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Useful appendices provide lists of helpful publications, exhibitions, consultants and suppliers of accountancy systems.

Roger Cowe is a qualified management accountant. He is editor of 'Data Business'.

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INTRODUCING COMPUTERS

Introduction

As microcomputers proliferate in the home, the business and professional communities are taking to the technology much more slowly because they have different needs and attitudes to computing. Home users are interested in the machines themselves, or at least in the games that they can play, and do not expect the computer to do anything useful. The business user is just that, a *user* of technology in a very practical way. So the essence of this book – and every other title in this series – is practicality: choosing a computer, installing it, getting it working, and keeping it working; combined with a comprehensive account of how to get the best out of a microcomputer in specific professions and businesses.

No technical knowledge is assumed, and any jargon used is explained only as necessary. Today's business microcomputers do not require, in any case, the kind of knowledge that earlier systems did. However, there are some terms that the beginner may not have come across, but are worth understanding before you start. These few items of jargon are simple and useful, and will save repetitious explanations later on in the book.

Glossary of Terms

Disk drive: Business computer systems, unlike the popular home systems, really need large and fast storage facilities for information. Magnetic disks are the most common medium, and business systems will generally have two *floppy disk drives*. These are electromechanical devices that spin the disk and position the reading and writing heads to store or retrieve data under the computer's control. In most systems these are built into the box next to the display screen. They look like thin slots

with some kind of door mechanism, and are just big enough to take a *floppy disk*.

Floppy disk: There is sometimes some confusion about microcomputer storage. The computer's *main memory*, or *RAM*, is made up of silicon chips inside the machine and is used for temporary storage of the program the computer is running and the data the program is using. But RAM memory loses its contents when the power is switched off, so some permanent medium is needed to store data that you want to keep as well as the programs you want to use. In business systems the most common medium is the *floppy disk*. This is a thin plastic disk coated with a magnetic material similar to that used on audio cassette tapes. The disk is encased in an envelope to protect the surface, with a window to allow the read and write heads of the *disk drive* to make contact with the surface. There are two standard sizes, with diameters of 5.25in and 8in, the smaller size being the one most often used these days.

Hard disk: Some systems now offer hard or *Winchester* disks as an alternative to *floppy disks*. The *hard disk*, as the name suggests, is much more rigid than the floppy type. The disk itself is made of metal coated with a magnetic material, and spins in its drive much faster than the floppy type. The storage capacity is up to 20 times that of a floppy disk, but the disk can not be removed from the drive and the cost is much higher. Microcomputer hard disks are of the *Winchester* type, which refers to the technology used in building and running them.

Main memory, or *RAM*: One of the first details given about any computer system is the amount of *RAM (Random Access Memory)* it embodies. As mentioned above, the RAM space is temporary storage, and the contents are lost when the power supply is switched off. When a program is loaded from disk into the computer, part or all of it goes into RAM for the computer to work with; likewise, any data you enter from the keyboard go into RAM until you tell the computer to store it on disk. RAM capacity is measured in units called kilobytes, abbreviated 'k' – without going into too much detail, a 64k computer has a main memory space of 64,000 characters or so while a 128k machine obviously has twice that. The more RAM there is the better, since larger programs can be loaded in their entirety. With small RAM spaces, only part of the program can be loaded at once,

and other lumps brought in off disk as required. If these disk accesses are needed often, frustrating delays in program execution can result.

Microprocessor: Most people know by now that the microprocessor is simply the main part of a computer shrunk to fit on a tiny silicon chip. But now the talk is of a war between '8-bit' and '16-bit' microprocessors and systems. The 16-bit microprocessors, which handle their data 16 binary digits at a time instead of eight at a time, are faster and can handle much larger amounts of *main memory*. Until recently, there was a shortage of good software on the market for 16-bit systems such as the Sirius 1 and the IBM Personal Computer, but things are improving quickly.

Programs, or *software*: Programs are sequences of instructions telling the *microprocessor* what it has to do, and *software* is the generic term for programs of all types. First-time users tend to use off-the-shelf programs written by software specialists, and these are often called software *packages*.

Computers as Problem Solvers

Together with the software programs now available to work with them, they have been designed for people with no computer experience. They are simply tools that are meant to be used to solve business problems as efficiently and quickly and simply as possible.

One attractive analogy is to compare the micro with a hi-fi system. The purpose of the hi-fi is to produce music that pleases the ear, and this is generally done by putting on a record or tape and pushing the necessary button. Then the listener's job is over. The processes involved in getting the music onto the surface of the record or tape, then taking it off again and recreating the original sound from loudspeakers, is irrelevant to the owner's enjoyment. Not knowing how a hi-fi system works internally is no bar to buying and benefiting from one.

This analogy is pretty close. In computer terms the recorded music is the software supplied on computer storage disks; the hi-fi is the computer hardware; and the music coming out of the loudspeakers is the computer's output on a screen or printer. The output is what you buy the computer for, and how the software gets onto the disk, or how the computer works on it,

does not matter at all. You put the program disk into the computer and it does its job.

There is no point in buying a computer to do a business job that can be done quicker and easier with a calculator and a pencil. Advertisements in microcomputer magazines give the impression that microcomputers are suitable for any business job in any field of business, and often give a list of programs available for work in different professions or types of business. But although microcomputers – and computers in general – are very versatile, and the range of programs is very wide, there are some things that they do well and some things that they do not so well.

One common fallacy is that computers are only good at handling numbers and performing calculations with them. Inside the computer's circuits this is true, since the computer hardware can only cope with binary patterns, groups of '1's and '0's, and these are usually translated into more familiar numbers – for example, 10001101 can be translated into 141. But these binary patterns are only codes, and can stand for anything, particular letters of the alphabet and punctuation marks.

So a computer is happy handling words as well as numbers; and that is why the whole computer/telecommunications field is often called 'information technology'. Microcomputers are good at handling information, including storing and recalling it, re-structuring it, and putting it out in various forms as required. Therefore the decision as to whether or not to invest in one depends on the type and volume of the information that needs to be handled.

For instance, it would not be particularly efficient to buy a micro for word processing where the information being handled consists of words typed on a keyboard if your business only produces a few letters rather than large quantities of form letters or lengthy reports. Likewise using a computer to store details on a handful of clients or customers will certainly be slower than using a simple card index.

So the first step in any decision process should start with a close look at the kind of information you need to handle better or faster, and at any particular problems you encounter in dealing with that information. If there are no problems, the computer

might even spoil things by making you handle information in a different way, so forget about buying one for a while.

However, there usually are some problems, or at least some improvements that can be made. The next step is to see if a computer can help to solve or improve, and if so exactly how you would like it to do it. You don't have to start looking at software to do this; just knowing that computers can act as word processors or fast data storage and retrieval systems is often enough. What should always be remembered is that computers are problem-solving tools, not magic wands. There is no business justification for buying a microcomputer if there are no problems for it to put right.

Selecting a System

The secret of success in using microcomputers has very little to do with the machines themselves.

That might sound odd, but it comes naturally from the division of functions in any computer system – the split between hardware and software, between the electronics and mechanics of the system and the programmed instructions that make it do something useful.

Without programs to put it through the right hoops a microcomputer is a useless package of silicon, metal, plastic and glass that might just as well be used for holding doors open. Thus the process of selecting a computer *must* start with a close look at the programs that will be needed.

Fortunately there are only three ways of acquiring microcomputer software; buying a ready-written package off the shelf, paying a programmer to write special programs to suit, or taking the plunge and writing the programs yourself.

Most first-time users choose the first option, since it is the simplest and cheapest in both cash and time. There is a vast array of ready-written software on the market, and somewhere there will probably be a package designed for any application you care to name. Of course, finding the right package is the first difficulty since it is impossible to judge the quality or suitability of a particular program from suppliers' advertising copy. Then there is no guarantee that any program you select will fit in with existing business methods, meaning that some adjustment – minor or maybe drastic – will have to be made in the business to

make it fit the program's demands. Too many businesses have acquired computers and packaged software to solve business problems, only to find that the system has caused even more trouble by enforcing new and unfamiliar methods of working. Some firms for example have used programs originated in the US which were not converted for the UK business market, where standards and practice are very different.

One way of getting round these adaptation problems is to hire a programmer for as long as it takes to produce a set of programs that meet the business needs exactly. The advantage here is that the final product is tailored to the application and makes it much easier to switch from the old methods to the computer; the customer can also try out the programs in real life, and correct any defects by calling the programmer back to make improvements.

This apparently ideal modus operandi has a major drawback however: it is expense. The demand for skilled programmers is high, and they can command high rates for the job. For instance employing a computer consultant to examine the business, specify the necessary programs and hardware, and write the programs costs upwards of £200 per day for an indefinite period. Six months of programming work – not unreasonably long for a business package – can cost around £15,000. Although software is much more important than hardware, many prospective users jib at the idea of paying five times as much for it.

One answer to this would be to write the programs yourself, but unless you know computers already or are willing to invest considerable amounts of time in learning, this is by no means easy. Although this is the cheap option it is expensive in terms of the user's time, since learning programming from scratch and then producing workable and efficient business programs can take years. And the computer hardware has to be bought first; this means that an initial capital outlay is needed without any prospect of substantial benefits for a long time to come. There is also the problem here that the hardware you buy to program on might turn out to be incapable of doing the jobs you need doing.

Despite all the drawbacks, hundreds if not thousands of businesses are successfully using microcomputers with software derived using one or other of these three methods, or some

combination of them. And in fact many of the ready-written packages on the market, particularly those written for specific industry areas or professions like plumbers' merchants or dentists, have originally been written or commissioned by individual users. In these cases, either the customer has asked a dealer-cum-consultant to write a special package, which the dealer can then market; or a computer user has written his own package, which is spotted by a dealer and signed up for sale; or a customer has worked throughout with a dealer to produce programs intended from the start for the mass market.

All this tends to multiply the number of off-the-shelf program packages available, with several different products available for each application such as estate agency management or running a medical practice. For the prospective buyer this is all to the good, although it lengthens the selection procedure, because there is more chance of finding a package to do what you need well enough at a reasonable price, if you search long enough.

The choice between the three routes to software success can be a difficult one, trading off cost against time against adaptability to suit the business. But it is the first choice that needs to be made, and governs the selection of computer hardware that you have. 'Software comes first' should always be the beginner's motto.

Given that software is of prime importance in selecting a microcomputer system, the next step is to find out what software is available off-the-shelf, to see if the perfect program package for your needs has already been written. This is not necessarily easy. In fact it can look impossible when you start. There is no one guidebook that lays out every business program available by category, with the hardware as subheads under each application. Fortunately, if you are looking for a wide range of software to choose from the hardware range cuts down quite a bit.

In fact, the range of hardware comes down to the original big three, Apple, Commodore, and Tandy, and to the large number of machines that use the Digital Research CP/M operating system.

Every computer needs a kind of control program, called an operating system, to handle the 'housekeeping' of the system –

checking whether a key has been pressed, putting characters on the screen, sorting out how and where data is stored on disks, and so on. The operating system program sits between the user and the actual application program that does the real job, and generally makes life easier. Originally every micro had its own operating system, and programs written for one machine would not run on another. Then came CP/M, which could work on a lot of different micros, and made it possible for a single program to run on all those machines with minimal changes.

What that means for the customer is that there is a lot of software available to work with CP/M, since the software suppliers soon realised the benefit of producing programs that would work on systems from many manufacturers.

So, while you are involved in the inevitable process of looking through adverts in the micro magazines and visiting micro exhibitions, send off for a catalogue to one of the specialist CP/M software suppliers, such as Lifeboat Associates in London. Telephone or write to Apple, Commodore, and Tandy for the software catalogues which all three produce to go with their (basically non-CP/M) computers.

In each of those catalogues is a comprehensive list of ready-written programs that can do various jobs for business users. But there are usually several different program packages to do the same job and there is very little information given to help you see how they differ.

There is no substitute for seeing programs in action. But there can be short cuts if a few details of the different packages are given. For example, sales literature or a catalogue listing might say that a payroll program can handle 50 employees – which is obviously no good if you employ 127. Or if a sales ledger has space for 100 entries it will not help a business with 386 customers to store details on.

Rule-of-thumb procedures like this should enable you to produce a shortlist of programs from the catalogues that might do the job. Unless the application you have is relatively obscure this shortlist will not be that short. So the next stage is to get more information. Get in touch with the sources of the programs on your list and order the program writers' sales literature, which varies from a glossy brochure to a single photo-

copied sheet. This information will certainly cut the list still further, as undesirable details unknown before come to light.

There are various factors that would make a software package undesirable or even a liability, but unfortunately information to help your judgement is often hard to get from the people who actually write the software or the people who sell it on to users.

There is, however, no harm in asking some questions and trying to get some straight answers.

The first practical thing to find out is the number of users a particular program package has, and how many copies the dealer has installed. The more users a program has the likelier it is to be a solid and useful product – not just because the laws of the market mean a poor product does not sell, but also because software producers rely on user feedback to correct or improve their products. Moreover the more packages the dealer has installed, the more competent he will be to explain and demonstrate the product and help with any detailed queries. If you are lucky, the dealer will also give you the names and addresses of some local users who you can talk to about the software in question.

The next feature to investigate is the documentation and manuals provided with the program. If you get a brief photocopied guide giving a few details about the package, it is likely that the full manual will be inadequate as well. Remember that even the best program in the world is no good if the user does not have a good manual that helps set the thing up and operate it without an extended learning period.

Many software firms and dealers will sell their manuals separately, and this is a good if expensive way of finding out what the documentation is like. The dealer will also let you have a look at the manuals if he has them in stock and if you ask.

The dealer may also have come information about the software producer, some background information on the company's reputation and solidity. For obvious reasons the popular packages generally come from reputable companies, but even some of those can be having financial trouble. Then some very good packages come from one talented programmer working from home, in which case the back-up you or your dealer can get from these outfits is almost non-existent.

There is little you can do to find out whether a particular

company, in hardware as well as software, will still be around in the future but an honest dealer will give you a few hints.

The other useful information you might get is more readily available, since it consists of selling points. For example, it might be easy to adapt the package to suit the special needs of your business, although this is rare. Then it might be very easy to use, or claimed to be at least. And there might be an established process of updating and improving the product with updates and enhancements.

With a bit of detective work, the software shortlist can easily be cut down to manageable proportions.

Then you can think about seeing the software in demonstration. Many prospective first-time buyers go to all the micro exhibitions and expect to get the kind of full demonstration that you need in evaluating software. Unless you are lucky on the day this is a vain hope. Staff on micro show stands are harassed, and the exhibition atmosphere is wrong for detailed demos. Go along by all means, and play with a few machines. That could easily cut some hardware off your list of possibles. But do not order anything unless you are absolutely certain.

We shall come back to demos later, but let us assume for now that you have a shortlist, or maybe a longlist, of suitable software. Now comes hardware selection.

The software on the list may well run on a variety of systems. There might be four products for CP/M machines, one for the Apple II, three for different Commodore models, one especially written for a brand-new Japanese machine, and so on. This amounts to a hardware shortlist, and a closer look needs to be taken at each system on it.

The bigger and better-known manufacturers are generally a better bet; they have experience in the market, reliable supplies, established dealers, and organised service arrangements as well as more software. This consideration should cut a few of the more obscure names off the hardware list, unless the software available for them looks really outstandingly good.

