APPENDIX

COMPUTERS IN HOSPITALITY MANAGEMENT

Throughout most of this text, manual systems of financial control have been discussed and demonstrated. The materials within the text are not intended to impart financial accounting expertise, but to make the reader familiar with certain basic accounting procedures and managerial applications to assist management in the decision-making process.

Today, most hospitality businesses in hotels, motels, food service, and beverage operations are using computers to record, report, and analyze the effectiveness of internal operations. One must learn basic accounting concepts to understand not only the necessary information needed as input to a computer system, but also the output of information the computer is capable of providing. Knowing what an average check is for a food service operation is one thing, but knowing how it is determined gives a greater insight as to how it can be changed. This simple analogy rings true for the great majority of developed ratios, percentages, units, and dollar values that can be generated through computer analysis.

In the three decades or so since computers have been commercially available, they have become a major factor in business operations as well as our individual lives. Computers have had a dynamic impact in all forms of business enterprise, including the hospitality industry. Initially, computer use was limited due to their high-cost specialized operator technical expertise and rather large requirement for floor space. Computers have evolved to the point that their cost, need of a specially trained operator, and space requirements are no longer major obstacles to their acquisition. Microcomputers are used extensively in all aspects of business operations rather than being limited to only chain operations or very large independent operations.

A majority of hotels now use computers in the areas of reservations, registration, guest history, guest accounting audit, and back office accounting. Similarly, most restaurants are using computerized point-of-sale terminals and registers that control guest checks, kitchen orders, and guest payments. In addition, such a system stores a great amount of data, which can provide a range of averages, and ratios that can be used to evaluate such items as menu-mix analysis, average guest check, seat turnover, cost of sales analysis, and inventory control, to name a few possibilities.

Computers have, in effect, successfully removed much of the time-consuming drudgery present in a manual accounting system. The analysis and evaluation of labor productivity, cost control, inventory control, menu costing, budgeting, and so on can be obtained quickly and accurately from a computer, using software designed for a restaurant operation. Needless to say, software programs are available for specific business operations within the hospitality industry, which can assist in the safeguarding of assets, controlling cost, maximizing profit, and providing information to measure the efficiency and productivity of an operation.

Today, small, low-cost, yet powerful microcomputers are available to almost any business operation or an individual. Even a small, independent entrepreneur would be remiss by not taking advantage of computer availability. These microcomputers are so low in price that many operations provide a separate computer that can be used cost-effectively by a single department within a large operation. An example of this might be for maintaining storeroom inventory records.

COMPUTER ADVANTAGES

The main advantages of a computerized system over a manual one are speed and accuracy. Computerized systems, however, don't do anything that cannot be done manually, nor do they relieve management of the responsibility of decision making once the information is produced. In reality, computers allow quicker access to all forms of information necessary to allow a quicker managerial response to changes in the business environment.

Computers are no longer expensive, space-consuming units that require a highly skilled technical person to operate them. No longer do they have to be operated by computer departments that are remote from day-to-day operations, producing voluminous reports long after the need for the information they provide is past.

The new, low-cost computers may dictate a change in the way that hospitality managers behave on the job. Competitive survival may require managers to learn how to use computer resources in order to understand and effectively use the wealth of information computers can provide.

TYPES OF COMPUTERS

Generally, computers can be categorized into three types: mainframe computers, minicomputers, and microcomputers.

MAINFRAME COMPUTERS

In the early days, computers were very large, requiring dedicated, air-conditioned rooms, and specialized personnel to operate them. Most often, mainframe computers were often remote from the departments that needed the information that they could provide. In some cases, a terminal located in an individual department could access the mainframe computer, or access could be made by an individual operation that was part of a chain. This type of computer is generally referred to today as a *mainframe.*

MINICOMPUTERS

With the introduction of minicomputers, this situation changed. A minicomputer was smaller, cheaper, and occupied less space than its mainframe predecessors. A chain organization could now afford to have a minicomputer in each separate operation and still be linked to the head office mainframe. Also, a number of users could be connected through terminals to the minicomputer at the same time. This type of connection is known as computer time-sharing. As a time-share user accesses the minicomputer, the computer locates that user's information, receives instructions from the user to manipulate information or create changes, provide reports, and then becomes a storage host until it is accessed again by a user. For a computer to do this for several users, it needs to be programmed so that information from different users is not mixed up and so that each user is treated in turn as if several were using the computer at the same time.

