's largest manhunt for managerial talent. Through sixty "assessment centers" located throughout the country, 30,000 Bell System employees have been tested thus far, and about 10,000 are tested annually. One of Bell's favorite management games is the "in-basket" exercise. The performance of the employee is observed and appraised as he copes with a stack of memos, correspondence, requests, and reports and decides upon the course of action to take in each instance.

In another Bell System game a group of employees is asked to manage a make-believe toy company. The assessors, by observing reactions to changes in costs and prices every twenty minutes, are able to evaluate an employee's ability to lead, organize, compete, and cooperate. Following comple-

tion of the games, each of the assessors rates each participant on twenty different personal and behavioral characteristics and reports on his rank and effectiveness within the group. Finally, all results are tallied and each man rated "more than acceptable," "acceptable," "less than acceptable," or "unacceptable." The rating is then passed to the employee's supervisor. It is not binding, however.

While Bell's cost may seem high (about \$400 per candidate), the results are impressive. The proportion of managers rated as successful in their new jobs as predicted by the new assessment techniques is from 13 to 50 per cent higher than the proportion of successes without assessment.

Sears' approach

Sears, Roebuck prefers to assess the individual before he is hired rather than after. Sears officials hope to reduce turnover among their college trainees (42 per cent within five years).

Sears has recently opened an assessment center in Philadelphia. Before the center was opened, all candidates selected by campus recruiters were offered jobs. Now, only two of every five finally go with the company. Sears' success is credited not only to the tests given but also to management's straight talk with regard to frequent transfers and "those lousy hours."

Humble's program

The heart of Humble's program is a biographical quiz designed to provide clues to managerial potential by analyzing the candidate's early behavior. In order to establish a norm against which the potential candidate can be compared, Humble gives these same tests to its present managers and correlates the results of the tests given the managers with the results for managerial candidates.

For some, biographical testing creates a misunderstanding. They

feel this is the company's way of ensuring the perpetuation of its present philosophy. This is not so, says Humble. Since people have had varying opportunities to display motivation and to exercise their leadership qualities, this is a way of ensuring that each individual is measured according to his potential rather than according to his experiences.

Employees helped

The testing programs at Sears, Bell, and Humble provide rewards for the employee as well as the company. In no case are test results allowed to overwhelm management's decision about a man. Instead, their purpose is to provide additional useful information.

At Humble, half of the men scoring in the highest ten per cent had not been with the company long enough for an adequate opinion to be rendered in the traditional manner. As a result of their high test scores, management regards them as men of exceptional promise and is watching them with close attention.

Imitators cautioned

Even though Sears, Bell, and Humble regard their programs as very successful, would-be imitators are to be cautioned. The key to a successful testing technique is a homegrown system tailored to an individual company's needs. As one executive states, "Any company that tried to adopt our program all by itself would almost surely be disappointed. It's worked for us because we don't have to take it too seriously when the test results look wrong. We still put our main emphasis on performance. Testing just improves the odds of picking the right men to begin with." The success of any managerial testing program must be judged on the basis of performance in the real world rather than under laboratory conditions.

A. W. WILLIAMS
University of Southern California

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EDITED BY JOHN C. BURTON, Ph.D., CPA

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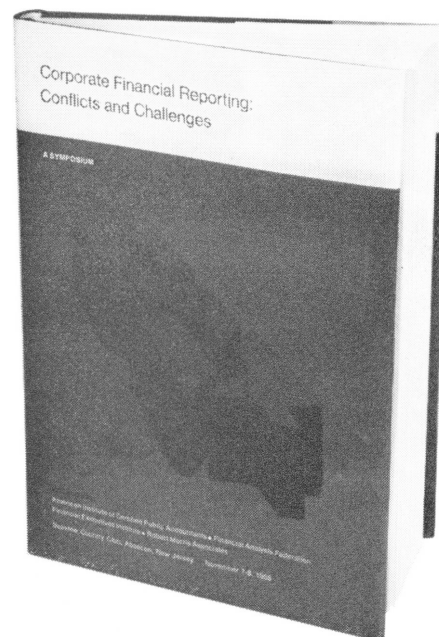
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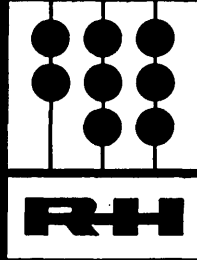
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