Management Services: A Magazine of Planning, Systems, and Controls

Volume 5 | Number 6 Article 3

11-1968

Computer Time Sharing for the CPA

Felix Kaufman

CPAs have long been intrigued by the obvious advantages the computer could offer them, but only the largest and best-established firms could risk the enormous investment in time and money required. Here's a solution that actually cuts costs —

COMPUTER TIME SHARING FOR THE CPA

by Felix Kaufman
Lybrand, Ross Bros. & Montgomery

WE'VE ALL BEEN inundated for years now with scare stories about the effect of computers on CPAs—stories of the "get on board, fellow, or you're going to be wiped out" variety. We're still hearing them, though by now most CPAs may have become complacent because the threat has not been carried out.

Still, almost all CPAs, large and small, know that the computer is impinging on their practice. The problem has been to define just *how* the computer affects the CPA and how the practitioner can use the computer.

Many CPAs have been guided by such wisdom as "if you can't lick them, join them." They have installed their own computers and have laboriously learned to use them.

This is fine for the larger firms, where computer expense may not be very much higher than associated income, and where the whole staff complex of programers and systems designers necessary to an installation can either be hired or trained. But it's not necessarily the answer for the smaller practitioner. Costs for him are out of all proportion to benefits, and the time he must spend in learning the intricacies of computer operation are completely out of line with the benefits he gains from the computer.

In addition—and this is most important—the installation of one's own system implies entry into the data processing business. The question we want to consider here, however, is not how and why the

CPA enters a new business—the computer service bureau business—but how he aids his CPA activities.

So we have what looks like a dilemma—and what truly was a dilemma until very recently: How can the small CPA gain the advantages offered by computers while remaining a CPA?

New technology

The former dilemma is no longer real because the technology has reached a point where the small CPA can meet the computer and find a reasonable relationship. No longer is the CPA required to mortgage everything he owns in order to install a computer; no longer is he forced to spend months learning to communicate with the machine.

The technology that has rescued the CPA is available in the shape of time sharing computers with small, inexpensive input-output terminals. Such terminals — though they are not yet easily portable and they must be used from the CPA's own office instead of client premises—have opened to all CPAs an opportunity to take full advantage of the computer's vast capabilities.

Equipment rental is cheap — cheaper for some applications than the staff time required for manual data handling. By using a remote terminal, the CPA can avoid fixed costs; he pays only for the computer time he actually uses (and also for telephone transmission to the computer, of course). That's all.

Instead of saying "I must make an investment of X dollars to be in the computer business," he can now say, "Every job I decide to do will be justified on its own merits, because I will know how much that job will cost."

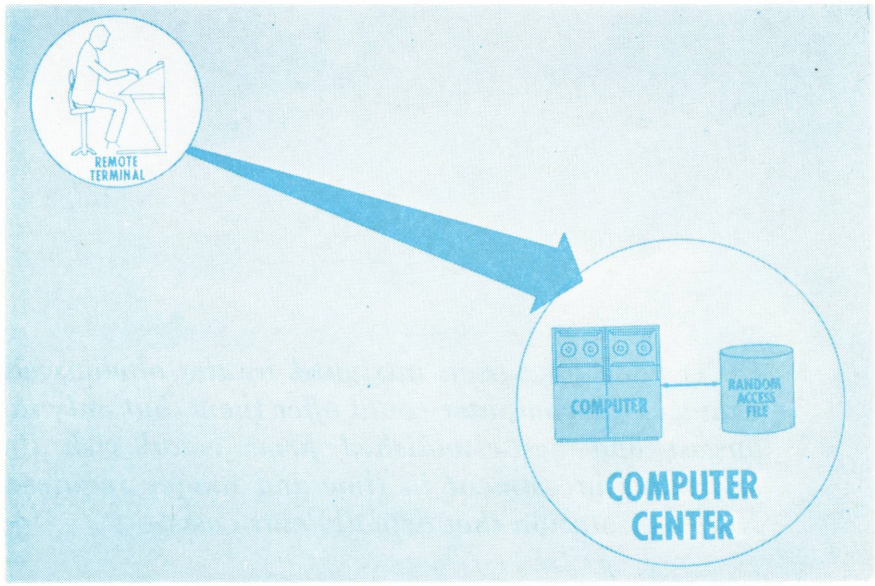

FIGURE 1

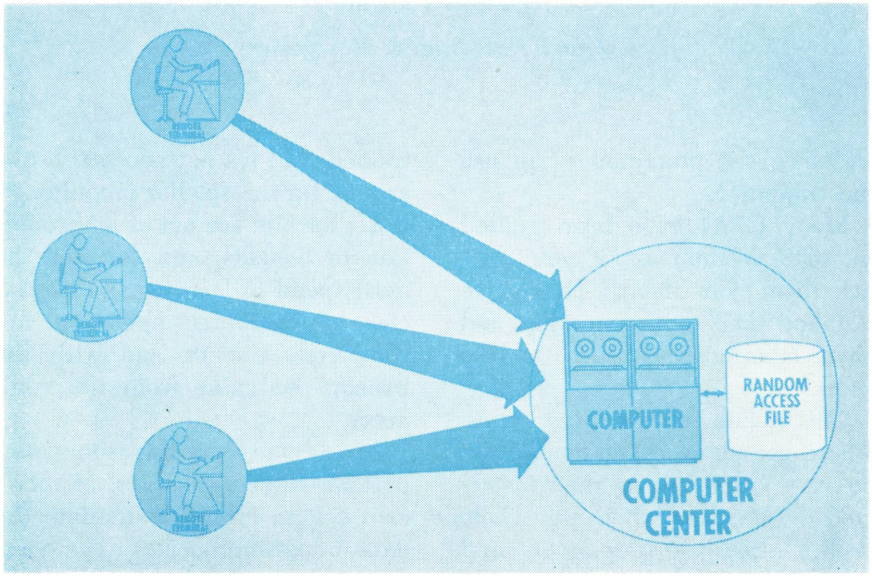

FIGURE 2

Programing simple

Programs for terminals are easy to work with, and this is a second boon to the CPA. Programing languages like BASIC are taught in just one day of classroom training. These languages are designed to be adapted to time sharing conditions.