The result is that time-shared computers—either mainframe or minicomputers—operate at only about 50 percent efficiency. As the computer gets busier as more users access it, it slows down. Its response time also becomes irregular, and a user might not know, if the computer does not respond promptly, whether the machine has slowed down because of heavy use or because the user has supplied information that the computer does not understand and cannot process.

A minicomputer might also need a complicated set of instructions and an expensive communication system, as well as extra levels of security with passwords and protected security levels, to link it with all its users and prevent unauthorized access to confidential information.

Finally, with a large time-shared mainframe or minicomputer, access plays a valuable and important role in maintaining and sharing common information with a number of different users. This might be the case in a hotel where guest

reservation, registration, and accounting information can be accessed not only by front-office personnel but also by accounting office, housekeeping, and marketing employees.

MICROCOMPUTERS

The heart of a microcomputer is the *microprocessor*, sometimes referred to as a microcomputer on a chip. Actually it's a processing and controlling subsystem on an electronic chip (a very small part of the actual microcomputer). Computer chips are so small that 20,000 or more of them can fit into a briefcase. When the microprocessor was introduced, it dramatically changed the accessibility of computer power and prompted a major reduction in the cost of this power to manipulate, process, report, and store information.

Today, a stand-alone microcomputer or personal computer (or PC, as it is usually referred to) can cost as little as $1,000 (or less) and can be easily placed on a manager's desk or small table. No technical or specialist expertise is required to operate these computers. Indeed, it is no more necessary to know how a computer works internally to use it than it is to know how a car works to drive it. However, it is generally important to understand what it is doing to know what information to give the computer, which is necessary for the software program to return to the user the output requested.

The terms *microprocessor* and *microcomputer* are sometimes used interchangeably, even though they do not mean the same thing. A microprocessor is the physical design and structure of a system engraved on the chips that are the "brain cells" that make a microcomputer function. Microcomputers are called so because their systems are miniaturized. A microcomputer could therefore be simply described as a small computer, although that can be misleading because today's microcomputers, as small as they are, are also independently versatile. In fact, it has often become better and in many ways cheaper to buy an additional microcomputer to handle a specific type of job than it is to create a special mainframe or minicomputer time-sharing or networking program that several users can access.

The major disadvantage of microcomputers in their early years was their somewhat limited storage capacity; however, the small microcomputer of today can store more data than many of the older mainframe computers. The average storage capacity of a microcomputer today is approximately 13 gigabytes (GB), and that capacity grows larger each year.

Microcomputers can be operated independently but can also be linked together through a network to access the same information or specific programs that all their users may need from time to time (such as reservation information in a hotel). *Networking* is the linking of a number of independent computers. Networking capabilities have grown rapidly, and continue to evolve and improve. It is now possible for a hospitality operation to have its purchasing needs transmitted by its microcomputer to a network of supplier's computers.

This operation is often handled in a new Internet technology-based network solution called an *extranet.* Such a network allows companies and suppliers to create a secure shared network configuration between the organizations and their suppliers. This network also allows individuals to utilize user-friendly computer applications such as Web browsers to directly enter and track orders with suppliers. Other technologies, such as intranets, have also entered the computer arena. These intranet configurations also work on Internet-based technologies (Web browsers, Internet protocols). Intranets allow companies to link all of their remote locations to a central secure network of Web pages, which helps to simplify access to personnel, accounting, inventory, and other corporate records, and allows for easier submission of local data to the corporate office. Internet technologies are ever advancing in their capabilities and continually change the work environment.

Also in use today and continuously expanding is the electronic transfer of funds, in which point-of-sale terminals in a hotel or restaurant are connected directly to a computer at a local bank, which is, in turn, networked to terminals at other banks. If hospitality customers pay their bills by use of a national credit card, a bank credit card, or personal check, the card or check can be verified and approved by the local bank's computer. The bank will then issue instructions that are transmitted to the customer's bank so that the funds are immediately transferred to the hospitality operation's local bank account.

The advantage of this to the hospitality operation is the reduction of the collection period, thereby saving one or more days and potentially resulting in a near-cash transaction. This procedure significantly decreases potential losses from dishonored credit cards and checks, which would not clear due to insufficient funds (NSF). In addition, with the rapid inflow of cash, interest income on the hospitality operations bank account may increase.

LOCAL AREA NETWORKS

Local area networks (LANs) are systems that connect microcomputers and allow authorized users to share common files. LANs allow computers to be used in ways that previously could be handled only by much larger mini- and mainframe computers.