To complete the winnowing process you must analyse what exactly you want to do and how your requirements might change in the future. Can the machine be expanded with extra memory, more disk storage, extra user terminals, and other add-ons if you might need them? Is enough disk space available now

to avoid your having to switch disks at annoyingly frequent intervals to get at your data? Can the machine communicate with other computers, big and small, if you want to do that some time?

Systems that do not have many expansion possibilities are almost always cheaper than those that do, and this should be weighed in the balance too.

Finally, there is the general 'feel' of the system, and of its manufacturer and suppliers. Playing with micros at exhibitions will certainly show up all sorts of 'unfriendly' features. The screen might be hard to read, the keyboard might be unpleasant to use, and even the colour of the case might be wrong. Do not neglect the human factor.

After a length evaluation process, you should arrive at some kind of shortlist of hardware/software combinations. The next job, and this is another long one, is to try to see these combinations in action.

Remember that there is no hurry. A computer that does not do the job it was bought for is just an expensive liability.

Seeing systems working with the software you have selected as possible solutions is, again, a tricky but necessary thing to do. The majority of microcomputer dealers stock only a small range of machines, covering maybe three or four different manufacturers at most, and nothing like a full range of software. How then can the customer see software and hardware at work if nobody stocks that particular combination?

One approach is to look at the hardware first, which seems to go against everything we have been saying before. Which it is, but it is a consequence of the way the microcomputer distribution system works. Dealers sign up with manufacturers or distributors to sell particular ranges of hardware, but have few if any such restrictions on the software they stock. So the start of the search for demos has to be with the hardware; if the supplier has shortlisted hardware, he can always get hold of the software you are interested in. It doesn't work the other way round.

Get hold of a list of local dealers from the manufacturers or suppliers and find a preferably friendly dealer handling each set of hardware you are interested in, and who will either have the software on the shelves or be willing to get hold of it for you.

Try to get the dealer to agree to a demonstration of the soft-

ware you want on his machines, and then make an appointment to visit his shop, showroom or office with the system set up and the software you want to see ready to hand. Once there it is all too easy to sit through a prepared demonstration, often with special demo data provided by the software writer, and agree with the salesman that it works fine. But remember that the dealer is trying to sell the system to you, and that you should, in the nicest way, make him work hard to do so. Ask questions where you don't understand, and make a particular point of asking what happens as the amount of information stored increases, since computers often slow dramatically as storage disks are loaded up. In short be an awkward customer.

Look for ease of use of the system and software. If only one person is to operate the system then it is feasible to train that person in complicated operating procedures. But if various people might use the system, operation should be virtually self-explanatory. The software should be 'user friendly', giving instructions on the screen that are clear to the untrained user. It should forgive the operator errors without hanging up, should report any mistakes on the screen, maybe with a bleep, and should generally be operator-proof. The hardware should have similar features, although the way hardware works in practice is almost entirely software-dependent apart from mechanical or electronic faults.

Do not let the salesperson get away with vague statements or promises of improvements some time in the future. Take a list of the things you want the system and software to do, and check them off as the demo and the salesman's answers satisfy you or not, as the case may be.

It is not only in the microcomputer business that the buyer has to beware. But it is a business that the customer can easily feel lost in. The only solution is careful preparation and a decent helping of bloody-mindedness.

However good a microcomputer system is at manipulating information internally, that information has to be extracted sooner or later – and more often than not it has to be printed out to give a hard copy. The printer is a vital part of any business computer system. There is an enormous range of printers to choose from, but it can easily be narrowed down.

Computer printers come in two fundamental types, the

impact and the non-impact, with the impact types being by far the most common. As the names imply, impact printers make marks on the paper by striking it with something, while the non-impact ones use more indirect methods such as jets of ink, lasers, thermal effects, or electrostatics.

For most business applications the non-impact types can be rejected, although they do have the advantage that they are all virtually silent; in fact Apple's cheap thermal printer is called Silentype to emphasise this feature. Ink-jet and laser printers offer high speed, high quality and high quantity output but are enormous pieces of machinery in size and price. Electrostatic and thermal printers may be cheap – the Silentype and Sinclair's ZX printer are examples of this – but they need special paper and are often slow in operation.

Impact printers then are most appropriate for the small business. Once again these fall into two types, called 'dot matrix' and 'letter quality' printers. In dot matrix printers each character is made of an array of small dots, printed on the paper by a set of needles 'fired' against an ink ribbon and so against the paper. The quality of the printed output depends on the number of dots in the array, and since most reasonably-priced dot matrix printers have a matrix only seven dots by five for each character, this type is not recommended for business letters or other documents where print quality is important. A 7×5 matrix means that the individual dots in each character are visible, although the character itself is perfectly legible, and dot matrix printing would not impress a client.

For high-quality output a letter-quality printer is needed, and most of these in the computer business, like the extensive ranges from Xerox subsidiary Diablo or ITT subsidiary Qume, use a print mechanism called a daisywheel – which is just what it looks like. In this type of printer the characters are just like those on a typewriter, fully-formed raised characters mounted on little blocks. But here the letter blocks are fixed at the ends of flexible metal or plastic 'petals' around a central hub. A typical daisywheel has 96 such petals each with its own letter, number, or other character. To print, a single hammer (as opposed to the multiple needles of the matrix method) hits the required letter block and presses it through a ribbon on to the paper. The daisywheel spins on its hub to bring the right letter under the

hammer. An exception is NEC's Spinwriter, which uses a print 'thimble' like the golfballs on office typewriters, but the principle is the same.

As the letters on the wheel are just like typewriter letters, daisywheel printers produce printed output resembling conventional typed copy. They offer a variety of type sizes and styles just by changing the wheel. However they are slower than matrix printers since the wheel may have to spin round completely between printing characters, and they are much more expensive.

A good daisywheel printer printing at about 50 characters per second, such as the Diablo 1640 or the Qume Sprint 5 costs well over £1,500 although smaller and much slower models are now on the market for £500. A good dot matrix printer running at 80 characters per second, such as Epson's MX-80 or some of the Oki range, costs around £350.

The type of printer you choose depends on what you need to do, although of course you could, if you wanted to cover all possibilities, buy a dot matrix type for general use and a daisywheel for letters.

Whichever type you choose it has to be plugged into the computer to get the information it is to print – and once again there are two ways of doing this. The first, called serial interfacing, sends data to the printer over a single wire; the other, parallel interfacing, uses a number of wires simultaneously. To put some names to these methods, since the computer and printer makers will use the names, the most common serial interface is called RS232C and parallel interfaces include IEEE 488, Centronics, and Dataproducts types.

Unfortunately it is not just a matter of buying a printer that has the same interface as the computer and plugging a cable between them, particularly with the RS232 type which is the most non-standard standard around.

The parallel types are easier to handle. This is to be expected since two of them, Centronics and Dataproducts, are named after leading computer printer manufacturers. Unless you really know what you are doing with the interfaces do not buy a printer by mail order. Much safer is to buy from the dealer supplying the computer, in which case the dealer will make sure the printer works with the machine, or from a specialist printer supplier

who will either install the printer himself or give you foolproof instructions on how to do it without disasters.

These days most computers use the RS232 serial interface, and most printers on the market offer this at least as an option – although it sometimes costs extra. Exceptions include the Commodore Pet range which always uses the IEEE 488 parallel interface, and some other machines like the Osborne 1 which give you a choice. So the computer hardware can limit the choice of printer. Make sure that the computer and printer use the same interface. Also, at the risk of labouring a point, get the printer installed by an expert unless you are an expert yourself.

Microcomputers might run their programs perfectly, yet still be absolute brutes for mere human beings to use. The ergonomics of the machine, the human factors involved in operating it, are deservedly receiving more attention these days as microcomputers spread across the business spectrum.

The main features to study are the screen display and the keyboard, since these will get heavy use. Let's take the display first.

Whatever case or mounting the screen comes in, it is basically the same type of screen as is used in domestic TV sets, and works in a similar way. But the sort of information displayed is different, and for detailed text displays or computer-generated graphics only a purpose-built computer monitor has the quality required.

These monitors are either sold separately or built into the computer case, and these days are mainly produced by Japanese companies. Separate monitors are available from firms like NEC, BMC, and Panasonic for example, with UK competition from smaller companies like MicroVitec and Crofton.

The first obvious thing is whether the display is colour or monochrome, but business microcomputers are only just starting to use colour displays and monochrome is much more common. There are various schools of thought . . .

The first obvious thing is the colour of the screen display, and there are various schools of thought about the ideal colour combination of letters and background. Most popular are white on black and green on black, with the green shade reckoned to be less wearing on the eyes; other rarer combinations include dark brown on amber – particularly fashionable in Scandinavia – and

black on white, sometimes used on sophisticated word processors.

Next comes the screen format, the number of characters that can be displayed at once. Most microcomputers intended for home use, such as the Sinclair Spectrum, the Oric 1, or the Commodore Vic 20 – and even the Apple IIe or the Tandy Model III – have restricted formats of 24 lines of 40 characters or less. For 'serious' business use and word processing the standard size is 25 lines each of 80 characters. All mainframe computer terminals use this format, and microcomputers like the IBM Personal Computer, the Sirius 1, and the Superbrain have brought this standard down to the microcomputer business.

This format provides a decent amount of information per screen, and for word processing lets the user see the equivalent of a full line of typing on ordinary A4. Most ready-written business software expects this screen size, and there is really little point in accepting less. To show its importance, several companies are making money out of selling add-on units to convert the 40-column Apple II screen layout to 80 columns width.

If the screen is the computer's method of communicating with the user, the keyboard is often the user's only method of communicating with the machine. The keyboard has to be good enough for prolonged and regular use.

The 'feel' of a keyboard is a very subjective criterion, but there are some things to look out for. Ideally a computer keyboard should be as similar as possible to that of a standard office typewriter. Stepped key rows, shaped keys, some kind of tactile or audible feedback to prove a key has been pressed, and familiar keyboard layout are all worth considering. The layout is particularly important, since although the alphabetic characters are always in the right places the punctuation, tab, and shift keys may not be; and the computer's own control keys are often inconveniently placed. Sometimes the layout just seems sloppy, with the vital key that resets the machine and empties its memory placed right next to the backspace key, say.

A good keyboard just seems to feel right in use, and the only way to find out is to try as many as possible from your shortlist.

Another important ergonomic consideration is the physical

comfort of the operator who has to sit at the computer eight hours a day. The more flexible the configuration of the system the better, so that operators can adjust its components to suit them individually. In the best modern systems the display screen can be tilted and rotated, the keyboard is detachable, and when the system is assembled on a desk everything is in a handy position for the user to handle.

In general, the only way to evaluate the human factors of a microcomputer is to try it out in an environment as near to that of its prospective site as possible. See the system set up in its entirety, and then just sit down and play with it. Glaring ergonomic deficiencies will show up very quickly.

Making the Deal

Microcomputers are getting to be fashionable, and people are appearing all over the place ready to make a quick buck out of selling them. As usual, some of these people are interested only in shifting the product and don't care whether it's computers or soap powder.

There is not much you can do to avoid bad suppliers, initially at least. But it should soon be clear from their attitude to the customer whether they will be any good or not. What kinds of suppliers and attitudes are you likely to come across?

The most common set-up is that a manufacturer in the US or Japan appoints one or more distributors or master dealers in the UK, and the distributor then appoints a network of local dealers. The importing and most of the stocking is done by the distributor, who is the only source of supply for the dealers. This system can work well. The distributor can build up a close relationship with the manufacturer, ensure regular and sufficient supplies of equipment, and give comprehensive help and support to the dealers.

Then again, it can work badly. The distributor may choose dealers indiscriminately, and just act as a staging post for the transfer of cardboard boxes from the manufacturer to the dealer's bombsite. And the dealer might just shift the boxes on to the end user without even opening them; this in addition to waiting for a customer's order before ordering a system from the distributor, who then orders it from the makers . . . If any link in the chain is weak, the customer suffers.

There are other systems too, where there is no distributor and the dealers go straight to the manufacturer for machines, or where the distributor covers the whole of Europe or is a subsidiary of the manufacturer. But whatever the methods the customer's first contact is always with a dealer of some kind or other, and these have their own distinct types.

The most obvious is the new breed of high-street computer retailers, now also including departments in shops such as W. H. Smith and Ryman's. These are glossy emporia with window displays calculated to bring custom in off the street, but once the customers are inside they often find that the sales staff know very little about the computers they are supposed to sell. Go in to collect information by all means, but go carefully and do not just wander in and come out with a computer under your arm.

The specialist computer dealers may also have retail outlets, but this is only peripheral to the operation. The dealer's main concern – if he is not a cowboy of course – is to guide the prospective user to a combination of software and hardware that will do the job. He would not be doing his own job if he didn't end up recommending one of the systems he sells, but it has been known for dealers to admit that the customer will have to go elsewhere for the right solution.

Dealers sometimes handle just one manufacturer's computers with a range of software to suit them, but it is more common for them to handle a range of perhaps three or four makers' machines. The choice available from a particular dealer depends on the contracts he has been able to sign with distributors, and on the market he intends to concentrate on; some dealers stick to home and hobby computers, since this is a simpler market to satisfy.

The type of dealer to avoid is the pure mail-order supplier, although the prices are attractive in the adverts. These are pure 'cardboard box' shippers, and buying this way is risky for the customer who does not know exactly what to do and how to do it successfully. The equipment might not be checked by the dealer, and might not work; parts or cables connecting the system together might be wrong or missing; the printer, if there is one, probably won't be configured to work simply with the computer; and above all, there is very little back-up or support

from the supplier. If you buy like this you are really on your own.

On the other hand, the best dealers will go through your business needs, comment on the software you are thinking of and demonstrate it on a computer system in stock, advise on the scale and type of hardware needed for the application, and provide full price lists and specimen contracts. You will find that this paragon has facilities for full after-sales support and service, and will be happy to be called up day or night with any problems you might have before or after the installation.

Most dealers fall between the cowboy and paragon extremes, but these days the quality is rising as customers get more discerning and knowledgeable, and more dealers are offering full consultancy services to assist the selection process.

And this brings us to the last type of supplier – the independent consultancy. This should be distinguished from the dealer who acts as a consultant, since the independent type has no connection with any manufacturer and is free to recommend any combination of hardware and software that is on the market. In practice the consultant will tend to recommend systems that he has had experience with, but he can select computers from a much wider range than a dealer can. And consultants are generally experienced in software, in selecting it or writing it, and in how it goes together with the hardware to make a system.

All this comes expensive though, with the consultants' fees on top of the cost of the system itself. It can also take a long time, but you do end up with a system that works. And that has to be the final aim, and the system supplier has a big role to play in achieving that aim. The only rule is to avoid the cowboys, and the only way to make sure of that is to build up some background knowledge first.

A vital thing in picking a supplier of the selected machine is the type and quality of after-sales support on offer. With mail-order houses this is practically nil, and some dealers also get away with minimal attention to this vital area.

Even if a particular supplier has been specially helpful in demonstrating hardware and software, answering your stupidest questions, and offering you a good price, you should not buy there if the support after sale is not good enough.