The act of preparation necessary to get into data processing is extremely modest by comparison to the act of preparation needed to get into his own system. We're thinking now of the man who finds it necessary to put a program together himself, a chore that is not always necessary. Time sharing doesn't eliminate such requirements altogether, but it does moderate them substantially, and it changes their character substantially.

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The technology that can rescue the CPA is available in the time sharing computer.

There is yet a third factor working for the CPA in a time sharing environment. He can participate in the development of program libraries, and he can also call upon existing program libraries. Jobs he wants to do may become feasible for him because of the programing work someone else has done previously.

Perhaps a very brief definition is called for. Let's be sure we all know what time sharing is.

Figure 1 on page 18 depicts essentially how time sharing works: An operator at a terminal types questions that are carried over telephone lines to a distant computer. The computer, which may be serving several terminals simultaneously (Figure 2 on page 18), accepts the data, does its work, gets its answers, and returns them over the same line. Time sharing then involves using a remote computer. It is of no concern to the user where the computer is located, so long as he may use it when he wants to.

Random access

Time sharing also implies that the computer is working with something we call random access memory, which means that it has the ability to turn from one assignment to another rapidly and easily because files and programs are stored in an electronic medium which fosters skipping around.

To visualize the picture, let's look at what might happen in your own shop. Although you could install a terminal in place, let's visualize your installation in terms of using a transportable terminal. The terminal can be carried and plugged into an electric power outlet. A telephone instrument is moved from its regular cradle and placed in a yellow box next to the terminal (Figure 3 on this page). The yellow box is an acoustical coupler that provides a path for signals coming off the terminal to be transmitted through the phone line.

At this point we dial the computer's telephone number. It is easy to see that future time sharing systems will include a number of computers, any one of which can be looked up in a directory and called to do a specific job. Carrying that concept one step further, a user who knows what program he needs will be able, by reference to a telephone directory, to find the program, the computer in which