HARDWARE VERSUS SOFTWARE

The hardware of a computer system is its physical equipment, which follows a predetermined set of instructions in a self-directed fashion. Instructions are developed by programmers. Once a program (or set of instructions) is placed in the hardware, the computer can carry out those instructions without any

operator intervention. Any "intelligence" that a computer has must perform a variety of tasks, which must be programmed into it, and any weaknesses in that intelligence are the fault of the program.

SOFTWARE

A computer is able to operate with many different programs for different jobs. Each program is copied from the hard drive to the random access memory (RAM) in a microcomputer when it is needed. When the machine is switched off, any information currently in the RAM is lost. Software is generally stored on hard drives, and when it is loaded into the machine it is not removed from the hard drive but only copied for use into the RAM.

Once stored on the hard drive, information can be used with other computers of the same general type. Information on the hard drive (disk) is read when the computer scans the magnetic surface of the hard drive, copying encoded program data into the computer's temporary RAM memory. Once the data is in the computer, it can be amended, added to, manipulated, or removed if no longer wanted before being stored again on the hard drive or other storage media.

Good hardware is not hard to find, but a good software program is the key to a computer system's performance. Software can be written in a programming language to create industry- or company-specific software. However, many hospitality organizations buy existing software programs from vendors that specialize in industry software.

HARDWARE SYSTEMS

Computer hardware systems normally have a number of components. Even a microcomputer cannot do much without the aid of supporting hardware or peripheral equipment. The main part of the computer, where all the work or manipulation is carried out, is referred to as the central processing unit (CPU). The CPU is often referred to as the *brain* of a hardware system because it controls all other hardware and peripheral equipment or devices.

The CPU has its own set of instructions built in its memory chips that cannot be altered by the user. These instructions are known as read-only memory (ROM), which the user can access and "read" but cannot change. To load user programs or instructions into the CPU, another hardware device is required. For microcomputers, that device is known as a hard disk drive.

Input devices are also needed before the user can interact with the computer. These input devices include such things as a keyboard, mouse, scanner, bar code reader, and a stylus writing device. A monitor, also known as a screen, cathode ray tube (CRT), or video display unit (VDU), is another output device. The monitor displays information and prompts to the user from the CPU; what is input from the keyboard by the user; and the result of the work that is being done.

Another output device is a printer, invariably a separate piece of equipment attached by cable to the computer. When work performed by the user is printed

out, the printed material is often referred to as *hard copy* to differentiate it from *soft copy,* or work that is viewed only on the monitor and might still have further work needed before a hard copy is output. For example, when a guest is dining in a restaurant that has a computerized sales system, the server can view the soft copy of the guest's check on the monitor during the course of the meal, and add items to it as the meal progresses. The guest check can be reviewed on a monitor before printing a hard copy for presentation to the guest.

Obviously, with all these various pieces of hardware in a computer system, there has to be a high degree of compatibility among them. In addition to compatibility of hardware, the software used must be compatible with the hardware.

CANNED SOFTWARE

The question sometimes arises whether it is better to have software specifically written for an individual hospitality operation's needs or to buy an already-written software package (known as *canned software*). Specifically, custom software is far more expensive than canned programs. Also, most hospitality businesses are generally small operations that do not have the resources necessary to carry out a system analysis and undertake the design work necessary to develop their own computer software.

Canned programs normally have been widely tested, and any errors (bugs or glitches) in the program have been detected and corrected. Demonstrations of canned software can usually be viewed before the purchase decision is made because a number of vendors may carry comparable packages. The cost to buy, install, and train employees can also vary between an operation, depending on its needs and the software's capabilities to adjust for those needs.

A successful canned software package represents a proven product that is obtainable at a cost much lower than that for a custom-designed software package. In addition, specialized canned software packages are readily available for a hospitality operation in such areas as food and beverage cost control, payroll, and generation of financial reports and ratio analysis. Obviously, the benefits of using off-the-shelf software have to be considered against the disadvantages. A software package written for broad hospitality requirements may not be as easy to use, or as fast, as one that is custom-designed.

INTERACTIVE PROGRAMS

Software programs can be either interactive or noninteractive. An interactive program prompts the user sequentially step by step and is generally considered user-friendly. Such a program is normally easier to use because it helps ensure that no information that should be entered by the user is omitted.

A noninteractive program provides no prompts to the user, which means the user must know exactly what information to enter in correct sequence, line by line, following a predetermined sequential format. This requires a higher user

skill that also adds to training cost and normally requires a higher employee pay rate; however, the advantage is that the program is a lot faster.