There are various ways a supplier can help the user after the machine has been installed. Some dealers, usually the bigger ones, have their own teams of engineers on call to be sent out to the user's site and get the system working again. Others, without these resources, pay a third-party maintenance firm to provide the engineering back-up; the deal is made between the supplier and the maintenance firm, and any breakdowns are referred to the outside firm by the supplier. Yet others may have two support schemes, one costing more than the other. One would involve the engineer visiting the site as before, while the other would involve the user taking the system in to the supplier's workshop for repair there.

Whatever your chosen supplier's methods, the details of the support scheme and how much it will cost should be laid out clearly in the contract you sign.

The cost itself will vary, yet again, between suppliers. The time it takes an engineer to get to the site might be guaranteed to be six hours, 12 hours, 24 hours or more; the use of an alternative system while the original is being repaired might be on offer; or parts needed for repair might be charged on top. The price of the maintenance deal depends on the combination of services offered.

As a general rule, the price of the maintenance deal will be around 10 per cent of the total system cost per year. So if the system costs £3,000, the maintenance cost would be around £300, per year.

The minimum you should look for in the maintenance part of the contract is free service during the warranty period, followed by engineers' visits in a reasonable time after breakdown. That might sound vague, but it really depends on how vital the computer is in your business. If you are only using it to do payrolls once a week, say – though that would be a bit of a waste – then it is hardly necessary to have a service engineer at your door within six hours of a failure. And again, in this case the replacement machine option would not be needed, since the inherent reliability and modular design of microcomputers mean that repairs are generally fast unless obscure spare parts are needed from the (usually overseas) manufacturer. It is worth asking, though, what kind of spares stock the supplier has on tap.

As so often in the micro business, the onus is largely on the

customer to work out the requirements, sniff out what is available, and decide what kind of support deal is suitable.

One important thing to ascertain is the length of the warranty period on the equipment. In the US, the standard warranty period is just 90 days, and this is often applied by dealers here when systems are imported. There seems little justification for this, since micros are so reliable these days, and in fact some suppliers in the UK have extended the warranty on their systems to a full year. This is sadly still rare.

All this assumes, of course, that you want a full maintenance contract to cover you, and indeed this is the best course to take. Suppliers will almost always offer a parts plus labour deal on any repair, but like any electrical and electronic repair the time it takes and the final price are uncertain. Losing a computer for a couple of weeks could be disastrous, and the price of one or two repairs a year could easily add up to more than the cost of the maintenance deal anyway.

Whatever the maintenance deal offered, it should be made clear to you before any money changes hands, and should be included in the total deal either as part of the overall contract or as a separate contract in its own right.

As usual, read the contract carefully before signing it or paying anything. If you are not sure about the details, take it home for more study or get a lawyer to take a look to make sure it is legally sound and covers everything verbally agreed.

Take care before touching the dotted line.

If all this sounds a little hard on the supplier, there is more to after-sales support than arranging repairs. Software support, and that odd thing called 'hand-holding' in the trade, are important too. When a microcomputer is installed there are going to be problems. Maybe the makers' manuals aren't very clear, or the use of the software in certain situations is a bit tricky.

The first resource here is the telephone call to the supplier, and to their credit most dealers will be happy to help over the phone if they can.

The micro business is often held up as one that reverses the old 'customer is always right' maxim, but with new users the dealer's patience is often quite surprising.

There are no hard and fast rules for working out whether a

particular supplier is a good hand-holder. The only thing to do is meet the dealer face to face if possible, have a chat, and you will often know the kind of personal service you will get. And never be afraid to ring the supplier with any kind of simple query, before or after you buy. Some firms even budget for the time taken in answering calls when a sale is made.

Installing the System

Once the order for a computer system has been made, and a delivery date set, the customer has to think about how to handle the machine when it arrives.

In theory, all that is needed to install a microcomputer is a suitable desk-top to stand it on and a 13A power outlet to plug it into. But in practice there are still things that need to be considered.

First there is the location of the system in the office. This is not as simple as it sounds; obviously the machine should be placed so that all the people needing to use it can get easy access, but there are human factors to take into consideration. For instance, any business system needs a printer of some kind, as we saw earlier, and computer printers are pretty noisy. It is a matter of personal opinion as to whether the fast dot matrix type is more irritatingly loud than the high-quality daisywheel type, but both are disturbing. One GP's practice in Chester found that once the printer was delivered the system had to be moved from the office and reception area into the common room/kitchen, to let people hear themselves think.

For this reason, particularly if the printer is likely to be in use for long periods of the day, many users find they need a separate computer room to avoid disturbing the rest of the staff.

Printer manufacturers are now starting to do something about the noise problem, and one maker – Centronics – is now producing a new range that is meant to be much quieter than its old ones. But in most cases, the only alternative to a separate room is an 'acoustic hood', a kind of perspex soundproof (-ish) box that encases the printer. Otherwise the staff will just have to put up with the noise, which is not too bad providing that the printer is only going for short periods spread through the day.

The power supply to the computer system can also cause trouble. Some microcomputers such as the Sirius 1 or the

Superbrain come in neat desktop enclosures including the magnetic disk units, display screen, and all the computer hardware itself. But others, for example the Apple IIe and the Video Genie II, are in separate sections to allow the user to start with a simple system and add extra bits and pieces as needed. In these systems each part often needs a separate power cable and plug. For instance, there might be a keyboard box containing the computer, an expansion box containing extra memory and controlling hardware for disks and printer, two separate disk units, and a display screen – a well as the printer itself. This system would need six 13A sockets for all its plugs, which really means that you would need a long plugboard and extension cable to cope with the demand. If the system on order is made up of separates, it is worth working out how many power sockets you will need and investing in the appropriate plugboard.

There should be no worries about running six separate computer system units from a single 13A socket, since the power requirements of modern microcomputers are very small. However, microcomputers are also sensitive to power fluctuations, changes in the voltage or current supplied to the units, and these can corrupt data stored on the system. If, for example, the power circuit the computer is in tends to have electric heaters or fans plugged into it in numbers, at unpredictable times, you might find intermittent faults happening on the computer. If you are not sure about the stability of the computer's supply, it could well be worth investing in a regulator unit that smoothes out fluctuations of the supply. These are widely advertised in the computer magazines, or your dealer could help.

At their most sophisticated, these regulators are non-interruptible power supplies with large banks of batteries that will keep the computer running for some time even during a complete power blackout. But these are expensive, and only really necessary for systems which store very sensitive data and run for long periods at a time. In Britain power fluctuations and failures are rare, so even a simple regulator is not a necessity.

Work out the location and power supply requirements of the system before it arrives, so that the dealer installing it can get the machine set up and running as quickly as possible in its proper site.

Once the system is set up, you can think about other factors that might be difficult to work out beforehand. Does the lighting in the room cause reflections in the display screen that make it hard to read? Many computer monitors these days are fitted with anti-glare coatings to stop this, but some aren't. Is the desk set aside for the machine big enough to take all its units and let the operator handle them easily? A second desk for the printer is often a good idea, to cut down vibration of the computer itself and leave more space for working documents next to the keyboard.

If you have thought about the ergonomic factors of your system before buying, the actual working position of the operator should present few problems. A comfortable chair at the right height, and that should be just about it.

The decision to buy a computer for a business is often taken – in fact, almost always taken – for pure business reasons. The system is intended to automate a set of business functions, provide better business information, and increase business efficiency. But unless the managing director, senior partner, or whoever is in charge means to run the machine himself or herself, that business decision involves the staff who will be operating the system to give all the new, expected benefits.

Staff can become understandably worried. The prospect of computers taking over people's jobs is by now widely recognised, and in the past employees have suffered from 'rationalisation' and 'efficiency' plans that have simply meant shedding jobs. The only way to avoid conflicts is to consult the staff, whether through unions or not, about the computerisation plans.

Once the staff are used to the idea of the computer, the main task is to work out how the system will be operated and who will do the operating.

There will certainly be problems, particularly concerning status and actual physical workloads. For instance, transferring data from a manual system to a computer is a lengthy and pretty tedious process, and if one member of the secretarial staff is appointed to do the job the rest will have to take over the operator's other work. Even when the computer is working there will be divisions between the staff members who operate it as a new job and those who don't touch the computer but still have to

keep up with existing work. The only way out of this is to keep staff informed about developments in specifying and ordering a system, make sure that work practice is sorted out before it arrives, and arrange suitable training for the prospective operators.

Many companies and practices have found it a help to farm out the actual transfer of data from index cards, say, to the computer. A temporary secretary, who does not have to have any but the most rudimentary computing skills, can do all the data entry at home and present a fully-stocked system to the office without disrupting normal work too much.

Training is best undertaken before the machine is delivered. Many larger dealers run their own training courses on the computer hardware they sell, and if the dealer you are working with is one of these there should be few problems in getting your staff to take a course. Besides the benefits to your own business, many secretarial people will jump at the chance to get some computer training, since they know as well as anyone that it could well come in useful later on.

If your dealer does not do courses, check out the local Universities, Colleges of Further Education, and other educational establishments for useful courses. These may not be so specific as the ones dealers give, but they can be useful in giving staff some 'hands-on' experience with computer systems.

The National Computing Centre, based in Manchester, can also give helpful advice on staff training.

Training courses, particularly those run by commercial organisations, can be expensive. But they are well worth it if the transition to a microcomputer is to be relatively painless. Even if you intend to operate the system yourself, and keep the rest of the staff away from it – particularly when confidential information is involved – there has to be some back-up for you. It is no use grooming one expert operator for the computer system if that person decides to leave the company. And computer operators are just as prone to illness as everyone else. It pays to invest in training to spread the expertise around the staff.

By the time the computer hardware and software arrives, you should be reasonably ready for it.

The main task immediately after installation, is to get used to the machine. You or the operating staff, or more likely both,

should take turns at sitting down at the machine and trying things out. If you intend to set up files of data, try setting up a few false ones using your software, and manipulate them in any way you like to get used to the controls and the commands you will be using. Any false data you put on can easily be erased later. It is very difficult to make any catastrophic mistakes with modern computer hardware and software. Even if you do manage to erase your program disk, or just as unlikely make the hardware 'hang-up' in some kind of state you cannot get out of – it is much better for it to happen now while you are just playing yourself in. At this stage things are easily put right, while later on it might involve the loss of vital business data.

And while we are on the subject of playing, do not look down on computer games. In practice, playing computer games is one of the easiest ways of getting used to the operation and behaviour of a system, since loading a games program and running it is just the same procedure as used for a business program. With games though there is no problem about losing important information (apart from the previous high score). There is even the advantage that the operators will get used to handling a computer keyboard, and using a computer screen. Buy a couple of games that suit your new system, and set aside some time for play.

Sometimes, if you have chosen the wrong supplier, the dealer will not offer any help with setting up the system. Since this was one of the criteria laid out for choosing a supplier earlier on, we shall not give much space to this problem. But if the supplier is estimable in every other way, and you end up with a set of boxes in the computer room or office with no-one to help out, you are in the hands of the manuals supplied with the system. With the all-in-one desktop systems, with everything in a single enclosure, the process of setting up is pretty simple and will certainly be explained in the first couple of pages of the hardware manual. With the 'bits and pieces' system like the Apple II things can be more complicated and may not be well explained – although the standard of the Apple manuals is generally high.

Computer hardware these days is generally straightforward to plug together though, provided that you have a bit of common sense. However, it will certainly save time and maybe

frustration if the dealer does all that for you as part of the support package.

Up and Working

Eventually the computer hardware will be set up in its appointed place, and the software tried out as much as possible with fake data and manipulations during the feeling-out period shortly after installation. You will then be ready for the real stuff, transferring information from a manual system to a computerised one as painlessly as possible and using the computer to handle that information.

However, switching too quickly would be a mistake while staff are still adapting to the computer and have at best only tentative trust in the new machine. What is needed is an overlap period during which the computer and the manual system work in parallel, with cross-checking between the two to make sure that the computer is doing at least as accurate a job as the previous system.

The way to go about this is simply to carry on as you were before with the manual system, which you will have to do anyway until the computer is loaded up with all the records it needs to work with. As mentioned earlier, this loading of data into the computer – generally from a duplicate set of index cards or from whatever storage medium used – can easily be done by a temporary secretary at home.

The length of time this loading process, that is the transfer of business data from paper records to computer disks, can go on is not often mentioned by salesmen or other experts in the computer industry. The time can easily extend into months, obviously depending on the amount of data involved, and during this period the manual system will obviously continue to be used.

Then when the computer and all its data are ready for use, in theory, it should not be instantly relied upon for any purpose. There are sure to be errors in the data that will only come out when the computer is used for its real job, since no information transcription process is perfect. There will be misplaced decimal points, mispelled names, wrong postcodes and street names, and records that have been missed out completely – all

very embarrassing mistakes on a system that is supposed to improve efficiency and accuracy.

So the computer and the manual system should be run together for an indefinite period, using the manual method as usual and then doing exactly the same job on the computer. There may well be discrepancies in the two results produced, and then the fault must be tracked down to the manual system itself or to the computer. With a long-standing manual system in operation it is much more likely to be the computer that is at fault, and the error in the stored data has to be corrected.

Obviously this actually *reduces* business efficiency somewhat since there is more work involved for the staff than there was before. But the workload is not much increased since the computer has a considerable speed advantage; however, tracking down and correcting discrepancies does take considerable time.

There is no way round it though, and the dual operation of two systems doing the same tasks is a very good test both of the data and the programs being used on the computer system. It is at this stage that 'bugs' in the software will turn up as well as errors in the data, and these too can be put right before the computer takes over the business tasks on its own.

As mentioned above, this parallel operation can go on for an indefinite period. The only criterion for discounting the manual system altogether and trusting the computer is that you are sure about the computer's ability to take over successfully. This is a very wishy-washy criterion, but it is easier to spot in practice than it is to explain on paper. As a general rule, the two systems should run together for a full business period – a quarter or a half-year – to make sure that every aspect of the computer system's software has been tried out for real and compared with the manual results.

The extra work involved during this period is worth it, as it saves a lot more difficult work later on. Discontinuing the manual system too early means that there is no check on the computer's operation if you come across incorrect or corrupted data on the disks, or bugs in the programs you are using. They are very difficult to put right by this time.

Once all your business data is stored on a computer system, usually on floppy magnetic disks, it is tempting to rely on it completely. After all, after a few teething troubles – and there

are always a few – your foresight in choosing hardware and software carefully has borne fruit in a system that is doing the job you need done to your satisfaction.

But there are two words in the name of the storage medium that should be a warning; 'floppy' and 'magnetic'. Floppy implies a certain flimsiness and any user of audio cassettes will know what can happen to *that* magnetic storage medium under certain conditions. Floppy magnetic disks are neither immortal nor 100% reliable, and you need to take precautions to retain any vital data stored on them. Losing a lump of your records for ever is not an attractive prospect.

Like so many things to do with microcomputers, data security – physical security that is – is largely a matter of applying common sense. Floppy disks themselves are encased in a protective envelope, and never removed from that; and the manufacturers of disks provide paper envelopes to put the disks in whenever they are not actually being used in the computer. The simple rules are that floppy disks containing data should be stored in their paper envelopes, preferably in a tough storage box. Some manufacturers of disks provide these boxes with their product. Disks should be kept away from stray magnetic fields (such as those produced by the computer's display screen or other TV sets, or by large electric motors), and away from any heat sources including direct sunlight. If you are really security minded you can buy storage cabinets and safes for your disks, which stops unauthorised use as well as protecting the disks physically.

Consider the possibility of backing-up.