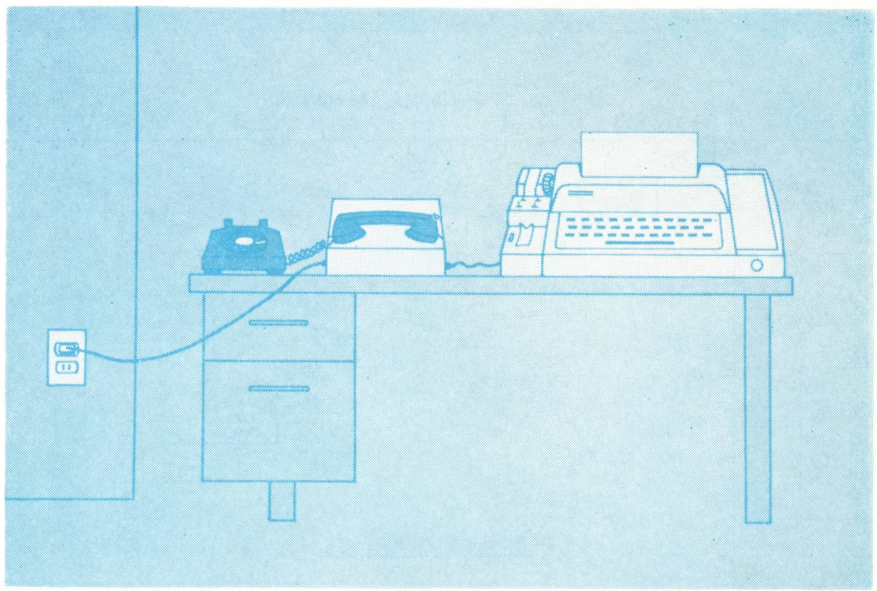


FIGURE 3

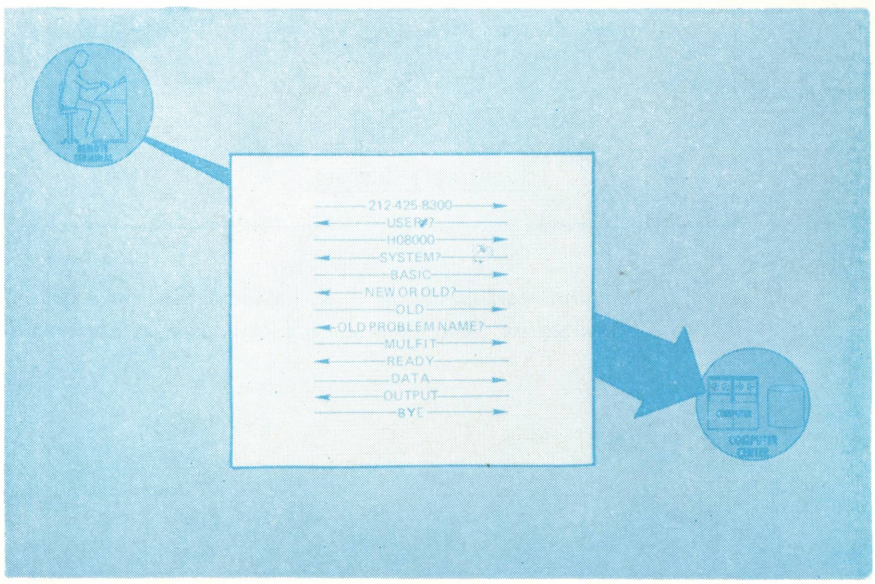
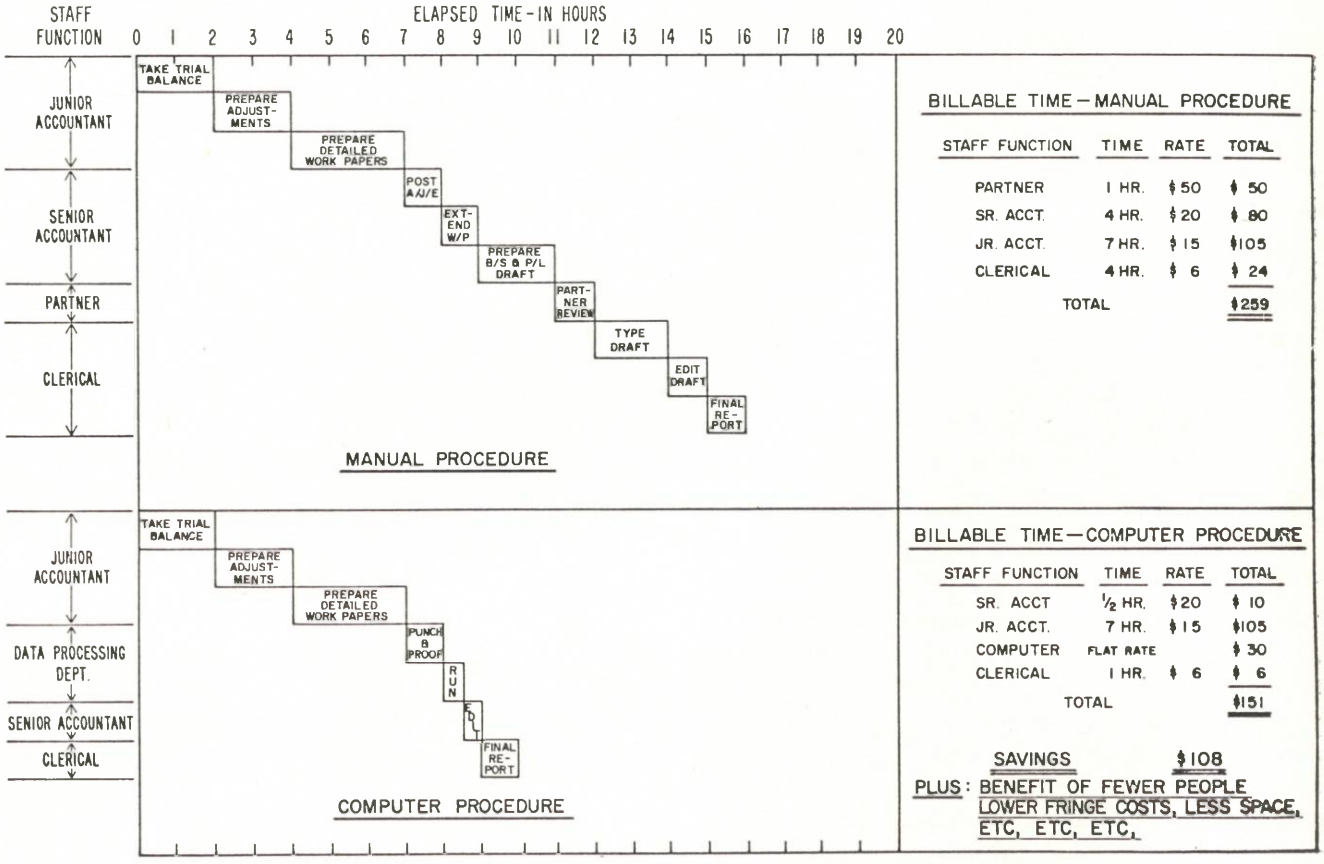


FIGURE 4

This article is adapted from a filmstrip presentation that was made by Mr. Kaufman before the third AICPA-sponsored semi-annual conference of CPA Computer Users, held in Kansas City, Missouri, in May of this year, and since then has been made before several meetings of state societies. The illustrations and figures in this article are from the slides that accompanied the speech and in each instance, except for Exhibit 1 below, were provided by Lybrand, Ross Bros. & Montgomery.



Figures worked out at J. K. Lasser & Co. show graphically savings made possible by using time sharing computer as opposed to manual methods.

EXHIBIT 1

it is stored, and the number to dial for that computer.

What happens when we dial the computer? What kind of dialogue do we get into? We dialed the number; we reach the computer. The computer responds by printing at our terminal, "May I have your user number?" and we type back, "HO 8000." The computer recognizes that that is a valid user number and it asks, "What language are you going to use?" We say, "I am going to use BASIC (or FORTRAN, etc.)." Then the computer says, "NEW or OLD?" That means, "Do I, the computer, have the program that you want? If so, you will type back OLD." But if you are going to give the computer a new program, you will type out NEW.

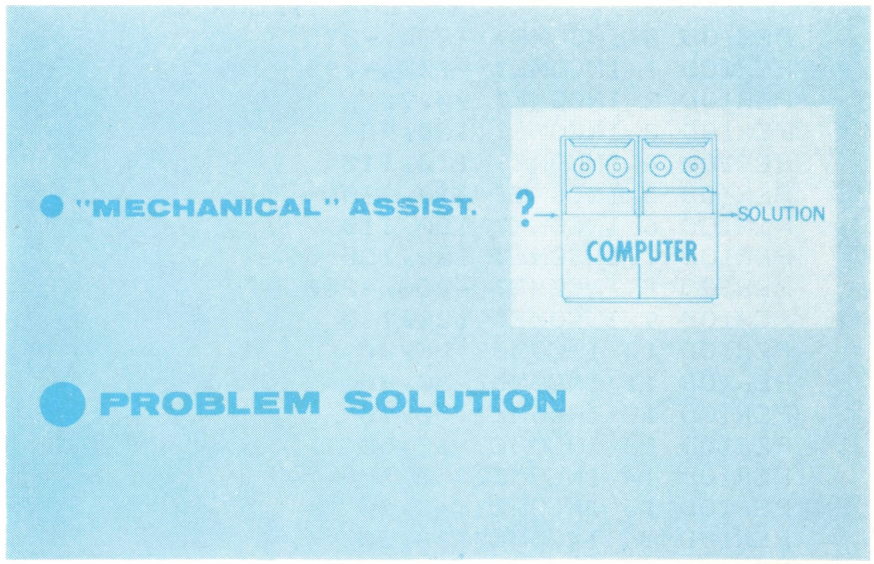
We type, "OLD," and the computer asks, "What's the name of the program?" We send the code designation of the program we want and the computer confirms that it has that program. At this point, we can type information for the computer to work on and, after perhaps some seconds or minutes, produce output. The job is done. We type, "Goodbye" and the call is ended (Figure 4 on page 19).