INTEGRATED SOFTWARE SYSTEMS

In a hospitality operation, some information is used for more than one purpose. The name of a guest registering in a hotel is an example of information that might be used for room reservation, registration, guest history, housekeeping, and accounting purposes. Similarly, the name of a food item might be used for receiving, storing, issuing, recipes, production, inventory, and sales control.

With a computer system it is feasible, sensible, and advantageous to use software that is integrated. In integrated software systems, the objective is to record an item of data only once and then use it in every possible way to provide information for planning and control purposes. If the item of data had to be entered into the computer each time it was wanted, errors could be made. Correcting errors costs time and money.

One could consider a hospitality operation as an entire system and have a completely integrated package of computer software to control and plan every aspect of its operation. However, a completely integrated software package to handle all this would be costly and complex, would probably incur higher training costs because of its complexity, and would create severe maintenance and data security problems. Further, if one part of the system failed, it would create difficulties in all departments or areas. For these reasons, a small operation might find it difficult to justify a completely integrated system financially.

APPLICATION-ORIENTED SOFTWARE SYSTEMS

At the other extreme is a software system that is oriented to a single application. If software is application-oriented, it is generally designed to handle one specific type of job and does not allow much integration. An example is a payroll system that is not integrated with labor cost budgeting or a food inventories control system that is not integrated with purchasing and food costing.

Due to their relative simplicity, application-oriented software systems can be easily evaluated to determine whether they will perform precisely the jobs that they were designed to carry out. These systems are cheaper to buy and install and can be introduced into an operation over time as finances allow. An ideal situation is to move from a piecemeal stand-alone set of application systems to an integrated system over time, as long as each part can be made compatible with others. In this type of in-house network, each computer system is capable of operating on a stand-alone basis, but retains the ability to integrate with all others for transmission of certain data.

Obviously, the narrower an application-oriented system is, the easier it is to develop—hence, the lower its cost will be. It will also be more efficient and reliable because it controls fewer functions. However, the narrower an application

system becomes, the less effective it may be as far as overall control is concerned. For example, if a food inventory control system has to be supported by a separate food cost control system, then two packages of software will be required, two different computer hardware systems may be needed, and two sets of user-operator systems will have to be learned.

Initially, most microcomputer applications in the hospitality industry were stand-alone applications, but as the power and memory capacity of microcomputers increased, available software packages rapidly became more integrated and their use as stand-alone applications quickly diminished. Three of the common application-oriented software packages are word processing, databases, and spreadsheets.

Word Processing

Word processing refers to software that is programmed to manipulate words (text). Almost all microcomputers have a word-processing program installed, as it is quite versatile in the creation of written communications in a business environment.

The purchase of a low-cost microcomputer to be used primarily for word processing is a good way to introduce computers into a business. Word processors can be very useful when a large amount of standard correspondence is handled, as in a hotel reservation department where a form letter is used to confirm reservations, or in a catering operation where a standard banquet contract is used. Only certain information, such as the number of expected guests, the menu selected, and the price of the meal, has to be inserted.

The main purpose of a word processor is to facilitate text creation and editing, and the ease with which this may be done is a major factor in selection of word processing software. One of the major advantages of using computers rather than typewriters for word processing is that documents can be printed more attractively. For example, some computer printers have a variety of type styles that can be used in the same document, as well as allowing text editing; most word processing software contains spelling and grammar checkers.

Database Applications

A database is a collection of records such as addresses of regular customers, a food or beverage inventory listing, personnel data, or a file of recipes. These are all records that form a database. A database application allows quick access to, and ready manipulation of, the records that are in that database. In other words, it is much like an office filing system where records (files) can be randomly accessed, used as required, and then restored in the same order or rearranged in some other order before storing. For example, for one query, a database of recipes can be stored in alphabetic sequence according to the main recipe ingredient, and only recipes containing that ingredient can be printed out.

For another query, all recipes could be stored alphabetically, regardless of ingredients, before printing them.

It may be useful to purchase a software package that includes both word processing and a database. For example, it may be necessary for a hotel to send a standard form letter to all the travel agencies it regularly does business with, advising them of a change in room prices or commission rates. The computer can be programmed to take each travel agency's address in turn from the database, type it on the hotel's letterhead, type in the letter from the word processor, then move to the next address and letter on a new page until all addresses have been gone through. All of this can be completed without any user intervention once the process has been started. This process is known as a mail merge. A database application can be particularly useful in yield management (see Chapter 6) because it can be used to store guest history information and reservation patterns.