Backing up is simply the process of making copies of disks containing vital data, so that if one disk is damaged or corrupted – by magnetic fields or by having coffee spilt on it – there is a spare that can itself be backed up and then used instead. The principle is that you must always have a duplicated set of data disks.

The same goes for program disks, the disks containing the programs that actually make the computer do the job, since the information stored on these is just as vital as your records. Most software suppliers either give full instructions for making copies of their program disks, or give you two copies of the disks so you have ready-made back-ups. However, some software companies

are worried about piracy since if it is easy to make copies of their program disks, the copiers could sell the copies and cheat the software firm of its just rewards. So there is now a tendency to make 'uncopyable' program disks that stop users making back-ups, although the software suppliers will give users free copies if a corrupted program disk is sent back to them.

Another use for back-up disks is if your records change frequently, for instance in a ledger where the amounts paid, owed, and invoiced are updated by the computer. We will come back to this subject under the next heading.

But a new backing-up problem is posed by the Winchester hard disk storage units now being installed, since the storage capacity of even the smallest of these is far higher than the densest floppy disk can manage. And although hard disks, like floppies, retain their stored data magnetically when the power supply to the computer is switched off, they can also be corrupted and vital data lost. So Winchester disks need to have their contents periodically copied onto some other medium for safe storage in case anything happens.

The storage capacity of hard disks is so high, however, that using floppies to back them up is a laborious task. For example, Apple's Apple III computer has an add-on Winchester unit – not a particularly capacious one by today's standards – that would take 37 Apple floppy disks to back it up. There are ways of cutting this down by backing up only the hard disk files that have been changed, but floppies are barely adequate.

Other methods include high-speed, high-capacity tapes, including one company's neat method of using an ordinary domestic video recorder for the purpose. But it will only become simple when the new removable hard disk units get cheap and common enough, when a fixed Winchester can be copied onto another Winchester in a removable cartridge that can be stored. Winchesters have considerable advantages in storage capacity and speed, but the back-up problem for data security has still to be properly solved.

Keep Working

Microcomputers are generally robust things, and rarely go wrong. The silicon chips that do the computing and storage are always the last things to crack under the strain. Microelectronics

aside the electrical and mechanical parts are by no means as reliable. It makes sense to look after the machine properly to cut down faults and 'downtime'.

First of all, dust is an enemy to both hardware and software, particularly when the latter is on floppy disks. The floppy disk units themselves are precision-made mechanical devices, and the tolerances are so small that it is easy for airborne dirt to clog them up. But the disks themselves are even worse, since the recording surface is exposed to the elements whenever the disks are not in their storage envelopes or inside the drive units.

Display screens get smeary with fingerprints, or dusty because of the static electricity they generate – look at any home TV set. Printers too can suffer from airborne dirt.

Fortunately there are simple remedies to most of these failings. A dustcover, either made to measure for the particular machine, since some companies do produce them, or improvised from an old tablecloth, can simply be draped over the system when it is not in use. And cleaning the display screen is simple too; all it requires is something like a camera lens tissue, perhaps with some anti-static cleaning fluid.

In fact, computer supplies firms such as Data Efficiency and Inmac can sell you computer cleaning kits that have suitable cloths and fluids included.

Floppy disks and their drives are a bit more difficult to handle. When a floppy disk is in the drive having information written or retrieved, the read/write head is actually in contact with the disk surface like a cassette is in contact with the tape. And as with tape, particles of magnetic material are removed from the disk surface and deposited on the head.

With tapes, the result is just fuzzy sound. With disks, the result can be corrupted data and programs, and corruption of this kind can be fatal.

Backing up disk contents to maintain a working copy has already been described, but there are ways of extending the life of disks by looking after them in use and taking some simple precautions.

The lifetime of a disk in heavy use is perhaps a year. However, that time can be considerably shortened if drive heads or disks are dirty. Once again, head-cleaning kits, just like tape head cleaners, can be bought from the computer supplies companies

and used from time to time. After a year back-up copies too should be checked.

For the disks themselves, the best protection is careful handling and storage. The exposed recording surface should never be touched; the disk should never be bent to show how floppy it is; it should always be returned to the protective envelope supplied after use; and the envelopes complete with contents should be stored in a safe place. And of course, the disks should be labelled and stored in some kind of order so that the right ones can be found again as necessary.

Storage requirements are commonsensical, and very similar to those for records. Disks should be stored upright, away from heat sources and direct sunlight, and so on. But there is one extra requirement; disks need to be protected from magnetic fields, since these can corrupt the data stored on the disks' magnetic surfaces. So disks should be stored away from magnetic field sources like electric motors and, more surprisingly, the TV set or computer monitor being used for the display. In all-in-one desktop systems the screen and the disk units are separated by magnetic shielding, but in systems where separate units are connected by cables there may well be warnings about keeping disks and disk drives away from the monitor. Check what the disk drive and monitor cases are made of; metal gives magnetic protection, but plastic does not.

The labelling of disks is simple. The floppy disk makers thoughtfully provide a set of self-adhesive labels in each box, and one of these should be stuck onto each disk as it is used. The contents of the disk should be written on the label in felt-tip pen, not ballpoint, since the label should be stuck onto the disk itself rather than the protective paper envelope, and pressure should not be applied to the disk even in its casing. Then the disks can be stored in a case, organised in any way you like.

Various manufacturers have come up with disk storage cases, usually plastic boxes with lids, locks, separators, and so on.

One final point on floppies. Disks with important data or programs should be 'write-protected', that is protected from being overwritten with new data by mistake. The labels on the disks should help, but to make sure the disk makers have provided a write-protect notch on each disk and a set of little stickers in their disk boxes that are simply stuck over the notch if

you want to protect the disk. But note that with 8in floppies the convention is generally the other way round, with an open notch meaning that the disk is protected.

All this discussion of floppy disks has neglected the care of the new Winchester hard disks that are being built into many systems these days. Frankly, there is very little that can be done. Winchester disks are sealed airtight units so that airborne dust or smoke is not a problem, and the disks themselves can not be removed from the drive so handling them is not a problem either. Winchesters are very easy to look after.

When something goes wrong with a microcomputer it is generally pretty obvious. The screen refuses to light up when you switch it on, the disk drives make unpleasant clattering noises apart from their normal grinding ones, or the printer fails to print. But the reasons for these aberrations can vary considerably. Faults might be intermittent, and only happen under certain conditions. Or, when the machine just doesn't seem to work at all, something as simple as a mains fuse or as complicated as a blown display chip can be responsible.

Microcomputers have a lot in common with other electrical equipment, in that they need a supply of power from one – or sometimes several – ordinary power sockets. So if absolutely nothing seems to happen when you switch on, the first things to check are the fuses in the plugs and the fuses in the computer's power supply. The computer's fuses are generally just as accessible as the plugs', and just as easy to diagnose and replace. There is often a small screw-in fuse fitting next to the point where the power cable enters the computer box.

If that seems all right, and an all-in-one desktop micro still seems dead, then there may be a failure in the power supply of the computer itself, the transformer inside the box. In this case there is nothing to be done but call in the engineers.

But with systems made up of separate units, generally a keyboard/computer box, disk drive or drives, and monitor, it is much easier since the fault can be pinned down to one unit. Each unit will have some indication that power is getting through, usually a red light built in somewhere. If the plugs and local fuses seem all right, then you can tell the supplier or the maintenance provider that a particular unit is not working. It always helps maintenance engineers to know which particular part of a

system needs repair. Telling the engineer beforehand means faster repair, since a replacement unit or the right spares can be brought first time.

However, straight failure to work is not a common fault in microcomputers, and is certainly the quickest hardware fault to spot. The most difficult are the defects that only appear at intervals, and might at first look like mistakes by the operator. The biggest offenders here are the disk drives.

It has always been a maxim of the computer business that the mechanical parts of a system go wrong much more often than the electronic parts. Disk drives are complex mechanical assemblies, and can fail completely; but more likely there will be 'flaky' faults, things that happen at random or under certain conditions.

Fortunately, applications programs generally include error trapping routines that will put a message on the screen to tell you that something has gone wrong, and the message should also tell you what you can do to put things right or escape from the error without losing any data.

However, there are other error messages that might appear, coming from the disk operating system rather than the application program. The operating system is a program that you should never see while running an application program, since it works in the background to handle the storage and retrieval of information to and from the disks. If an operating system error message appears something catastrophic has gone wrong, perhaps with the disk hardware, and it is possible that you might lose any data that you have entered up to that point.

If you get an operating system error message, like the notorious 'BDOS Error on B:' message that the CP/M operating system can produce, it is worth calling the system supplier before trying anything else. There may be no way out, and a lot of data might be lost in the system. But there may also be an escape route that can get you out of trouble without any penalty.

Even an operating system error message does not mean that a disk drive is useless and needs repair though. The disk you are using might be worn out; the disk drive heads might be clogged; or the cable between the drive and computer might be having periodic electrical fits. However, if the error message – from the

applications program or the operating system – happens at frequent intervals with different disks and different operations, then the drive probably needs repair.

This kind of elimination procedure, narrowing the fault down to a particular part of a system, might seem like a burden to the user. But it helps in the long run, by speeding testing and repair by the engineer.

Apart from the power supply and the disk drives, the screen and printer are the other things that can go wrong in easily spotted ways. A printer seeming to work well but printing gibberish generally indicates a fault in the cable or interface between the computer and the printer itself. Strange characters suddenly appearing on the screen, combined perhaps with a locked keyboard where nothing seems to work, are often a signal that there is electrical interference on the mains lead to the computer. The other things that can go wrong with the screen, like wobbling, zigzag lines, picture rolling, and so on are obvious faults just as they would be on a domestic TV set, and the monitor circuitry is to blame just as the TV hardware would be.

There are few if any hardware faults beyond these that the average user can be expected to find and identify. Expert attention is needed for say aberrations in the electronic chip within the machine.

Software faults, or 'bugs' are much more subtle and can cause much more trouble. Computer folklore maintains that there is no program on the market without at least one bug in it, and some top-selling off-the-shelf programs have several widely-known faults in them.

The trouble is that software faults are not acts of God or metal fatigue, but oversights by the programmers. And since programmers try very hard and work for a long time on getting bugs out of their programs, the faults are hidden and will only occur under rare circumstances or combinations of circumstances. Which is not much comfort if you are unlucky enough to come across one.

If it seems obvious that the fault is in the software rather than the hardware, using the hardware criteria above, then the best thing to do is write down the circumstances under which the alleged bug occurred, and then send the information to the software supplier. There is nothing software sellers like better than

to have a bug pointed out to them, since they can then put it right, send out information on the bug to its users, and cut down the number of complaining telephone calls.

Software bugs come in so many different forms that it is impossible to give any hard and fast rules for detecting them. However if the program you are running does something unexpected, like leaving an irrelevant message on the screen, ignoring a command it should accept, or seeming to misunderstand a command altogether, then a bug is most likely to blame.

The software supplier should then undertake to correct the bugs and send you a corrected copy of the program, or should give detailed instructions so that users can correct or evade the bugs themselves.

Fault spotting does indeed impose some burdens on the user. But as we have said, microcomputers today do not go wrong that often. When they do it is much better if possible to call in an engineer saying "I think the printer interface is faulty" than saying "my computer isn't working".

Getting Support

Inevitably, sooner or later and for better or worse, something will go wrong with a microcomputer's hardware or software that requires urgent and instant attention. This is where the maintenance clause of the sales contract, or the separate maintenance contract signed at purchasing time, comes into play.

The level of support, and the time you might have to wait before getting it, will be laid out in the contract and should have been checked out before signing, as explained elsewhere. But how do you go about calling in that support?

The first step is a simple telephone call to the supplier, if the supplier carries out its own maintenance, or to the maintenance company if the supplier has set up a third-party service organisation. Give clear details of the hardware and software you have, what has happened, and what you think is wrong if you have any idea.

In many cases, particularly in the early days, that one phone call will be enough. The early troubles that users get into are often caused not by faults in the equipment or software but by sheer inexperience, and suppliers have seen most of these alleged faults before. It may be embarrassing to keep ringing

with what turn out to be trivial problems, but you are paying for support so make the most of it and do not be shy.

Some maintenance agreements do not involve visits by engineers to the user's site, but require the system to be returned to the supplier's workshop for service. Others stipulate that an engineer will be around within 24 hours of the first call, and even braver ones promise a response time of six hours.

There can be some complications though, depending on the details of the contract and the working methods of the supplier or maintenance firm. For instance, some companies insist on the workshop treatment, while others tend to carry a lot of spare system modules and just send the engineer round with the right spares to get the machine working on site and then take the module in for repair at leisure.

One process takes much longer than the other, and you can be left without computing power for an indefinite time if the first method is followed. This is why there are often sections of the deal saying that the supplier will provide the user with a new, identical system to run until his own is back in working order.

The biggest problems happen when there is no maintenance agreement, the supplier does not do repairs and has no third-party maintenance to provide, and the only recourse is to a local office of the manufacturer – if there is one, since most micro makers are small and pretty far from the UK – or to go to a company which advertises the fact that it will repair your particular brand of system.

In this case there is no guarantee at all of fast response or of keeping the computer part of your business going while the breakdown is put right. If you weren't convinced already of the necessity of a decent maintenance contract, be convinced now, for repairs of anything.

Expanding the System

The most carefully chosen computer system eventually – or sooner – fails to match up to the demands imposed upon it. It may be that the program you want to run does not fit in the amount of memory you have in the computer. Or that the data files you need to store take up a lot of floppy disk space and take hours to sort through and find what you need.

In cases such as these expansion is needed.

Expanding a computer has nothing to do with making it physically bigger, but involves adding extra hardware or software to let the machine do more work or do the same work more efficiently. Expansion capability was one of our selection criteria earlier, so the system installed should have the design and space for extra hardware bits and pieces.

The first feature computer users tend to find deficient is *memory*, the storage space provided by chips on the computer's circuit board. Manufacturers provide various ways of getting round this; one is to provide empty chip sockets in the right places, so that the user (or supplier, if the user does not feel competent) can just plug in extra inexpensive memory chips to produce an instant increase in space. Another memory expansion method is to connect extra circuit boards with memory installed, to the existing computer board, thereby getting more storage space. Different machines have different scope for expansion, usually measured by the number of board 'slots' provided to plug things into.

For example, the Apple IIe has eight spare slots for extra boards, the IBM Personal has five, and the Sirius 1 also has five.

With most of the common micros on the market, the amount of main memory you can add is limited to a maximum of 64k bytes and special techniques are need to get beyond that amount of space. But these days, different microprocessors have been developed that considerably extend the memory space available. For example, the processor used in the IBM Personal Computer, the Sirius 1, and the DEC Rainbow can have up to one megabyte of RAM – that is, space for over a million characters – compared with the 65,000 or so characters maximum of the earlier systems. The current record, with the Motorola 68000 microprocessor, is well over 16 million characters of RAM space.

Not that the average user is likely to need anything like that, but some applications do run faster and more happily in larger memory spaces. With these systems, a single board can hold up to 250,000+ extra locations and can simply be plugged into one of the blank slots provided.

In general, expanding main memory is easy as the computer is designed to make it easy by providing extra sockets for more memory chips or extra slots for more memory boards.