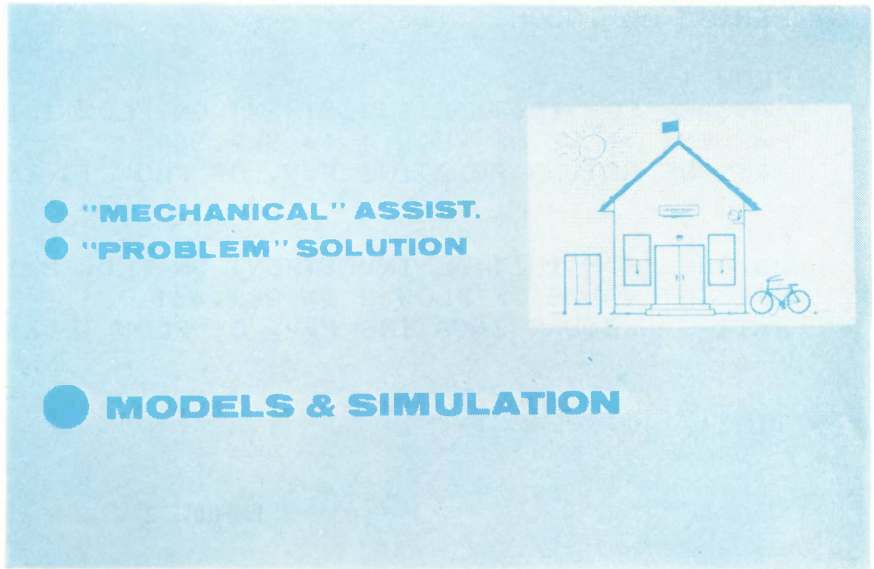
That describes the environment and the mechanics of time sharing. Now let us see whether it can handle the kinds of problems that CPAs would want to bring to it. The first thing we want to establish is that the computer can be of mechanical assistance, in other words, that it can improve a CPA's own procedures.

Mechanical assistance

That's what we mean by mechanical assistance: The CPA is now going to save his effort in his own office by using a computer. For example, a computer can proceed from trial balances to the preparation of statements and schedules. Or, it can handle write-ups all the way from the records of initial transactions, provided that these are machine-readable.

How can all that be done? A pre-





The three major aids the time sharing computer offers the CPA.

Mechanical assistance at lower cost in the CPA's office, help in solving . . .

```
SYSTEM--BASIC
NEW OR OLD--OLD
OLD FILE NAME--CSHFLO***
READY
RUN

CSHFLO          09:23          01/12/68


WHAT IS THE ESTIMATED COST OF CAPITAL IN PERCENT? 2.5
WHAT IS NUMBER OF PERIODS? 20
HOW MANY FLOWS ARE BEING CONSIDERED,1,2,3,OR 4? 2

ENTER CASH FLOWS,SEPARATE BY COMMA,MINUS FOR OUTLAYS
                        FLOW 1,FLOW 2
PERIOD 0  INCOME? -200,-275
PERIOD 1  INCOME? -100,-190
PERIOD 2  INCOME? 90,90
PERIOD 3  INCOME? 100,90
PERIOD 4  INCOME? 110,110
PERIOD 5  INCOME? 110,110
PERIOD 6  INCOME? 120,110
PERIOD 7  INCOME? 120,120
PERIOD 8  INCOME? -200,-280
PERIOD 9  INCOME? 120,110
PERIOD 10  INCOME? 90,80
PERIOD 11  INCOME? 80,80
PERIOD 12  INCOME? 70,70
PERIOD 13  INCOME? 60,50
PERIOD 14  INCOME? 50,50
PERIOD 15  INCOME? 40,30
PERIOD 16  INCOME? 30,30
PERIOD 17  INCOME? 20,20
PERIOD 18  INCOME? 10,20
PERIOD 19  INCOME? 5,20
PERIOD 20  INCOME? 1,5

FLOW 1
PAYBACK FOR INITIAL INVESTMENT ON FLOW 1 IS IN PERIOD 5
PRESENT VALUE OF FLOW 1 IS 547.567
RATE OF RETURN EQUATING P.V. OF FLOW TO ZERO IS 22.8458 PERCENT

FLOW 2
PAYBACK FOR INITIAL INVESTMENT ON FLOW 2 IS IN PERIOD 6
PRESENT VALUE OF FLOW 2 IS 289.451
RATE OF RETURN EQUATING P.V. OF FLOW TO ZERO IS 10.4844 PERCENT


TIME:     .93 SECS.
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EXHIBIT 2

. . . routine business problems, and models and simulations are the great advantages.

requisite is that the client's general ledger be stored electronically at the computer center. (The added cost for this service will depend on the number of accounts and the number of postings. For small clients, the expense can be held to a low figure.) Knowing we've got the client's general ledger stored in the computer, we now wish to post the adjusting entries and produce the traditional output; we dial the computer and we tell it what program we want to run. It tells us it's ready, and, if we have prepared the adjustments properly, an ordinary typist can send the account codes and amounts. In a very short time, the computer will produce an adjusted trial balance, pro forma P & L statements, and balance sheets.

Economics

Now then, what does this all get you? We must be a bit apologetic at this point, because we have not made careful calculations of the economics of this kind of help. Jerome Farmer of J. K. Lasser has, however, and his results are shown in Exhibit 1 on page 20.

We have said that the data can be put on the keyboard by any competent typist. If you are paying her $1.80 an hour, plus fringe benefits, and she spends half an hour, her time will cost little more than a dollar. Computer cost comprises two elements. One is a charge of $.04 a second for central processing time. (This is the time that the computer is actually working on your job.) One of our men recently ran a problem out of an accounting book, one with a limited number of accounts, and it cost $5.92. It is only fair to say, however, that most real problems would have far more accounts.

The second element of computer cost is connection time, which extends from the time you phone in to the time that you quit and costs you $10 an hour. In the case cited above, 2 minutes and 28 seconds of central processing time cost $5.92, plus $7.50 for a 45-minute transmission, a total of $13.42. Even after allowing for telephone charges and a typist's salary, the total cost is still under $16.00, compared with an estimated $30 that we would have had to pay a staff accountant to do the same job. By providing mechanical assistance, then, a computer can cut costs for a CPA in running his office.

Problem solution

A second category of assistance can be called problem solution. Suppose an accountant is called on to help his client evaluate an investment situation. Whether or not he has done this kind of work be-

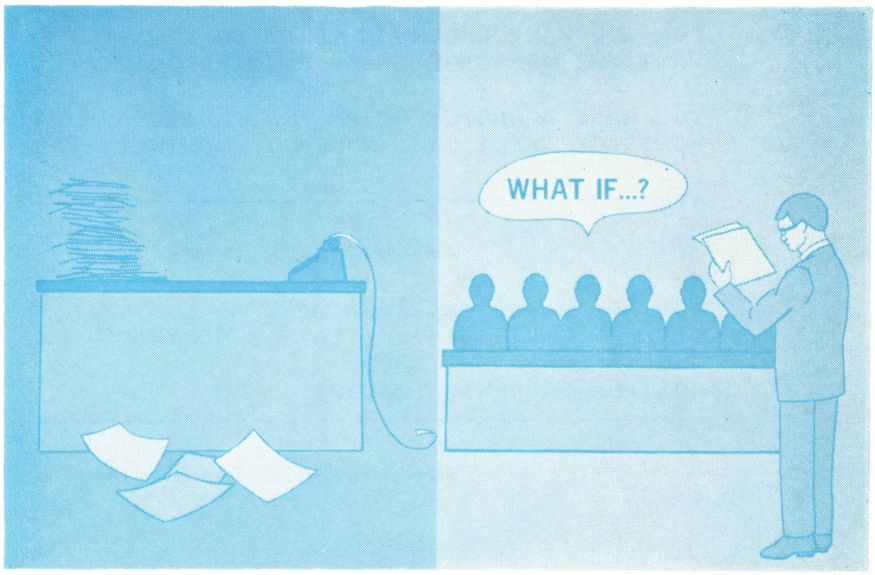

FIGURE 5

FIGURE 6

EXHIBIT 3