Spreadsheet Applications

Spreadsheet software is basically a large electronic sheet with rows down the side and columns across the top, much like a worksheet for preparing a budget. Most managers have struggled with budgets using pencils and column pads, and have become frustrated when they wish to see results. For example, if the food cost-to-sales ratio is altered over a 12-month annual budget, the changes that have to be made to food cost, gross margin, and net income require some 36 alterations, considerable erasing and correcting, and a risk that one or more errors will occur.

A properly programmed computerized spreadsheet will allow a manager to answer a what-if question in seconds and print out the results. Indeed, multiple what-if changes can be made at the same time at rapid speed. Spreadsheets lend themselves not only to budgeting but also to forecasting. For example, a spreadsheet can store in its memory all the various menu items a restaurant offers, including how many of each is sold on average by meal periods and day of the week for each specific month. The availability of information on the basis of past performance could show how many portions of each menu item the kitchen should produce for each meal period each day of the current month. Spreadsheets also lend themselves well to the following applications:

- Scheduling employees for improved labor cost control
- Preparing depreciation schedules
- Calculating percentages given the dollar amounts, for common-size vertical financial statement analysis
- Calculating the sales mix and gross profit figures, given menu items sold and their cost and selling prices
- Converting budgeted income statements (given appropriate ratios) to cash budgets forecasting cash inflows and outflows

- Using net present value and internal rate of return analysis for long-term investments
- Preparing budget variance analyses
- Using cost-volume-profit analysis for various types of decisions

As far as planning and control are concerned, word processing, database, and spreadsheet software are closely related. A computer ought to be able to pass data from its database application to a spreadsheet, and then pass the results to a word processor for addition of text and final printing of a report. Today, single software packages that include all three of these types of programs, such as Microsoft Office, are available.

ACCOUNTING PACKAGES

Another area that lends itself well to an integrated software package, available from a number of different vendors, is general accounting. Most businesses with a manual system of accounting use an integrated approach for their general ledger, sales, accounts receivable, purchases, accounts payable, payroll, and inventory control. Hotel front-office system, reservations, registration, and guest accounting can also be integrated into this system. Today, there are integrated software packages available for computerization of this work.

Most hospitality operations have already or will soon computerize their payroll systems. One of the reasons is the time savings computerized payroll software provides. Each time the laws relating to employment change, such as for minimum wage rates, tax deduction rates, and unemployment insurance rates, the software needs only an upgrade to accommodate those changes. In addition, payroll software programs provide, at the user's request, state and federal quarterly reports, W-2s, and transmittal forms. A great number of business operations prepare their payroll and maintain employee records and information using a computerized payroll program within their system.

For locations where food and beverages are recorded, two types of systems are available—electronic cash register (ECR) and a point-of-sale (POS) system. Basically, the ECR is a stand-alone electronic register, whereas a POS system may link several ECRs to a separate remote host computer, the sales register is primarily a keyboard rather than a separate machine. Customer service terminals respond to creation of customer checks by issuing instructions to the food preparation area for menu items, and print out the customer's bill (customer check). Unfortunately, the acronyms ECR and POS are often used interchangeably. Technically speaking, a POS system is more sophisticated than a stand-alone ECR, even though today's ECRs can provide a great deal more sales and cost of sales information than their predecessors (mechanical sales registers).

ELECTRONIC CASH REGISTERS (ECR)

The use of ECRs mean cashiers are no longer necessary in most establishments because servers can act as their own cashiers. The machine records, among other things, sales by server so that each knows how much cash to turn in at the end of each shift. Most ECRs have some sort of video display, often just a strip window with space for a limited number of characters. However, increasingly larger video displays are appearing on the equipment so that, for example, the entire bill for a group of people at a table can be seen on the monitor. More sophisticated models can have keys that light up to prompt the operator what to do next, or the monitor displays messages about subsequent steps to make or to explain mistakes.

Most ECRs have automatic pricing integrated into the software program, which eliminates pricing errors; change control features (in some cases, linked to automatic change dispensers to reduce losses from change-making errors); and automatic tax calculation for jurisdictions where food and/or beverage sales tax applies. Computerized ECRs can summarize sales not only by server (broken down into cash and charge subtotals) but also by categories, such as appetizers, entrees, and desserts. In chain operations, this sales information might be networked to the head office computer for further, more detailed, processing.