Increasing the disk space available also depends on the system design. Disk drives need a set of circuits called a disk controller, and this is either built into the computer board or built into the disk drive itself. It might seem irrelevant where the controller is, but it does govern disk expansion. If the controller is on the computer board or inside the computer box, it will have been designed to handle a certain number of drives with a certain capacity each. On the other hand, a controller in a disk drive can be tailored to handle the disk unit it is connected to, and produce standard signals that the computer can understand. In this way, every disk drive produces signals in the same format, and as long as the manufacturers come up with the bigger drives and the appropriate controllers, expansion is done just by plugging the new drive or drives into the computer's disk input/output socket.

Increasing disk space in computer systems with built-in controller is governed by the controller design, and may require extra hardware to change the controller. This might also have to be done – at a price – by the computer supplier.

These rules do not apply to floppies only. Winchester hard disks, with their enormous capacities and speed, need completely different controllers and once again could require hardware changes to use if the computer manufacturer decided not to build a Winchester controller into the design.

Expanding printing facilities, adding a letter-quality printer as well as a fast dot matrix type for instance, depends on the input/output sockets provided in the system. If there is just one, and the printer interfaces are the same, then you could switch from one printer to another by unplugging one cable and replacing it with another, but this can get laborious. However, many computers provide more than one port that can be used for extra printers, communications with other computers, or extra terminals. If the interfaces are correct, extra units can be plugged in and the user can choose which information goes to which port.

In the end, whatever the system and its design, the expansion capacity will run out as business grows or the work the computer has to do extends beyond its capabilities. Then a choice has to be made about how to proceed.

The most obvious, if painful, thing to do would be to discard

the existing system in favour of a bigger and more powerful one. The trouble is the software. Particularly in the micro business, software written for one micro will not generally run on another without modification. That modification is often extensive and expensive as well.

It is true that in some companies' ranges of microcomputers there is some standardisation across different machines – an example is the Commodore line, from the Vic 20 up to the 8096 business system, which uses the same dialect of Basic throughout. But there is no real equivalent to the minicomputer and mainframe lines of companies like DEC and IBM, where a program written on one machine will run without modification on any other machine in the range. For instance, programs written for the Apple IIe will not easily run on the bigger Apple III, and even programs written on the older Apple II are not guaranteed to run on the upgraded IIe.

Micros may not offer mainframe standards of compatibility through a company's range, but they do have other advantages. For a start they are so cheap that increased computer power can be added simply by buying another micro identical to the one you already have. Then any programs you have written for the first will run on the second, and if two are not enough you can buy a couple more and still be under the base price of a minicomputer.

But one thing that spoils the scene is the fact that each of the individual micros you buy is not connected to the others, and needs its own local disk storage and printer. You can get away with one printer, but that means lugging it around the building when another micro needs it.

The answer the micro industry has come up with is networking, where a number of micros are linked together and share a central set of disk and printer resources. Any micro in the network can send information to any other, access data on the disk drives at the central resource point, and print information on the printer at a central point.

There are various types of network, called things like trees and rings, but the main criteria for all of them are the transmission speed of the network cable, the number of micros, disk units, printers and so on that can be connected to them, and the

price of putting the network part of the system together. All of these need consideration.

Micro networks are really the alternative to 'multi-user' computers, where a number of terminals (screen and keyboard) share a central computer processor, memory, disk storage, and printing facilities. Until recently this was the preserve of minicomputers and up, but now the more powerful micros are often multi-user. The drawback here is that everything that any user does has to go through a single microprocessor, which acts as a processing bottleneck. The more users, the longer it takes to get any work out of the system.

Networks seem to be the way to go, since microprocessors and memory chips are so cheap that it makes sense to give each user a computer and just share the expensive bits like big Winchester disks. So do not throw away that first micro in order to buy a bigger multi-user machine that might not run your programs. Network it instead.

INTRODUCING COMPUTERS FOR ACCOUNTANTS

The work of accountants has been the major target for automation ever since computers were first introduced into commercial organisations. The microcomputer revolution has reinforced this dominance, bringing a vast new range of accountancy work within the scope of computerisation. The 1982 *Computer Users' Year Book* devotes just over a quarter of its contents to accountancy applications. 1,060 of its 4,026 products are designed for payrolls, asset accounting, ledgers, financial planning and virtually all the other aspects of the accountants' work, both in the practising office and in business.

Practising accountants have in the past shunned computers, either out of fear and ignorance of computer technology, as with so many other potential users, or out of a mistaken belief that their work was so special that no computer program could possibly cope with it. The second objection was valid to some extent until a few years ago. But in the last five years a number of firms have emerged specialising in computer systems for practising accountants. The systems are well-tried, often having been developed by accountants themselves, and there is now no excuse for the overwhelming majority of accountancy practices not to use computers in their work.

Accountants in industry and commerce on the other hand have never been as shy of automation as their practising colleagues. Computers were a natural development from the mechanical and electro-mechanical accounting machines which took over from handwritten ledgers in major companies long before electronic devices became available.

Despite this greater familiarity, computers are hardly more popular with accountants in industry and commerce than with anybody else outside the ranks of data processing professionals. The common use of computers since the mid 1960s for applications such as invoicing, payroll and ledgers demonstrates their

eminent suitability for such jobs rather than any particular enthusiasm for computers on the part of most users.

There can be few accountants who have never used the computer as an excuse for bills not being paid, management information not being available or correct, or the pedantic insistence on detailed procedures. And most accountants will also have been on the receiving end of that familiar cry: 'I'm sorry, it's the computer's fault'.

But the accounts department in large companies has to handle large volumes of purchase and sales invoices, salaries and wages, budgets and monthly reports. It has to monitor large numbers of suppliers, customers and employees, make payments when due and try to make sure debtors do the same. All the resulting information has to be recorded and verified, and presented in correct and understandable form to company management and shareholders, not to mention the Customs and Excise, Inland Revenue and auditors.

It is the ability to handle massive volumes of data quickly and accurately (despite all the excuses) which makes computers so special and which has made them ideal tools for accountants in industry and commerce. The power of micros to do now what the large, cumbersome machines of the 1960s could do then enables that special attribute to be applied to small businesses and accountancy practices. And it can make a remarkable difference to the way in which accountants in larger companies can use computers.

INDUSTRY & COMMERCE

Industrial users have suffered computerisation as a necessary evil rather than enjoying it as a potential liberating force which is not only capable of removing much arithmetical drudgery but also of providing new insights into company finances and operations and improving the accountants' contribution to the management of the enterprise.

Data processing professionals usually get the blame for this sad state of affairs. They are credited with obsessive jealousy about 'their' machine, coupled with an all-encompassing ignorance about the operations of the company which is matched only by their lack of interest in what users really want,

and above all in an inability to complete any new project in anything less than 18 months.

There is usually a significant element of truth in all these allegations, but accountants themselves have not been blameless. Ignorance in particular has generally been as great on the part of the accountants, who have often wanted to know less about the computer than the DP people were willing to tell them. And too many accountants have been happy to settle for automation of existing work rather than face the more difficult task of entering entirely new areas. Financial planning in particular has continued to be a precise, useful but inflexible operation in many companies, as management accountants have struggled bravely with pencil and rubber and reams of analysis paper to reflect the changing plans of operational managers.

Micros bring the opportunity of opening the computer room door and letting the power of computing out into the hands of users where it can be most effectively applied.

This does not mean the demise of data processing professionals, although it probably does mean a diminution of their corporate power. Large computers are not entirely in the same class as dinosaurs. They are still valuable tools for accounting and other applications, and will remain so. But how they are to be used in future should be determined much more by accountants and other users than by the 'experts' themselves. The job of the latter will be restricted more to overall guidance and detailed control of operations, as users are increasingly able to develop their own programs and operate their own systems.

Such developments depend partly on senior accountants understanding more about computers – a process which will come about naturally as younger members of the profession who have always worked with computers and have been trained in their use eventually reach senior positions. But the growth of user power and influence has been encouraged by the availability of cheap and reliable micros with packaged software which is easy to use by accountants and their staff.

Micros alone will never be able to handle the masses of information which have to be dealt with in large companies. At least, not as efficiently as larger computers. But sophisticated communications technology now enables micros to be linked to more powerful machines, as well as to other micros. Account-

ants can then bring down centrally-stored data and manipulate it on their own micros, which is particularly useful for planning or special reporting exercises.

Modern financial modelling packages are also now able to handle many of the budgeting and reporting operations previously carried out by some decentralised groups using expensive timesharing networks, or batteries of harassed clerks. Even where the micro packages themselves are not sufficient to handle all the work, it is possible to install systems which will do some of the work on a micro leaving the subsequent tasks to be done on larger machines, using the micros' output.

Experience has shown that more effective systems are produced when accounting and data processing expertise mesh than when the two sides have to fight through a fog created by their ignorance of each other's disciplines. Where there is a good understanding of each other's skills and attitudes, users are more likely to adopt a positive approach to computing and to be more satisfied with the resulting systems.

Micros inevitably allow this meshing of expertise to take place more easily. The user is inevitably much more closely involved in the system development and operation, and in some cases is totally responsible. The result should be better financial and management information – which after all is the object of the exercise.

SMALL BUSINESSES

The same applies equally to smaller businesses. In fact for many small businesses the object of introducing a micro is not so much *better* financial and management information as to produce such information at all on a routine basis.

An enormous amount of attention has been paid to small businesses over the past decade as successive governments have striven to support and build this sector of the economy. Local and central government have virtually thrown money at anybody setting up or running a small company. Special property developments have been built, tax schemes introduced, and even ministers appointed.

But for many existing small businesses it is the micro revolution which could be of most help. Such companies could often avoid financial headaches by a minimum of planning and by

sensible bookkeeping. Now this would not save the company whose products are out of date, unreliable or simply unwanted. But many small businesses have perfectly adequate products and sell more than enough to keep afloat. Their problems lie in not being able or willing to keep track of money or to plan their financial requirements in even the broadest detail.

It is vital for the expanding small company to have tight control over its finances. And if overdraft or other facilities are likely to be needed from the local bank or other financial institutions it is essential that such requirements are seen sufficiently in advance to assess them properly. Bank managers are unlikely to be impressed by desperate appeals for help at the last minute, as suppliers refuse to deliver and customers demand products. But they are likely to be impressed by even the most sketchy plans which indicate either a temporary overdraft requirement a few months in advance or a need for permanent capital.

Such plans cannot be drawn up with any kind of conviction unless there is some initial information on which to work. Annual accounts which are probably several months, if not years, out of date will be of little use. Quite apart from that, the extra finance may not even be needed if closer control over cash can be achieved. Primarily this means for most small businesses chasing debtors. Most customers will be honest and will not try to avoid payment. Some may even pay on time to take advantage of discounts. But many will also have chaotic accounting systems and only know bills are due when final demands arrive. Some will perhaps be in financial trouble themselves and will not be able to pay everyone. The lucky suppliers will be those who ask first, most frequently or most forcefully.

Many small businesses survive all these traumas without micro-based accounting systems. Entrepreneurs do the books in their spare time, or use relatives to do them at home in the evenings or on a part-time basis. Bookkeepers might be employed to keep the basic records which enable the accountant to cobble together some statutory accounts at the year end. But few such businesses deem it worthwhile to have accountants provide routine financial information. Few follow up the basic records with proper debt collection routines, and few use any information available to develop even rudimentary financial plans.

Micro systems can not only help do much of this work, they

are likely to force some of it on even the most reluctant businessman.

Systems which are designed to handle the routine sales bookkeeping normally produce as an automatic by-product aged lists of debtors. Virtually at the press of a button they will also churn out the nasty letters to be despatched to those clients who are overdue.

Analysis of sales, often in several different ways, is another computer-generated product which can help the hard-pressed owner understand the business better. Few owners would be prepared to admit that they might have anything other than a perfect understanding of their businesses. However, there is nothing like hard figures to prove them wrong. One recent large order easily displaces many smaller ones in the human memory, while the computer memory clearly shows that nevertheless it is the smaller orders that add up to more business or perhaps that the single large order carries little profit margin.

This kind of ancillary information can make a micro system a vital aid for the small business, even though the cost is unlikely to be less than for the manual systems which are replaced. Accounting can be transformed from a seemingly useless chore which has to be done to keep the VAT inspectors happy and to comply with Companies Act requirements, into a positive exercise which, though it may never be enjoyable for many business owners, is nevertheless decidedly useful to them.

IN PRACTICE

The less-than-enthusiastic attitude towards accounts and accountancy held by many small businesses must be blamed on the small accountancy practices with which they come into contact.

Often worse than the stuffy and reactionary caricatures of the profession, accountants in many small practices have been happy to carry on their practices in much the same way as their fathers did before them. With a captive market of small companies needing annual audited accounts to comply with the law, and too few accountants to go round, let alone create competition, such practices have largely been able to ignore the needs of small businesses for regular financial information. The advent of micros which can help provide this sort of information, and help them run their practices more efficiently, has of course passed such accountants by.

These are, though, exceptions to the general rule. A growing number of small practitioners, many trained in large firms which have been less blinkered where computers are concerned, have appreciated the potential benefits these systems can bring. Some have abandoned traditional practice altogether to set up firms providing management accounting services, usually using computers on a bureau basis. Others have begun by computerising their own practices and gone on to provide management accounting services to clients, and routine bookkeeping services on a bureau basis, in addition to their traditional services.

These enlightened members of the profession have discovered that practice administration is as suitable for computerisation as is sales ledger accounting, and that they too can improve their cash flow by tightening up on their own accounting routines. They have also discovered that monthly or quarterly management accounts which can be produced with little more effort than the annual accounts can help their clients run their businesses better.

DRAWBACKS

Many of these computer-orientated small practitioners have even found that they actually enjoy using micros in their work, as indeed have many accountants in industry and commerce. But changing over to micros is seldom painless, and for all their advantages there are inevitably drawbacks as well.

As the first part of this book made abundantly plain the process of choosing hardware and software, then buying, installing and running it, is far from simple. It is almost certain to take much longer than anticipated, cost possibly twice as much as the buyer originally estimated and only produce what was originally intended after a good deal of anguish. Of course there are installations which go like a dream, but they are about as common as self-made millionaires.

Cost is of course the first problem for small practices and small businesses, although it is unlikely to be an important factor for larger organisations. The £5,000 which will buy a decent micro system with several software packages will fit into most managers' budgets without too much trouble. But this is

still a lot of money for a small company or practice. While a micro can be obtained for much less than this (a full system can be bought for half the price) it is likely to be of little practical use for any but the smallest business or practice.

Comparing this price with the cost of the owner's or partner's car – a sales ploy not unknown in this market – is unlikely to carry much weight. What matters is the cost of the alternative to buying the micro. And in both cases that cost is likely to be difficult, if not impossible, to quantify. Where a small business's books are done at no cost by a relative, for example, the cost of the micro appears to be wholly additional to existing expenditure. The costs of *not* computerising though will tend to be hidden in the unknown level of bad or slow debtors, or the confusion of the existing accounting systems.

Even so, many organisations have opted for a micro solution and many more will follow suit. But many buyers will assume that the micro can take over without too much difficulty, and above all without too much effort. The worse the tangle of the existing accounting system, the less true this will be.

The first objective for any organisation setting about computerisation then is to put existing manual systems in order – a task which will normally fall to the accountant. This is often difficult enough in businesses (or indeed practices) which have developed haphazard systems over many years which often rely on the extensive experience of just a few people. But that is at least a task with which accountants will be familiar.