```
SYSTEM--BASIC
NEW OR OLD--OLD
OLD FILE NAME--MORTGAGE***
READY
RUN
MORTGAGE      13:53       01/05/68


THE PROGRAM CAN COMPUTE THE RATE, LIFE, AMOUNT BORROWED, OR
THE MONTHLY PAYMENT. WHICH DO YOU WANT? MONTHLY PAYMENT

WHAT IS THE NOMINAL ANNUAL RATE USING DECIMAL NOTATION? .06

WHAT IS THE LIFE OF THE MORTGAGE: YEARS, MONTHS? 20,8

WHAT IS THE AMOUNT TO BE BORROWED? 20000

WHAT IS THE MONTH AND YEAR IN WHICH THE MORTGAGE LOAN
IS TO BE MADE (TYPE OUT FULL NAME OF MONTH)? FEBRUARY,1968

FOR HOW MANY CALENDAR YEARS DO YOU
WANT THE MORTGAGE TABLE PRINTED OUT? 21

YOU HAVE A CHOICE OF AN ANNUAL SUMMARY (ANNUAL) OF THE
MORTGAGE TABLE OR A MONTHLY (MONTHLY) TABLE. WHICH? ANNUAL

------------------------------------------------------------

                *** MORTGAGE TERMS ***

NOMINAL ANNUAL RATE= 0.06
LIFE OF MORTGAGE= 20 YEARS 8 MONTHS
AMOUNT BORROWED= 20000
MONTHLY PAYMENT= 140.901
------------------------------------------------------------

                *** MORTGAGE TABLE ***

                                                ENDING
                                  PRINCIPAL     PRINCIPAL
YEAR            INTEREST          REPAYMENT     OUTSTANDING

 1968            990.674           418.332       19581.7
 1969            1160.47           530.334       19051.3
 1970            1127.76           563.043       18488.3
 1971            1093.04           597.771       17890.5
 1972            1056.17           634.64        17255.9
 1973            1017.02           673.783       16582.1
 1974            975.466           715.341       15866.7
 1975            931.345           759.462       15107.3
 1976            884.503           806.304       14301.
 1977            834.772           856.035       13444.9
 1978            781.974           908.833       12536.1
 1979            725.919           964.888       11571.2
 1980            666.407           1024.4        10546.8
 1981            603.224           1087.58       9459.24
 1982            536.144           1154.66       8304.57
 1983            464.927           1225.88       7078.69
 1984            389.317           1301.49       5777.2
 1985            309.044           1381.76       4395.44
 1986            223.82            1466.99       2928.45
 1987            133.34            1557.47       1370.99
 1988            37.9834           1370.99       0
```

EXHIBIT 4

```
SYSTEM--BASIC
NEW OR OLD--OLD
OLD FILE NAME--DEPR1
READY
RUN

DEPR1      17:33     H WED 06/19/68

THIS PROGRAM COMPUTES AND PRINTS DEPRECIATION BY YEARS BY
FOUR METHODS: STRAIGHT LINE, DOUBLE DECLINING BALANCE, SUM-OF-
THE-YEARS-DIGITS, AND 150 PERCENT DECLINING BALANCE.
WHAT IS THE AMOUNT OF THE INVESTMENT? 20000
WHAT IS THE SALVAGE VALUE? 1000