Some ECRs can also be programmed to print out the most popular combinations of appetizer, entrée, and dessert that customers choose. This is useful information for menu and sales mix planning. Some ECRs can also provide inventory control for items that can be easily quantified, such as steaks. If the software program has the capability, complete inventory control is possible. If it were to be used for complete inventory control, however, the system would have to be programmed to remember the recipe of each dish, and that sort of inventory control might be better left to a separate software control system, which will be discussed later. Alternatively, the point-of-entry terminals can be linked to an internal host computer, which receives and stores all information regarding sales. This is not unusual for a software program.

A more sophisticated software program can be used to record servers to clock in and clock out of work on a terminal, which provides hours-worked information for staff planning and payroll purposes. At the end of each shift or day, summary reports of hours worked by employee are recorded and accumulated for each weekly or biweekly payroll period. A built-in time system can also track patterns of sales by time of day or time of guest arrivals and departures. This could be valuable for staff scheduling, labor cost planning, and kitchen food production planning.

Most customer service entry terminals maintain sales check records in detail. In most ECR systems, it is not necessary to have customer sales checks preprinted with sequential numbers. Blank standard sales checks can be purchased at less cost without numbering, and the ECR will print a consecutive number on each when the check is started. If the same check is used for a

reorder, the employee must instruct the machine that a previous check number is being used. If the server does not use the previous number when adding items to an active sales check, the machine will assign it a new number since it assumes that it is a brand new check. If a server collects the full amount of a check and turns in only the amount due from a reorder, the first number will show up as a missing check. The server error, made as the result of simple omission or on purpose, will be identified and require correction. The error will be noted since the register prints a report at the end of each shift or day of the "open" checks—that is, those that have not been closed off—and identifies the employee responsible.

INTEGRATED POINT-OF-SALE (POS) SYSTEMS

Generally a point-of-sale (POS) system is a series of individual sales terminals (such as ECRs) linked to a remote computer system. Food and beverage POS systems may be used as stand-alone systems for each separate food and beverage outlet, but may also be linked to other POS systems in other sales outlets. Point-of-sale systems can be linked to other peripheral equipment, such as a printer in the food preparation area that tells the kitchen what is to be prepared, identified by server number or name. Obviously, the server does not walk to the food preparation area until the order is ready to be served. Some software systems enable the kitchen staff to send a message prompt to a server entry monitor to pick up prepared food orders.

The most recent POS device is an electronic server pad (ESP). With an ESP, servers no longer have to write out orders at the customer's table and then go to a terminal to enter them. They simply punch them on to a hand-held computer and the information is beamed to a central computer through low-frequency modulated (FM) waves. The central computer then relays the information to a printer in the kitchen and/or bar.

Hotel POS systems in food and beverage areas may also be linked to the front office accounting system so that hotel guests charging food and beverage items in the restaurant or bar can have the amounts automatically added to their front-office accounts. In other words, a POS system has a much greater capability than an ECR and can produce a much larger variety of management reports by sales outlet and in total. It is generally a totally programmable system that can be easily modified within the business to accommodate changes in menu prices and many other items.

A point-of-sale terminal can also be linked to a chain head office where data can be analyzed by the mainframe computer; results compared from unit to unit; and data consolidated by region and for the chain as a whole. In some systems, analysis reports for each individual unit can be sent back to the unit in a process known as downloading. Downloading can also be used to provide each unit's computer with new menu pricing and recipe costing information.

The major disadvantage of a POS system is that, if the central host computer fails, all the POS terminals in the entire system fail. POS terminals cannot operate independently of the central host computer unless the system is backed up with disk memory or the individual terminals have some memory and storage capability to produce reports independently of the central computer.

INVENTORY CONTROL

Computers can be very valuable as a tool in inventory control. Computers can do the following:

- Prepare purchase orders for suppliers. It is now also possible for the computer, through networking, to place orders automatically with approved suppliers who submit the best price for the items and quantities needed.
- Prepare lists of items to be received from each supplier so that receiving employees can compare what is delivered with what should be delivered.
- Compare information as produce is received and product information is recorded in the computer from invoice information against purchase order specifications for those items received.
- Issue appropriate credit memoranda for goods short-shipped or returned to suppliers.
- Prepare food and beverage receiving reports for products delivered.
- Maintain a record of all storeroom purchases from information entered from invoices and update the perpetual inventory of each storeroom item.
- Record all issues from the storeroom from information entered from requisitions. This information is used to adjust the perpetual inventory by item, to calculate total cost of all items issued each day, and to assist in the calculation of daily food and beverage cost.
- Calculate the cost of items requisitioned by any individual department for any period of time.
- Compare requisitions signature (using a scanner) with a record of those signatures stored in the computer to ensure they are authentic.
- Compare at any time quality information of actual inventory for any specific item with the computer-maintained perpetual inventory record, and print out variance reports.
- Alert both management and the food buyer when quantities purchased exceed prescribed limits for storeroom stock.
- Provide a monthly list of all items that were short-stocked during that period.