The next step will lead into unfamiliar territory, namely the setting up of organisational systems to work with the computer. Microcomputer systems are increasingly easy to use, and difficult to abuse, although some machines, and some software packages, have idiosyncrasies which will take more than a little getting used to. But the ease of data entry, the speed of calculation and the apparent dependability of micro systems can be deceptive. Computerisation should be synonymous with formality and accountants setting up micro systems must pay considerable attention to the manual procedures which must surround the computer system to ensure the greatest possible security, accuracy and efficiency.

Data cannot be entered haphazardly, either because a good software package will not allow it, or because the results will be

gobbledegook, or both. Data entry can be done in moments snatched between shipping an urgent order and arguing with suppliers, but the myriad informalities of manual systems cannot be transferred to a computer. Notes cannot be scribbled against entries as they can on a handwritten ledger, unless the program specifically allows comments. Errors cannot simply be rubbed out and corrected – or at least that should not be possible. And a highly informal pricing structure which relies on old friendships and long-forgotten deals probably cannot be transferred to a master product file at all. Finally and most frustrating of all for many accountants, a computer file, while most meticulous and much easier to store, cannot be flipped through as can a manual file. The accountant cannot just turn the pages to look for a particular account or entry.

The only procedure is to adhere strictly to formal systems for data entry, for recording operations as they are carried out, for controlling access to key files and authorising amendments to policy items such as discounts or payment terms. Batch totalling and verifying entries is essential, and should be part of a ledger system.

The smaller the system, and the smaller the organisation, the more difficult it will probably be to establish and maintain such formal procedures. If there is only one operator, that person is likely to be able to cope more easily without these procedures than if there are several users, perhaps in different offices. At the same time it is more important that there be formal procedures so that other people can use the system when necessary, and that one operator does not become the only one fully to understand it.

Multi-user systems have their own problems, beyond this question of logging work done and controlling operations. Technical attributes of both the machines and the software become very important when several machines are linked together.

The less powerful the machines, the more difficult it will be to operate two or more concurrently, either on the same or on different jobs. Moreover the cost of the system begins to climb steeply as terminals are added – not mainly because of the cost of the terminals themselves but because the central processing capability must be more powerful, and the controlling software

more sophisticated, to cope with several terminals, and perhaps several jobs, running simultaneously.

However it does not take a very large business or practice to need more than one terminal. Especially in practising offices the aim will be to have the terminals in use for much of the working day, rather than simply being available for enquiries. A practice may be using the computer system for the whole set of practice applications – accounts preparation, word processing, internal accounting and reporting. Since these are closely related and use much common information it may make sense for all but the smallest practices to have them on one integrated system rather than all operating independently.

These requirements will push the starting cost of computerising up to £10,000 for a small business, and perhaps £20,000 for a practice. This compares with a minimum cost for a single user system based on floppy disks of about £4,000.

But this is still a small price to pay for an accounting system which makes a business or practice grossly more efficient, or enables an accountant to spend more time examining and analysing information instead of just preparing it. A micro can be a cheap introduction to computing for any accountant but can still make a dramatic difference to the long term performance of the organisation which buys it.

This part of the book describes how the various accounting and administration systems work, working through the set up stages to operation. The three sections concentrate on the practising office, the small business office, and other applications which are applicable both to these and to larger businesses as well. Each application for each type of organisation is described separately, although many will be used together in integrated systems. The main features of package systems are described with comments on which are most important, and which are superficial or unnecessary luxuries.

The packages described here should be of great benefit to many organisations. Considerable effort will be needed to implement any of the systems, but the rewards can be substantial. For accountants, simply removing the chore of adding up, balancing columns and rows and ensuring double entry are worth a good deal both in time and money. But the real benefits will occur if using the systems described here actually makes a

difference to the running of the operations, as most of them should do.

COMPUTERS IN THE PRACTISING OFFICE

INTRODUCTION

Despite the popular image of accountants with quill pens ticking clients' ledgers and reluctantly appending the mystical audit certificate to annual accounts, many practices have long been using some form of mechanisation. For most this has gone beyond mechanical calculators, but few have progressed from electro-mechanical accounting machines. A survey in 1981 by the English Institute of Chartered Accountants discovered that half the small firms investigated used either a computer bureau or some form of in-house equipment for some aspect of their work.

Nevertheless few firms use computing for their professional work. Word processing in particular has so far made little impact on the professional office, despite the fact that it offers several ideal application areas. Firms which have computerised have generally stuck to practice management applications such as time recording.

Yet adequate specialist software has been available since the mid-1970s and several fairly major software houses have been aiming at the accountancy market for the last five years. They are gradually breaking down the profession's natural caution as accountants see that micros with good software can dramatically increase practice profitability and enable a better service to clients. Promises of vastly improved productivity are of course two-a-penny in the computer business, and too often prove groundless. But accountant users of micro systems claim anything up to 50 per cent time savings on accounts production work.

Such savings are not to be dismissed lightly, and if they can be supplemented by bringing existing bureau work on time records and billing into the office, justifying computer systems on cost

grounds is unlikely to be very difficult even for the most efficient practice.

Of course there are firms which should not consider computerising. Small tax practices, for example, would probably find that the few tax packages available were suitable for only a small proportion of their work.

But for the average firm which concentrates on accounts preparation and financial advice, there are plenty of packages and micros around to help run the practice better. Bureaux are also available if the user refuses to get involved in computing in the office, or if the amount of work of a particular type is insufficient to warrant in-house computing.

Bureaux offer some of the advantages of computing without the problems of actually operating the machines. If the firm and all its staff have no experience of computers, beginning by putting some work out to a bureau can be a relatively gentle introduction. But bureaux offer only a relatively clumsy computer solution for most work in accountancy practices. Working with bureaux is always likely to be frustrating because of the rigid operating schedules which have to be applied. Data has to be supplied when agreed, and output can only be delivered at specified times. Correcting errors can take as long as the original job.

It is now possible to have a terminal in the office, linked to a bureau, but once a firm has gone this far, it may as well go all the way and acquire its own machine.

The alternative of ignoring computers altogether and relying entirely on clerical staff becomes less and less practical, regardless of the specific advantages of micros. The kind of clerk needed to carry out the tedious and meticulous groundwork in a practising office is increasingly difficult to find in most parts of the country.

The result is that basic work on clients' accounts is often sloppy or simply wrong. Managers or partners then have to spend expensive time correcting mistakes or bringing the work up to standard rather than simply reviewing it, making accounting instead of arithmetical adjustments and having sufficient time to discuss problems properly with the client.

Another major problem with poor groundwork in the office is the resulting chaotic paperwork. Clear documentation is vital to

an efficient accountant's office, especially for dealing with the Inland Revenue. Clear audit trails must be preserved so that figures in final accounts can be traced clearly and quickly back to source documents. And of course books must be in a suitable condition to satisfy VAT inspectors.

None of this is guaranteed by any computer system, indeed the mountains of printout which can be produced offer even greater potential for confusion than manual systems. But good systems insist on certain routines being followed, do not allow corners to be cut, and have already been approved for VAT purposes. A poorly organised office can still produce considerable confusion with a micro system, but with a little effort in the right direction a good system can make it easier for well-organised accountants to do better work more efficiently.

Small practices are also likely to find themselves increasingly on the receiving end of micros in their clients' offices. Apart from being asked to advise on client computerisation these developments will pose audit problems and may require special computer audit techniques. There is little chance of the auditors adopting constructive and intelligent attitudes to clients' micros, and the audit of them, if they are not familiar with the workings of computer systems.

If a firm is persuaded of the advantages of computers, partners face a particularly difficult choice. The work of the practice is all closely inter-related, with word processing being applicable to the usual letter printing jobs as well as producing final accounts and annual reports, basic client data being common to all applications from incomplete records to billing, and time recording being intrinsic to the fees system. Additionally, many clients are usually 'live' at any one time, especially so around the popular year-ends of 31 December and 31 March.

Consequently a single micro can cause considerable frustration, since clearly only one client's work and only one kind of job can be processed at once. Micros with floppy disks will also be fairly slow in processing the large volumes of data which are often encountered, and a considerable amount of floppy disk handling will be required. If each type of job is quite separate, there will also be substantial amounts of input of the same or similar information, which could be avoided with an integrated system.

But integration almost certainly means higher capital costs. It also means that the firm will not be able to learn gradually. It is a high risk/high return strategy. For the more cautious firm, especially one with no experience of computing, a piecemeal approach offers a much safer introduction. Mistakes are bound to be made, and it is much better if they are made when manual systems are still operating for most applications. In the long run the cost of the first micro with a system for, say, time recording may have to be written off to training. But if the period spent learning with that system saves mistakes and money when a fully integrated system is introduced, it will be a worthwhile investment.

The alternative approach to integration taken by some suppliers, such as Computer Services Midland who supply the leading systems for Commodore machines, is to use one floppy disk per client. This is a highly practical approach for small numbers of clients. Only one client's data is needed at any one time, so all clients do not need to be stored on the same disk. But at a cost of around £3 per disc there is a break even point of around 400 clients above which the cost of a hard disc system becomes competitive.

Judging the capacity requirements of a system is the most difficult job for the potential user. The first requirement is to know fairly accurately the numbers of clients and transactions which will be computerised, allowing a healthy margin on top of existing figures for expansion as well as error and omission. Then the best solution is to take these figures to various potential suppliers and discover the system requirements each of them recommends. Estimates can also be obtained, although less accurately, by consulting similar firms which have already computerised.

Integrated systems using hard disk are much more attractive than the more mundane floppy disk systems, but practices should consider carefully whether they need the extra sophistication and flexibility – and whether it is worth paying for. Integration is less important than in commercial ledger systems, since the links between the various systems are not as strong, and in some practices an application such as billing may not merit computerisation.

Many firms find that once they have computerised their own

practices and are handling clients' accounts on a computer, many other computerised services for clients are possible, and indeed are sometimes demanded by clients, sometimes before the firm is really ready to branch out. But accountancy firms can provide a good accountancy bureau service to clients, for routine ledger work. They obviously know precisely what the client needs from applications such as sales and purchase ledgers, and the information is already familiar to them. In many cases it will merely be an extension of providing monthly accounts.

This section looks at each application in the practising office, and looks at them separately. This is not necessarily the way many practices will computerise but whether an integrated or piecemeal approach is adopted the descriptions of each application are still valid, as are the features which are most important. Where it has been necessary distinctions are drawn between operating with integrated systems and with the individual system on its own. Accounting services such as sales ledger offered by a firm are not covered in this section. The applications will clearly be just the same as if the system was run in the client's company, so the chapters in the next section are relevant to this type of application, although there will clearly be additional organisational issues for the practice to face.

The following case study illustrates how one small firm went about computerising. The lessons it learned will be valid for many others, even though this firm opted for a significant investment in powerful minicomputers.

The firm, which we shall call High Street & Co, was young but growing fast. Its two founding members were still the only partners, both having left a large practice to set up on their own. Each had three managers reporting to him, with a total of over 30 staff in the firm.

A wide variety of businesses was represented in the client base. The firm was based in a racing town and many of its original clients were connected with the bloodstock business. Others ranged from sole traders to small but growing limited companies, some in manufacturing but most merely trading.

High Street & Co had grown to its present size in just 10 years, and had recently opened a second office in a neighbouring town. The partners were understandably pleased with their

progress and believed it was largely due to their personal energy and attitudes. Both were youngish men with no-nonsense attitudes and had little time for the accounting establishment or tradition. Neither had worked closely with computers nor did they have particularly high opinions of them.

The initial impetus for computerisation came largely from two of the managers. The partners themselves remained sceptical in the early days, finally yielding and becoming reluctant converts, while understanding that in ten years time no accounting practice would be without a computer and it would be better to start early.

A company was set up separate from the practice to act as the firm's computer arm, and the two enthusiastic managers deputed to find the right system.

Nine months later they had spent 700 chargeable hours (charged to the company) evaluating all the systems they could find against a 39-point checklist. They began with the idea that a floppy-disk system costing perhaps as much as £10,000 would suit each office, but ended up recommending the purchase of two separate minicomputer systems at a total cost of £65,000. The final bill was £73,000 when it was decided to invest in a better printer and more storage. The total cost of their time implementing the system was £30,000.

Implementation was fairly chaotic, partly because the firm's manual systems were in a mess and partly because they were overtaken by events, and partly because the partners would not let the two managers concentrate purely on the computerisation. They were still expected to do most of their normal work as well.

Virtually all the firm's work was to be computerised. The original plan envisaged both offices computerising more or less at the same time, on the same projects. Accounts preparation was to be tackled after the time and fees ledger had been set up, even though it was the money-earning part of the system. Then it was envisaged that ledger services for clients would be started. The machines were to arrive shortly after the firm's year end, so it made sense to set up the internal systems then, with work in progress figures for clients already available from the manual year end details.

Setting up the initial client details and the work in progress

for each client, would it was thought be fairly straightforward. Partly because of that, and partly because one manager was diverted from the project for urgent client work, they began entering the data willy-nilly. The consultant advising the firm was horrified to discover there were no control totals and no checking of the input forms had been done to ensure the data would be correct.

Other problems arose beyond High Street & Co's control. They suffered a series of hardware faults, all of which were minor but even so these held them up for at least half a day at a time. These faults emphasised firstly the importance of having a good maintenance service from the supplier and secondly the necessity of keeping a very detailed log of operations so that when the machine went down they knew exactly what had been processed and which work had to be input again.

Next, one of their major clients took over another company and needed to introduce very quickly a computer system for stock control and sales ledgers. This was precisely the kind of opportunity High Street & Co wanted to happen – eventually – but the request came too soon, interrupting their carefully planned implementation schedule, which was in any case slipping badly.

The next stage of the implementation was accounts preparation. This too was not without its problems. The aim was to set up a series of standard formats for final accounts and directors' reports which would meet the requirements of the vast majority of their clients. New clients' accounts could then easily be set up, and setting up the existing clients on computer for the first time would require only adapting a standard format rather than each being a standard format starting from scratch.

However, setting up these standards took much longer than anticipated because mistakes were made both in the approach initially adopted and in the detailed work. Again, managers were expected to carry on with their normal duties as well as supervising computerisation.

Work at one of the offices was also interrupted because another client needed a computerised payroll service quickly, and wanted to use the firm's sales ledger service on a bureau basis. In theory this was all grist to the mill, but in reality it complicated the firm's own computerisation programme.

Not to put too fine a point on it, it was a highly trying time all round for partners, managers and staff, as well as the computer suppliers.

When the new computer system was operating effectively the partners were not sorry they had been persuaded to go for computers. But the firm could have helped itself in a number of ways by bearing in mind a few basic rules:

* Commitment from the top is essential. Both partners in this case were lukewarm throughout the changeover period.
* people with day-to-day responsibility for implementation should be taken off normal duties for the period necessary to set up the system.
* the firm did not realise how bad its manual systems were, nor how much work had to be done to set up the master files.
* too much time was spent on detailed evaluation of systems which were obviously inadequate from a superficial examination.

But with all the systems working the firm now has a powerful system which is easily expandable and which adds to the services it can offer clients as well as improving its own efficiency and management information.

INCOMPLETE RECORDS

AIM AND PURPOSE

The aim of incomplete records systems is to smooth the process of transforming that familiar cardboard box full of cheque stubs, bank statements, invoice copies and receipts into a presentable set of accounts.