WHAT IS THE DEPRECIABLE LIFE [IN YEARS]? 10

IN WHICH MONTH AND IN WHICH YEAR IS THE INVESTMENT
MADE, FOR EXAMPLE 8,1969
? 1,1969

WHAT IS THE DISCOUNT RATE [IN DECIMAL NOTATION] FOR COMPUTING
THE PRESENT VALUE OF THE ANNUAL DEPRECIATION? 0

YOU HAVE OPTIONS ON SWITCHOVER FROM DOUBLE DECLINING BALANCE TO
STRAIGHT LINE.  TO PREVENT SWITCHOVER TYPE 0; TO SPECIFY THE
YEAR OF SWITCHOVER, TYPE THE YEAR; TO OBTAIN AUTOMATIC SWITCH-
OVER WHEN THE ANNUAL STRAIGHT LINE DEPRECIATION BECOMES
GREATER THAN DOUBLE DECLINING BALANCE, TYPE 1.  WHICH DO YOU
WANT? 1

DATE          STRLINE      DDB          SYD          150%DB

DEP 1969      1741.67      3666.67      3166.67      2750.
CUM DEP       1741.67      3666.67      3166.67      2750.
UNDEPR BAL    17258.3      15333.3      15833.3      16250

DEP 1970      1900         3266.67      3137.88      2587.5
CUM DEP       3641.67      6933.33      6304.55      5337.5
UNDEPR BAL    15358.3      12066.7      12695.5      13662.5

DEP 1971      1900         2613.33      2792.42      2199.38
CUM DEP       5541.67      9546.67      9096.97      7536.87
UNDEPR BAL    13458.3      9453.33      9903.03      11463.1