- Issue monthly dead-stock reports showing items that have not moved in a stipulated period, such as 30, 60, or 90 days.
- List the number of each item purchased from any one supplier and state whether that purchase was made at the best-quoted price.
- List the number of each item used during each month and compare this with what should have been used according to actual food and/or beverage sales based on standard recipes and portion sizes.
- Verify supplier month-end statements against receiving invoices and/or receiving reports, and issue checks in payment of those statements.

A sophisticated inventory control computer program can also adjust the volume of storeroom inventory required according to the level of business. Thus, instead of leaving it to management to establish a fixed minimum and maximum level of stock for each storeroom item, the computer can adjust the recorder point and the order quantity to the actual usage or sales, which can vary over time or by season for that item. Each day, the computer prints out a list of items to be ordered, the quantities needed, and the economic order quantity, if this capability is in the software program. In cases where particular suppliers are under contract to provide specific storeroom items at contracted prices, the actual purchase orders can be prepared for those suppliers.

BAR CODES

One of the more recent advances in inventory control is the use of bar codes on product containers. The bar code is a series of parallel black bars of varying width on a white background. The scanner that reads the code can be a counter-level model such as those found at check-out stands in supermarkets, or a hand-held wand, which is the type most useful in hospitality industry receiving so that heavy cases do not have to be lifted to pass over the scanner.

A common bar code is the 10-digit universal product code (UPC) system, in which the first five digits identify the manufacturer or processor and the second five digits provide information about the product. It is not necessary for the product to be in a sealed container such as a carton or box. Even open crates of fresh produce such as apples and lettuce can be bar coded. The bar code information read and recorded by the computer can include the product's name, package size, and item quantity, from which inventory records can be adjusted. For example, part of the bar code can represent specifications for each product.

The UPC also has known advantages to suppliers who may have dozens of different qualities and container sizes of a particular product, each of which can

be quickly identified by reading its bar code and matching it with the purchaser's purchase order specification.

Where bar coding is used by a hospitality operation, it offers the following advantages:

- Fast order processing.
- Reduction in purchasing time.
- Reduction in specification misunderstandings between purchaser and seller.
- More accurate purchasing, ordering, receiving, and inventory records.
- Improved food, beverage, and supplies cost control.
- Improved supplier delivery schedules and performance.
- Simplification of receiving procedures.
- Improved inventory and issuing control. As items are issued, they can again be passed over the scanner so that perpetual inventory count will be adjusted and proper cost information can be recorded on requisitions.

Note that bar codes do not contain price information; they are placed on products by the manufacturer, who usually does not know what the end price of the product will be after it has gone through various distribution levels. Thus, pricing information has to be entered into the hospitality operation's computer from invoices received from suppliers.

FOOD CONTROL SYSTEMS

Many restaurants use a method of food cost control based on accurate costing of standard recipes. Unfortunately, because of the constant daily changes in food purchase costs, a restaurant with an extensive menu may find that manually revising recipe costs is a prohibitively time-consuming task. Even a restaurant with a limited menu may find the job too time-consuming and not worth the effort.

RECIPES AS BASIS FOR CONTROL

Computers, however, can considerably simplify this work by using a database software system that operates from a computerized file of standard recipes and their ingredients. As new purchases are made, the inventory (ingredient) quantity and cost information are entered into the computer from invoices. Alternatively, terminals can be equipped with a wand reader at the receiving area to

read the UPC codes on containers. If items do not have the UPC codes, the information has to be entered manually into the computer. As new ingredient price information is entered, the computer automatically updates all total recipe costs using current portion costs or a weighted average (depending on which method management chooses) for any recipes containing any of these ingredients. A report can be printed to show which recipes are affected and what the new food cost is in dollars and percentages for that recipe; the need to change the menu selling price can also be flagged.