For a single client the requirement can be met with one of the vast number of nominal ledger accounts packages available. Indeed some accountants use such packages for incomplete records work. Such packages process the basic information and produce the accounts which accountants want for their clients. But there are significant differences between the needs of a practising office doing incomplete records work, and a small business preparing its own accounts. The inputs and the outputs are the same, but the accountant is doing the books of many more than one client, and so needs different features.

The major requirement is flexibility. Any firm will probably have several different types of client. Major categories will be sole traders, partnerships and limited companies. But within those groups there might well be further classifications depending on the nature of the businesses concerned. A shopkeeper, for example, will probably require a different final accounts layout to a builder. They will certainly require different information if monthly or quarterly accounts are to be prepared, the builder having few stock items and massive work in progress, while the shopkeeper has no manufacturing but diverse stocks. Similarly a manufacturing company will have different accounts requirements to a trading company, and one with several departments or divisions will be different again to a single unit company.

The incomplete records package should allow enough flexibility for the firm to cope easily with the major categories, and enable it to fit in the oddball clients without too much difficulty.

A few standard final accounts formats will satisfy the first requirement, and the ability to set up additional layouts at will should deal with the second.

Ideally, the standard formats should be adjustable in small ways, such as underlining, so that the computer-produced accounts are as close to the firm's, and the client's, liking as possible. Appearances may not be all, but they are remarkably important when transferring to a computerised system. Some clients may be impressed by computer-printed schedules, others may feel it is a sign of the firm having too much spare cash and treat this as an excuse to argue for a reduction in fees!

Even within the firm, partners may be extremely fussy about the appearance of final accounts sent to clients. They will be used to getting accounts in precisely the format they want, because the typist has strict instructions to do them that way. It may not be possible to instruct the computer quite as flexibly as a typist, but if output is significantly different from what is wanted, it may inhibit the whole implementation because of the partner's disillusionment.

The problem of final accounts presentation can be eased if the output from the incomplete records system can be passed over to a word processing system for final amendment. This facility is not available on most micro systems, however, and it does have its drawbacks. Any amendment should be severely restricted, since if any figures are changed there is obviously a danger that the final accounts will end up wrong even though the version coming from the incomplete records package was correct.

Flexibility of final accounts format affects the ease of set-up of new clients' data, as well as the ease with which partners can approve the final accounts. And if anything is more important than a partner's wishes it is time spent in the office on non-chargeable work. An ordinary nominal ledger system is unlikely to be particularly good for setting-up a new set of accounts. That is because most companies only set up their 'chart of accounts' once or twice, although they may make amendments frequently. So an ordinary nominal ledger system does not need to be especially good at this particular job.

When an accountancy practice computerises its incomplete records work, an awful lot of setting up has to be done in a very short time. Assuming the practice is going to expand (if it is not

there is probably little need for the micro in the first place!) there will be a steady stream of new clients to be set up throughout the year. So it is important that setting up the chart of accounts is quick and relatively easy.

Speed of operation is also important, of course. And extras such as running totals for the bank and cash balances can help identify errors on input, saving valuable time later. Other input checks are also important. Considerable use will be made of journals, for example, and the system should not allow journals which do not balance. On the other hand it is useful to be able to carry a journal over more than one screen, so long as the balance check still applies when the journal is finally closed. Double entry does not prevent all errors, of course, especially posting to wrong accounts. This can be reduced, if not eliminated, by the system not allowing postings to be made to non-existent accounts, although the corollary of this is that all accounts to be used must be set up before posting begins.

For computerisation to be fully effective, routine statements such as VAT reports should be produced automatically by the system without any additional inputs. Full listings of all transactions should also be available, so that postings can be traced.

INPUTS

Setting up a new system is a big job, and this must be recognised in advance if it is to be accomplished without too much trouble. Time must be set aside for it, temporary staff recruited if necessary, and allowance made for the almost inevitable disruption.

There are three basic sets of information which will define a client's accounts and enable transactions to be input, processed and printed in the appropriate form. These are the client details, reports formats, and chart of accounts. Different systems will require the input in different ways and, as already discussed, allow different levels of flexibility. But whatever flexibility there is will be determined by the range of entries permitted in these basic inputs.

Apart from the client's name, address, and the number which computers inevitably require as an impersonal addition to manual systems, basic client details may also include reference information such as the type of client, trade group classification and whether tax or VAT forms have to be completed. These will

signal the system to select the relevant accounts formats and possibly prompt the user for certain information or actions as well. Internal firm information may also be required as part of these records, such as which partner is responsible for the client, and what level of partner involvement is required where clients can be classified as straightforward or difficult.

The system will also require details to define the form of reports which are to be produced for the client. This may be part of the basic client information or may be handled as a completely separate record. The amount of detail here will depend entirely on the extent of flexibility in the system. If only one form of report is possible for each category of client, then the category number on the basic client data will obviously be all the definition that is required. The more flexible the system, the more detail is needed to define the client's reports.

As a minimum the user should be able to define headings, purely descriptive lines and presentational matters such as underlining. It will normally also be necessary to indicate whether comparatives are required, or indeed available. Sophisticated systems will also allow users to define the detailed layout of reports. Sub totals may be required for some clients but not others, for example, and different amounts of detail printed, depending on whether the accounts are actually to be used by the client or simply produced for statutory purposes. Ideally the user will be able to define which account numbers should be aggregated to which lines on the profit and loss account and balance sheet, and ensure small matters such as a bank overdraft appearing as a liability while a balance is shown as an asset. Such matters are easily taken for granted by accountants, but they are not present in some computer systems.

This set-up information will not all be immediately available from a manual system and will have to be prepared specially, prior to computerisation.

In a manual system it is not necessary to formalise such requirements. A typist can simply be told to copy the layout of the previous year's accounts with the new figures which have been scribbled alongside those of last year. In effect the computer system will do the same, more precisely and much quicker, but only once it has been told – very precisely – what last year's format is. Accountants new to computers may well

find it difficult to be sufficiently rigorous about this stage of implementation, despite the rigour which is routinely applied to their professional work. Specifying in great detail what normally comes naturally is not easy and is not part of accountants' training or general experience. It is though important to get the basic information correct if considerable annoyance, and valuable time spent correcting earlier mistakes, are to be avoided. The fewer standard formats the firm can get away with the better, since once the format is perfected it can easily be applied to new clients, or indeed to additional clients in the set-up phase.

The third set of basic information is much closer to the accountant's knowledge and experience. The chart of accounts already exists for all clients, and is easily constructed for new ones, even though few accountants in this country would normally use the term 'chart of accounts'. It defines which accounts apply to a particular client, what type of accounts they are and how they are to be transmitted to the profit and loss account and balance sheet. For example a salaries account will be an expense account which appears in the expense part of the profit and loss account. The exact line of the profit and loss account will have to be specified where there are alternatives, or where various totals and sub-totals are allowed. Salaries might appear as part of a 'salaries, wages and labour costs' line, for example, or completely on its own, or as part of a line encompassing all overheads.

Once again the amount of detail which has to be entered to define the chart of accounts depends on the flexibility of the system. The more levels of reporting available, the greater the number of connections between accounts which have to be defined. Again, a firm can reduce the amount of detailed set-up work by relying on a few standard charts of accounts which can be applied to the majority of clients.

Once the basic data has been entered draft reports should be produced to check that the presentation has been correctly specified. Any errors must be corrected by amending the relevant specification. Opening balances and comparative figures can then be entered, where relevant, and a draft trial balance produced. This must also be checked and amendments made where necessary. Finally a dummy set of accounts should

be produced from data which has already been processed manually. The computer output must be meticulously compared with the manual version to ensure that if there are any discrepancies they are due to deliberate changes, or to errors in the manually prepared accounts!

RUNNING THE SYSTEM

Running the system should be relatively easy if the basic information defining the client and the relevant form of reports have been entered properly. However, it is not just a matter of entering the amounts and letting the computer do the rest.

Just as in a manual system the basic records deposited with the receptionist by a disorganised client may be in no fit state to be used as they are. At the very least bank statements and cheque stubs will need coding with account numbers. Basic preparatory work will also have to be carried out, such as bank reconciliations. Investigation of certain amounts may also be necessary before the appropriate code can be added. Journals will still have to be prepared for accruals and prepayments, stocks and adjustments.

Input checks may be included in the system, and these should help reduce input errors, or allow them to be corrected before the input is processed. The system will normally display the name of an account once the account number is entered, as an elementary check, but this is usually of little value since experienced operators will not normally examine the screen between entering the account number and the amount. More useful is a warning when an invalid account is entered (preferably with an audible 'beep'), when the operator will not normally be allowed to proceed, and automatic checks to ensure journals balance, or running totals to allow the operator to check the balance when entering transactions from a bank statement.

Further checks might include 'hash' totals on input forms, for example a total of all account numbers which must be input and which is automatically checked against the total of account numbers entered. Some systems also examine voucher numbers and warn if a sequence is broken, and query a date which appears inconsistent.

Errors can still be made despite these safeguards. It is important therefore that key account balances can be examined

and draft accounts can be produced for examination before the trial balance is printed and further adjustments then made if necessary before the accounts are run off. Final adjustments journals can then be processed, the accounts printed and closed off. VAT and tax schedules should also be produced automatically at this stage.

Ideally the system should allow automatic reversal of closing reserves and carry forward of balances. Some systems require new journals to be input to achieve these tasks.

Full details of postings and listings of nominal ledger accounts should be produced automatically as part of the close-down process. It is particularly important with floppy disk systems which do not retain transaction details for more than one period that these printouts cannot be suppressed. If printed details are not retained the audit trail will be destroyed and the transactions may have to be entered again. It is obviously vital that such printouts should be carefully stored for future reference.

This is just one aspect of the care which must be applied to the manual side of computerised systems. The firm must set up strict procedures for handling documents from the time the clients' records enter the office to the time the accounts are mailed out. Operators should keep detailed logs of their work, partly to guard against confusion in the event of machine breakdown but partly because many systems do not provide foolproof journal numbering and description facilities. Without careful records of what has been posted where, confusion might easily arise when trying to untangle postings using only the printed journal detail reports.

KEYPOINTS

Flexibility is vital

word processing link is useful, but can be dangerous

input details must be carefully prepared –

client details – how much scope for analysis?
reports – how easy to define and alter?
chart of accounts – how much detail is possible?

operation – data entry checks
comprehensiveness of audit trails
importance of manual procedures

ACCOUNTS PRODUCTION

Packages for accounts production in the practising office are extensions of incomplete records systems. They are designed to allow the accountant to do more than merely prepare a set of final accounts from the client's raw data, and will be advantageous for the firm which wants to provide periodic accounting information to clients. Full accounts production packages will also allow more flexibility in output than a basic incomplete records system, which is designed for a more limited purpose.

Some clients may not of course want accounts on a monthly, quarterly or even half-yearly basis. Businesses which already have their own computers will probably already produce regular accounting information themselves and thus be naturally reluctant to transfer this operation to their accountants if it is running satisfactorily. But some businesses may well have problems with their own micros, perhaps because a key employee who was responsible for the system and almost exclusively knew all about it has left the company, or because the machine was never big enough to cope with the demands placed on it. Or perhaps its main use is in production or stock control, and the monthly accounts routines are an additional burden which could well be removed, leaving the machine free to be used for its main task.

Whatever the attitude of clients to micros, accountancy firms may well find they can convince business owners of the value of periodic accounts. They will not only generate more business by doing so but will also provide clients with a service which should actually be useful to them in running their businesses. Limited companies have to produce annual accounts by law, and seem likely to have to do so for some time despite some attempts to remove this requirement for the smallest companies. Sole

traders and partnerships must also produce annual accounts for the Inland Revenue.

These requirements are a chore for businesses. They are usually of little value in helping the owners or managers to assess performance and take appropriate action to attack problems or develop opportunities. Annual accounts probably do not appear for several months after the year end, and are usually in such an abbreviated form that they tell the owner little about the sources of profit (or loss!), potential for cost savings or revenue increases, or the management of working capital.

What is needed is regular, timely, operating information. A company with several departments or product groups needs to know the performance of each of these separately, for example, even though the annual accounts are unlikely to provide such analysis, and nor do they need to. A business should already have basic information on sales and production costs, but it may not have. In any case the overall impact on its profitability and cash requirements will be difficult to assess without some routine financial information. Similarly, a company with heavy investment in stocks and significant debtor levels will need to monitor working capital movements carefully.

Monthly or quarterly accounts, if prepared carefully, can provide the business with this kind of information and allow the accountant to provide important financial advice on a regular basis. Together with a budgeting system they can help to identify quickly financial problems, to formulate evasive or corrective action and develop revised plans. In short, they can revolutionise the relationship between accountants and small business clients, making the former a financial adviser in the broadest sense rather than merely a bookkeeper and intermediary between the business and the authorities.

Not all accountants will relish such a transformation. Indeed some may reject it altogether. Some may even be incapable of coping with it. But for the younger members of the profession who have opted for practice rather than industry or commerce it may well be the only way of developing a profitable practice in the face of increasing competition from banks and other potential sources of financial advice.

Not all clients will welcome such a transformation either, although for most the prime concern will be the impact of such a

service on fee levels. Several hundred pounds for a set of statutory accounts and an official annual return is bad enough. If the provision of monthly or quarterly information doubles or trebles that figure the benefits to the small business are unlikely to be considered worthwhile.

However, the supreme advantage of using a micro in this way is that periodic accounts can be produced with relatively little more effort than can annual accounts. From the point of view of the computer system, closing off accounts at month end rather than at year end makes little difference. The procedures for opening and closing reserves are the same. The printing of trial balances, profit and loss accounts and balance sheets is the same. The main differences are in preparing tax computations and annual returns and in minor presentational matters such as prior year figures.

For the accountant there is obviously more work in entering data on an individual basis each month rather than in aggregated totals once a year. But if the job is done by coding bank statements anyway, the amount of extra entry will be small, while the year end work itself will be significantly reduced. If monthly accounts have been prepared throughout the year, the year end procedures can begin once the final month's entries have been posted. Apart from any other benefits this has the effect of spreading the work on the client's accounts throughout the year, especially useful in an office which has a large proportion of clients with the same year end. It should also mean that many problems arising from the basic data are sorted out during the year, and do not all have to be dealt with together at the year end. In an alert office many errors in clients' systems should be spotted as they crop up, again reducing problems later.

Monthly information can be entered from clients' books of prime entry with a series of journals for sales, purchases, bank, cash and wages transactions. A further journal will be required to deal with stock movements and accruals, just as for a set of annual accounts. The production of the accounts will be just the same, with examination of draft trial balances and any subsequent amendments taking place before the accounts are printed and closed for that month.

Much closer attention will need to be paid to the format of accounts possible when selecting an accounts production

package for these purposes than with incomplete records work, which is aimed primarily at statutory accounts. There is bound to be a much greater variety of presentation in clients' monthly or quarterly accounts than for their annual statements and any system must be able to cope easily with such diversity. There is little point convincing a client that monthly reports can aid the business if the reports cannot be produced in a form relevant to that business.