DEP 1972      1900         2090.67      2446.97      1869.47
CUM DEP       7441.67      11637.3      11543.9      9406.34
```

UNDEPR BAL	11558.3	7362.67	7456.06	9593.66
DEP 1973	1900	1672.53	2101.52	1589.05
CUM DEP	9341.67	13309.9	13645.5	10995.4
UNDEPR BAL	9658.33	5690.13	5354.55	8004.61
DEP 1974	1900	1338.03	1756.06	1350.69
CUM DEP	11241.7	14647.9	15401.5	12346.1
UNDEPR BAL	7758.33	4352.11	3598.49	6653.92
DEP 1975	1900	1070.42	1410.61	1148.09
CUM DEP	13141.7	15718.3	16812.1	13494.2
UNDEPR BAL	5858.33	3281.69	2187.88	5505.83
DEP 1976	1900	1064.33	1065.15	975.874
CUM DEP	15041.7	16782.6	17877.3	14470.
UNDEPR BAL	3958.33	2217.36	1122.73	4529.96
DEP 1977	1900	1064.33	719.697	829.493
CUM DEP	16941.7	17847.	18597.	15299.5
UNDEPR BAL	2058.33	1153.03	403.031	3700.46
DEP 1978	1900	1064.33	U374.2T3	705.069
CUM DEP	18841.7	18911.3	18971.2	16004.6
UNDEPR BAL	158.334	88.6949	28.788	2995.39
DEP 1979	158.334	88.6949	28.788	2995.39
CUM DEP	19000	19000	19000	19000
UNDEPR BAL	0	0	0	0
PRESENT VALUE BEGINNING OF 1969 ,OF DEPRN. AT 0	19000.	19000.	19000.	19000.

RAN 16.00 SEC.

EXHIBIT 5

A CPA, called on to help a client in an investment situation, will have access to programs that are ready to provide him with statistical analyses on call.

fore, and probably no matter which time sharing organization he deals with, he will have access to programs that are ready to provide him with analytical statistics on call. Exhibit 2 on page 22 is an actual example of what is available to the time sharer.

To illustrate, the computer takes on the problem and says to the CPA, "What is your estimated cost of capital?" He replies, "Two and a half per cent."

In this case, the program could handle four sets of cash flows simultaneously. In other words, you could say to the machine, "I'm planning to buy a major new outfit, and I am going to give you data for four different cash flows at once."

The computer will then give you this kind of output. (Exhibit 2 is oversimplified: It illustrates the method only; the output is not intended to prove anything.) Then the computer will tell you that the most important thing is that you have a 22 per cent deal, based on the input.

Now, you may be well satisfied with 22 per cent, but suppose a proposal turned up a return of only 7 per cent? Then you might want to say, "How do I alter this cash flow to produce a better return?" There may be several answers.

Incidentally, the computer actually prints out on the receiving terminal the fact that these computations took nine-tenths of a second. This is computer time.

Exhibit 3 on page 24 shows the dialogue from the start. The computer says, "What system are you going to use?" The answer is, "BASIC." "Is it an OLD one?" "Yes." "What is the name of the program?" "Mortgage." "Are you ready?" You reply, "Yes." "Okay."

Now the computer says, "What are the month and year in which the loan is to be made?" The terminal operator writes "February 1968." "You can have the mortgage payable annually or monthly. Which do you want?" "Annually." There are additional questions and answers: "What is the annual rate?" "Six per cent." "What's the life of the mortgage?" "Twenty years,

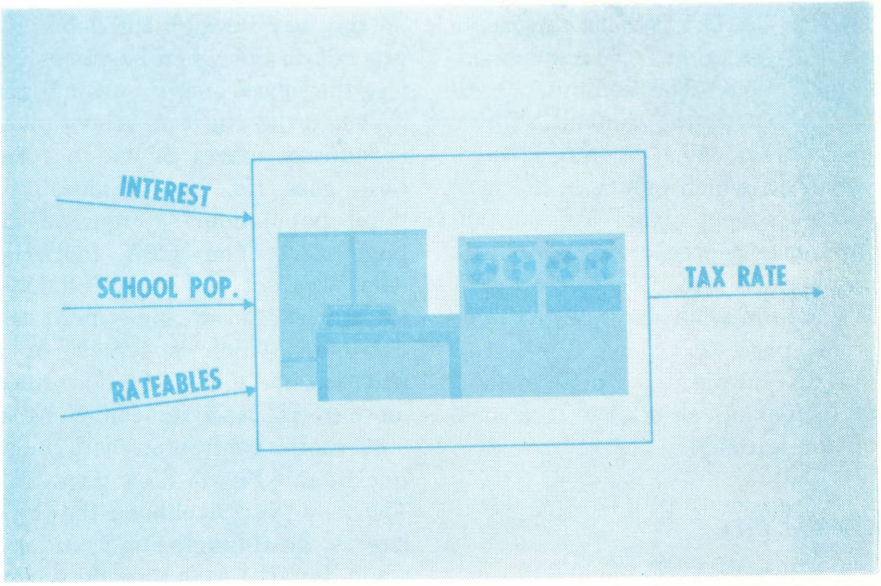

FIGURE 7

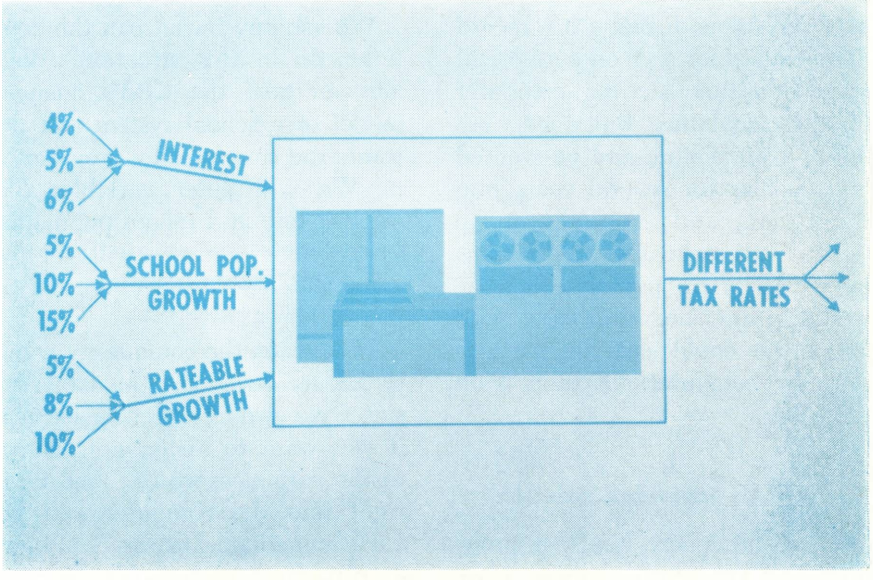

FIGURE 8

eight months." And so on. In the end, the computer produces a table that meets all the requirements; and part of the assistance the computer has rendered lies in asking the questions that need answering.

Depreciation

Let us take yet another application. For instance: "NEW or OLD?" "OLD." "What's the name of the program?" "Accumulated depreciation." The computer goes on, "What is the amount of the investment? What is the salvage value? In which month in '67 was the investment made? You can go from one depreciation method to another. Which do you want?" We type in what we want. Exhibit 4 on page 25 shows the computer's output: a depreciation table looking exactly as it comes off the terminal.

Use to CPAs

Now, some accountants will say, "Well, how am I going to use this?" It isn't likely, after all, that an accountant working on his clients' books and ready to record depreciation for a given period will turn to a time sharing computer for the calculation. But if he were doing a projection, and he wanted book values for several years into the future, and especially if he wanted to make the calculations by a variety of methods, then he would appreciate the ease with which he could get his calculations by computer. (Exhibit 5 on page 26.)

Variety of problems soluble

There are many kinds of problems that a terminal can help solve. For example, a CPA has been told that the community is interested in evaluating the effect on its tax rate of increasing and modernizing its school facilities. He is told from the beginning that there are several different plans for effecting a community school program.