FOOD PRODUCTION CONTROL

Each day before production is started, it is only necessary to enter into the computer the name of each recipe item and the number of portions to be produced that day from forecast sales. The computer prints the standard cost of all those recipe items and the total, and prints a requisition listing the ingredients and the quantities required from the storeroom. If more than a required quantity is needed for a particular day (e.g., a #10 can of an item when only half a can is required for production), the computer makes a note of this excess and takes it into account when future requisitions are prepared. A computerized system can also calculate a food cost for the day, based on food produced according to forecast sales.

INVENTORY CONTROL

As requisitions are printed, the computer adjusts the storeroom inventory count for period-end stocking and can provide a value for items requisitioned but not yet used in production—for example, the half #10 can just mentioned. From time to time, normal storeroom inventory reconciliation must be carried out; that is, comparing the physical count of items actually in stock with the computer listing of what should be there according to production usage.

If bar-coded products are used, inventory count and verification is further simplified, and a manual count of bar-coded items is not required. A hand-held bar code reader can be passed over the bar code to count all containers or products, and compile the actual inventory, including pricing and total valuation. The computer can also issue a report showing how the actual inventory, either in total or product by product, differs from the computer's perpetual inventory record, which was compiled from invoices and requisitions of what should be in stock.

Taking a physical, or actual, inventory is also easier with a computer even if products are not bar coded. There are programs that print an inventory form, complete with current item costs, leaving only the count quantity to be inserted manually. After the count, figures can be entered into the computer, and a final inventory report showing extensions of item count times price for each item and total inventory value can be produced.

MANAGEMENT REPORTS

Finally, management reports showing planning errors, such as overproduction of menu items because of poor forecasting, can be prepared. A comprehensive food cost control system would have to be built in by a computer linking it to POS terminals. The actual sales histories of various menu items, in combination with other menu items, provide the kitchen with daily food production requirements to minimize such problems as overproduction planning errors.

Other management reports might show operational errors, such as spoilage and waste because standard recipes were not followed, as well as causing errors. This situation indicates a loss of potential sales revenue in comparison with actual sales revenue because selling prices have not kept up with increasing food costs. Another report might show trends for major purchases, to assist in forward menu pricing planning.

FRONT-OFFICE SYSTEMS

The main objective of a front-office system for a hotel or motel is maximization of sales revenue. For this reason, most front-office computer systems are sales-revenue-oriented rather than cost-control-oriented, and are based on the reservation, registration, and guest accounting needs of the property. They can also be linked to food and beverage POS system terminals. However, front-office systems can provide cost control in certain areas. Front-office computers can be linked to the telephone system to monitor and bill guests' accounts for charges of local and long distance calls to preclude the hotel from paying for telephone costs not recovered through charges on guest accounts.

The front-office system can also provide constantly updated information to other departments such as housekeeping, food, and beverage areas relating to room occupancy and guest counts, so that adequate staffing can be arranged, thereby precluding departments from being overstaffed.

Finally, front-office computers can prepare and print room department operating ratios such as occupancy and double-occupancy percentages, average daily rates, and the daily yield statistic. In this latter regard, front-office computer systems can be immensely useful in maximizing yield by providing information to form a database of guest history and reservation patterns by type of guest for yield management.

More recently, front-office systems have been keyed to security control. A computer can be programmed to allow certain keys to open doors during limited periods each day. This may mean that housekeeping staff will have access to rooms only during the room makeup period. The system can also issue "keys" to guests, which are simply plastic cards a little smaller than a credit card that

have data encoded on them on magnetic strips or have a series of holes punched through them. The guest room door has a device that reads the card and allows the door to be opened.

As guests register, the computer issues new guests a *key card* with a unique code on it for each guest and for each specific room. At the same time, the computer erases the old code for that room in the device on the guest room door. This procedure ensures a departed guest's card will not function, and creates a new code corresponding to the arriving guest's card. Departing guests do not have to turn in their keys; on checkout, they can be discarded. In cases of emergency, a conventional key may be used by authorized hotel personnel to override a card reader device. The key cards can also be used as internal credit identification cards so that guests can charge to their room account food or beverages consumed in the hotel's dining room and bar areas.

For small hotels and motels, computerized equipment is now available that can be located at the front office to be operated by an arriving guest. The computer accepts specified credit cards and automatically charges the rate for a specific room to the credit card, prints a paid invoice for the guest, and issues a key card coded to the door of the assigned room. An all-night employee no longer is required to register late-arriving or early-checkout guests.