So he has a model in his head. Knowing how to get from the basic data to the tax rate, he goes all the way through this laborious procedure; but when he comes before the school board someone asks, "What is the effect on school plans if industry moves in and our tax base goes up, but so does our pupil population?" (Figure 5 on page 23.) The CPA looks at what he's got and says, "I'll have to go back and do some more calculating," which is typical of a situation like this. So he does some more work, and he comes back, only to be confronted with more questions. (Figure 6 on page 23.) There's a good likelihood that he'll have to go through this again and again, because each time the school board begins to see more clearly fresh problems that it wants answered.

We ask now, what can the computer do in this situation? Well, we can take the CPA's financial model of a school system and put it into the computer by programing it. We will enter variables like interest rate and school population assumptions, and we will get out a calculated tax rate. (Figure 7 on page 27.)

Now when the community wants to ask its questions, the CPA can say, "No trouble, folks, because if you want to assign new values to the variables, we can feed them right into the computer and get back immediate answers." (Figure 8 on page 27.)

Another example of the way a computer can help: While I was working on a school problem in my own community, another member of my committee agreed with me that what we had to do was to see how different costs, like construction or transportation or maintenance, had been varying over the years. And so we went back and got ten years' data, and we got out a slide rule and figured what the compounded rate of growth had been during that period.

Forecasting costs

So we concluded that all of our costs were compounding at some rate, which we derived from the historical data. (Figure 9 on page 29.) But it's a mistake to assume that all rising costs are increasing on a compound interest formula. There are other curves and other functions; and with a time sharing computer, we can call for certain statistical programs to match the historical data with given patterns of behavior and select the best fit for our model. This is another service available from computers.

Resembles business planning

Perhaps the school experience will not seem too germane to some CPAs, even though an astonishing number do become involved with schools, either as professionals, as parents, or as citizens. But the school problem we have been discussing belongs in a category of similar problems that are faced by businesses in making long-range forecasts. A business, like a school, exists in a community. Whatever happens in that community — changes in the tax rate, the entry or withdrawal of other business organizations, the growth or stag-

nation of the labor supply, changes in the money supply — are factors to take into account when planning for the future. (Figure 10 on this page.) So the school board plan is very closely analogous to a long-range business plan.

Long-range budgeting

Now the same computer abilities that were used so easily and to such advantage in the school board instance are just as available to the CPA in preparing a long-range budget forecast to project the results of the long-range plans of a client company. There are certain variables; there are certain possible outcomes. There are the most probable ranges of variables, and from various combinations of these one can deduce, with the help of a computer, the probable results.

New horizon for CPAs

The inexpensive terminal and the tie-in to a remote time sharing computer make available to every CPA, for the first time, most of the advantages of the computer. Moreover, the system enables smaller firms to take on assignments—like long-range forecasting for a client —that they probably haven't had the manpower to attempt in the past.

Wave of the future

Time sharing is in its infancy but it already has accumulated an impressive list of program routines. Input-output units are easily available, although readily portable ones—units you can take right into a client's office and plug into his phone lines—are only in the prototype stage now. (Figure 11 on this page.) But the concept of time sharing is no longer inchoate or experimental. Right now, any accountant who rents an input-output unit for his own office can do any of the things we've outlined in this article.

This is, we submit, the wave of the future for most accountants.

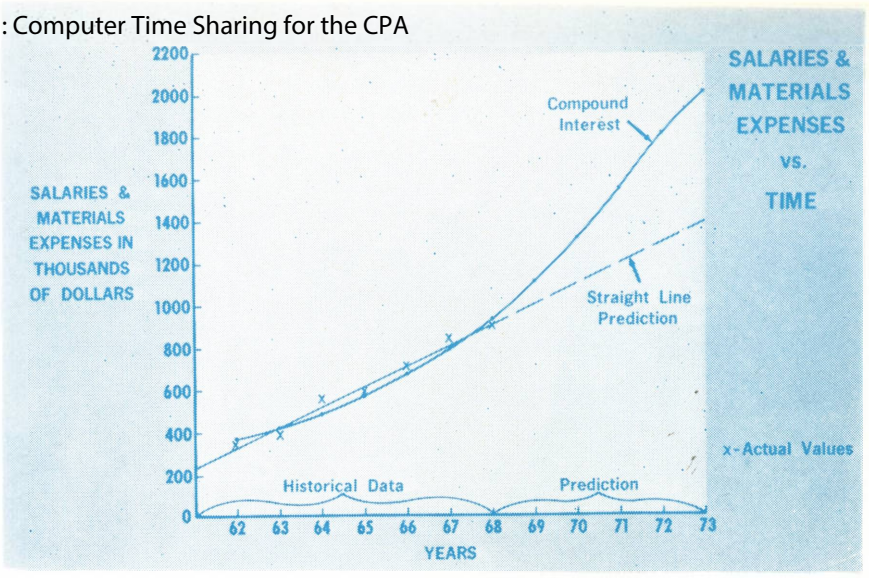

FIGURE 9

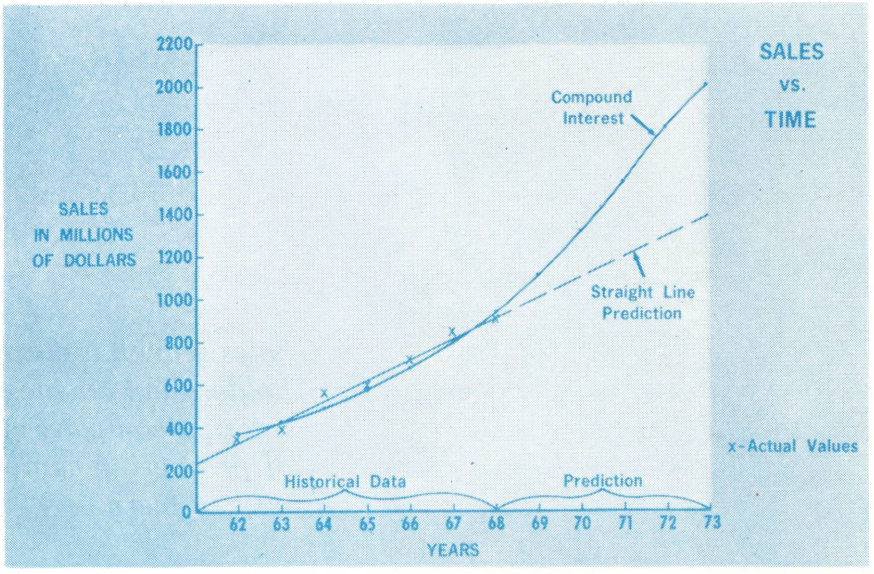

FIGURE 10

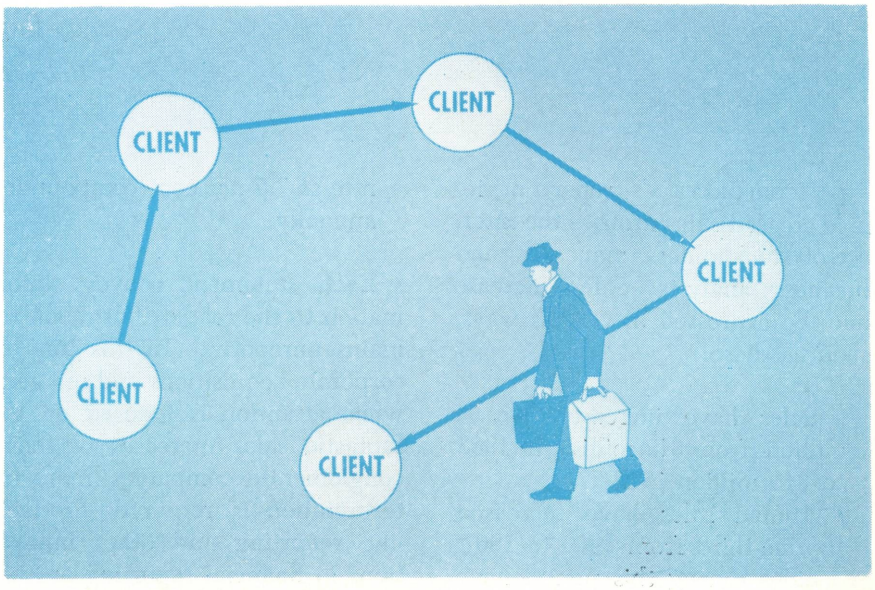

FIGURE 11