Control problems in the office will also multiply, with greatly increased numbers of postings, production of reports and handling of documents. With floppy disk systems, too, there will be increased storage problems. Data storage problems could occur because the system capacity is insufficient for the volumes involved, and physical storage and handling problems might also arise because of the numbers of floppy disks being used. This must be carefully considered when buying the original equipment, although it is of course possible to upgrade many micros with larger disk drives or even with hard disks.

If technical problems such as these can be avoided or overcome, the use of full accounts production facilities can be a boon both to the practising office and to its clients.

WORD PROCESSING

A good-looking set of accounts can make a remarkable difference to the reception it receives from the reader. As many a junior has discovered, scruffy presentation can easily obscure the most brilliant work, in the mind of the reader if not literally on the page. Well-printed and presented reports tend to carry more weight than those which have to be examined minutely to discover relevant information, to examine comparatives or even to understand them at all.

While printers, like everything else connected with micros, are steadily improving in terms of price, speed and quality of output there is bound to be a limit to the standard of presentation which can be achieved starting from the reports available on an accounts production package. If a word processing system can be used to generate the final reports it could well make a significant difference to the appearance of the accounts – and to the reception they receive.

It is not simply a matter of presenting the figures themselves

in a slightly better form, although if a wp package allows further manipulation of columns, sub-totals and descriptions this will obviously be an improvement. The extent of the difference, and therefore the value to be gained from using such a package, will clearly depend on the manipulation allowed within the accounts production package itself. If data has to be re-entered into the wp system this will be a further cost to the firm and will not be as attractive as a system which allows files to be 'passed over' to a word processing system.

But a wp package can help with more than just the figures or the accounts themselves. Particularly with companies' annual accounts, a considerable amount of written matter has to be included, and a wp package will be more adept at handling it than any accounts system. The directors' report and the notes to the accounts are ideal for manipulation on a wp system. Although, at first sight, each client's report and accounts might seem unique, every directors' report contains the same items and each set of accounts includes a standard set of notes, such as for example, a fixed assets schedule, because these matters are laid down in companies acts schedules and accounting standards. From a wp point of view they amount to a collection of standard paragraphs which have to have some numbers and names slotted in certain places and which may have to be 'personalised' for the particular client by entering the relevant figures and details of directors.

Jobs such as these are bread and butter to a wp system, which is built to manipulate written data just as an accounts package is built to manipulate numbers. With an integrated system the production of notes and reports will be even easier. Directors' names can be held as standard information to be repeated every year, for example, so that only their remuneration for the year has to be added. Figures such as that may well be available directly within the accounts production system, and automatically transferred to the relevant part of a schedule, but this is a further sophistication which not all systems will be capable of embodying.

If such direct entry of figures is available, further set-up procedures will be required to specify the source and destination of the figures, and other details where appropriate. The extra effort involved in this will be more than repaid by the savings in

time created by not having to enter information again at the final accounts production stage.

While wp facilities are particularly valuable for compilation of statutory accounts, they can also be useful with interim accounts work. Financial statements can mystify managers, however well they are printed and presented, and a few comments illuminating the figures are often an important addition. There is likely to be much less scope for using standard paragraphs, either for a variety of clients or even for the same clients in different periods, since the comments will vary depending on the circumstances in the period covered. But it may well be appropriate to set up standard forms (increasingly simple with wp packages) for summary reports or highlights. And in any case it will be simple to enter comments which are unique to a particular report and client if a wp package is being used. Again the cost of entering data must be carefully evaluated if an integrated system is not involved.

The wp applications outlined above are specifically related to the peculiar nature of the practising office's work. Many accountants fail to use wp to the full in other application areas, concentrating instead on its potential in accounts production. But wp can and is also applied to the normal office tasks as well. If anything there are more potential applications here because accountants have a variety of standard forms for communication with clients, banks and other organisations which are additional to the usual wp work in a small business. These are not discussed here since wp as a whole is considered later, and the routine applications in a practising office are not significantly different in principle from those in any small business.

KEYPOINTS

the value of periodic accounts

variety of presentation formats

problems of control

link to word processing

TIME AND FEES LEDGERS

Practising accountants' offices are some of the most chaotic small businesses. Because accountants tend to regard themselves as 'professionals' as opposed to 'traders' and disdain any suggestion that they should run their practice in a businesslike fashion they often disregard themselves basic rules and procedures which they would insist a client must follow. The monitoring of working capital is a prime example, with work in progress often being allowed to reach extremely high levels, which may be recognised in terms of accounts and tax matters to be dealt with, but seldom in financial terms. Part of the reason is the detail required to record time spent in professional work adequately and the extent of subsequent analysis necessary to produce regular reports for partners. Consequently in a manual system the value of work in progress is often calculated only for the firm's own annual accounts.

Management reports enabling partners to assess practice and staff performance are equally hard to come by, if not more so. Cross analysis and collation necessary to produce reports by client, by partner or by staff member responsible are usually too great to contemplate within a manual system. Such work can be done using bureaux but the usual drawbacks apply, of inflexibility in reporting and rigidity in processing procedures. Nevertheless this is a popular application for running on a bureau.

Another aspect of practice profitability faced by any small business is debtor and bad debt levels. There is little excuse for a practice not to maintain proper client ledgers and to chase up slow payers, but this often happens. The informality of manual systems can allow clients to get away with paying inadequate fees.

The level of fees is fixed each year in a negotiation which places great emphasis on the previous year's fee, and relatively

little emphasis on the amount of work actually required to carry out the work. This means that a mistaken or generous fee for a new client can easily be perpetuated for years. And extra work caused by growth of clients' business can easily fail to be reflected in the fee level.

These problems are reflected in the poor profitability of an alarming number of small practices, revealed each year in the survey of small practices carried out by the Institute of Chartered Accountants in England and Wales.

The difficulty of changing these long-established habits are considerable, especially considering the inherent problems of producing adequate information for partners using a manual system. In some cases fee levels may be too low largely because the partners are not aware how much work is done on each job.

Computers alone cannot change attitudes. But more importantly than that, if the wrong attitudes persist the success of a computerisation project may be jeopardised. At the very least, potential benefits are unlikely to be realised without positive attitudes from senior partners. At the worst, the computers may be blamed for subsequent losses.

With the right approach partners should find it easier to deal with slow-paying clients, inappropriate or inadequate fee levels, and work in progress problems. Indeed they will have to recognise these features of their business because reports available from the computer system will put them on their desks in black and white.

These aids to practice management can be produced with little extra raw data than will be available in a manual time recording system. The key to producing useful reports from such information is in the data manipulation possible using computer power, and in the structure of the reporting package.

As with the other computer applications for the practising office, client and practice details must be set up to provide the framework for the system. Once again an integrated system will reduce the work involved in entering basic data, as well as avoid the need to re-enter outputs of one system as inputs to another. Without integration a time recording system will merely total and analyse staff time sheets. Time charged will then have to be entered in a fees ledger system, which will probably also require separate client details from the other systems. A truly integrated

system will have a common data base of both client and practice information which will be applied to each system as appropriate.

But integration requires greater storage capacity, and even a small practice wanting to computerise fully for a couple of hundred clients will start to run into capacity problems and physical handling difficulties on floppy disk systems.

But most micro systems are now available with hard disks giving 15 or 20 megabytes of storage, which should be enough for several hundred clients.

Integrated or not, the systems will require the basic data to be recorded in the first place. This will define the clients' details including the types of jobs involved and the staff responsible, together with the practice details including groupings of staff and departments. As with other systems the sophistication of the package will determine the level of detail which can be handled. A time recording system should be able to cope with different types of work for the same client, for example distinguishing between accounts preparation, audit and tax work. Budgets should also be available, so that partners can see from time analyses which jobs are taking longer than anticipated.

Basic information for the fees ledger will cover charge-out rates, methods and frequency of charging and statementing and responsibility within the firm for the client and the individual jobs.

To operate the system, time sheets will have to be completed as in a manual system. It is important that the package allows expenses to be entered as well as time spent, for example entertaining or fees incurred on behalf of the client. Analysis of time spent on a job may also be required, since a total of time for each member of staff is unlikely to be much use in pacifying an angry client convinced that his accounts could not possibly have taken the length of time claimed. But the more detail required to be stored, the larger the system capacity will have to be, and consequently the more expensive it will become.

The process of entering interim payments and write-offs will be an important part of the fees ledger package, as will the procedure for deciding on billings. This is clearly the most sensitive point of the system since it has an immediate impact on cash coming into the practice. And this is where the formalisation

required by a computer system will put partners on the spot with clients who appear to be wrongly charged. With the computer system, time clocked up will appear on the client's account. If £600 has been recorded against a client whose bill is normally only £400, something is clearly wrong. Either the fee has been wrong in the past, this year's job has been particularly difficult, or somebody has been somewhat unproductive. Whatever the cause, the partner responsible will have to decide how much the client is likely to pay, and may have to authorise a write-off of the balance. The details will appear on subsequent reports and will hopefully prompt action to correct the misalignment in future.

Operating computerised time and fees ledgers will require a more formal approach throughout the practice, and while this may be a drawback from the point of view of staff flexibility it should provide benefits in terms of practice performance and will certainly be necessary if confusion and errors are to be minimised.

Strict routines will presumably already exist for handling cash coming into the office, and these will still apply to entering payments in the fees ledger. If they do not already exist these routines must be introduced for the proper completion of time sheets. This is essential not only for time to be charged properly but also for practice management reports to be valuable, and for computer usage to be properly organised. Assuming the machine is not left idle for long periods a specific time of the week should be set aside for entering time sheets, which must therefore be completed and available to the operator at that time.

Billing routines are likely to be part of a fees ledger system. Decisions on billings and write-offs should be prompted by reports on the current state of clients' accounts. These must be available for individual clients on an ad hoc basis but should also be produced routinely for all active jobs. The responsible member of staff should receive a statement of fees and expenses outstanding, together with a record of recent bills. Decisions must then be made on writing off any appropriate amounts and issuing new bills. The relevant amounts will then be entered in the fees system and the ledgers updated where necessary. At the end of a job a final bill or write-off will have to be raised, and at

this stage a new budget for next year's job may be input.

Time recording and client billing are routine aspects which will mirror existing manual or bureau-based systems. It is the spin-offs from these basic systems which should be more important from the point of view of practice management and profitability, and of more interest to partners. But the reports available to partners will depend very much on the type of packages acquired.

Any system should provide the opportunity to group clients together for reporting purposes and to produce reports on a variety of different levels and from a variety of different viewpoints. A basic distinction, for example, is between job type, staff member and client. Partners should be able to receive information on fees and time analysed on any of these bases.

Standard outputs from the time recording system will summarise staff time worked in the period. Analysed by partner, a report will show the hours billed by each member of staff, extracted from the time sheets, compared with total hours available taking into account holidays, sickness and training where appropriate. Details may be analysed by type of job or client so that particular shortfalls can be readily investigated. Totals for the period and for the year to date should be available so that any long term trends can more easily be spotted.

The most useful reports will probably be produced by the fees ledger system. These will cover work in progress and the debtor position. Partners should receive regularly – probably once a month – summarised work in progress reports on all the clients and jobs for which they are responsible. These should show the total time and expenses charged in the period and the total to date, compared to a budget total for the job or the client, or possibly a budget just for that period. Amounts written off, already billed on account, and received from the client should also be included, culminating in balances still to be billed and still outstanding from the client. Such routine reports will help a partner monitor staff performance in addition to the basic statistics on time charged. Exception reports, if available, will be a further benefit, although will probably only be available with the more sophisticated larger systems. Such facilities allow a partner to request details of all clients with more than, say, £500 outstanding on their account, or jobs with more than a certain

amount waiting to be billed, or those significantly out of line with budgets. Such exception reporting should help partners pinpoint difficulties without having to wade through reams of computer printout.

Further routine reports should be available covering payments. An aged debtors list, for example, will identify slow-paying clients and should prompt action to recover such debts. And partner profitability reports will summarise amounts billed and written off for the period and the year to date, compared to budget figures.

The extent to which these reporting facilities will be used cannot be determined by the computer system, of course. That depends entirely on the attitude adopted by the partners themselves both to the computer installation and to the management of the practice. It may also be affected by the way in which the system is run. Ease of access to information, which becomes progressively more difficult as systems get overloaded, will encourage the use of enquiry facilities. The selective use of reporting features should help avoid mountains of printout descending on partners' desks, eliminating any advantage there might have been in having the reports since they will never be read. Finally, partners must have faith in the systems and be able for example to trust a report on a client's payment position. Otherwise, as so often happens with computer systems, the partners will keep their own unofficial books hidden in their desks turning the computer system into an expensive white elephant.

Partner involvement from the start of the whole computerisation process should help avoid such problems, building a commitment to the systems, ensuring that the optimum level of reporting is achieved and that staff are properly trained to get the best out of the system. Commitment from the top should also help get the firm through the initial teething troubles which are virtually inevitable with such major changes to the way in which the practice works. The first few months of any of these systems are likely to be traumatic, especially if the practice has opted for a fully integrated system covering all applications. If confidence is lost at that stage it may not be recovered for a long time and many of the potential advantages will be lost or significantly reduced.

KEYPOINTS

the need for management information

data entry – how many types of work?
budgets
charge-out rates

operation – details of time spent
variety of billing procedures
formalisation of systems

Reporting – work in progress
performance of staff
debtor levels

partner commitment

```
MINUTEMAN - TIME RECORDS SYSTEM                    *** CLIENT'S FILE***

 FILE CODE    A1          NAME          Arthur Adams & Co Ltd
  ID CODE     ID11                       Priory Works
                          & ADDRESS      Swinton
                                         Manchester

 Brought Forward                              120.00
 Time This Period                            2497.50
 Disbursements                                  3.25
 Date last Trnsctn                           23.07.82
 Date last Bill                              27.07.82
 Amnt last Bill                              1500.00
 Billed Time                                 2000.00
 Cumulative Profit                            250.00
 Budget Figure                                650.00
 Balance Now                                  867.50

 Line-by-Line Analysis Required (Yes/No)  ?

Press 'C' For Different Client.   'STOP' to Return to Menu.
```

Clerk: Miss L Grant

File	Name	Wtype	Units	Amount
A1	Arthur Adams & Co Ltd	Unc	1	4.00
B2	Mr B Blimey	VAT	14	56.00
A37	Mr & Mrs G Arkwright	Admin	2	8.00
A21	Amersham Building Company	Paye	9	36.00
B2	Mr B Blimey	VAT	7	28.00
B2	Mr B Blimey	Paye	5	20.00
B147	Brampton & Brown Limited	Accnt	13	52.00
B2	Mr B Blimey	Paye	15	60.00
M1	Mathew & Sons	VAT	4	16.00
M1	Mathew & Sons	Accnt	2	8.00
M9	Miller & Flour Ltd	Mngmt	19	76.00
B1	Baker & Company	Accnt	12	48.00
M9	Miller & Flour Ltd	Paye	11	44.00
A21	Amersham Building Company	Admin	16	64.00
M1	Mathew & Sons	VAT	13	52.00
A21	Amersham Building Company	Unc	7	28.00

Chargeable 496.00 Unchargeable 104.00

Units: 150

Clerk: Mr D Shorofski

File	Name	Wtype	Units	Amount
M1	Mathew & Sons	Mngmt	18	63.00
M1	Mathew & Sons	Consl	12	63.00
M1	Mathew & Sons	Mngmt	2	7.00
B2	Mr B Blimey	Tax	5	35.00
B2	Mr B Blimey	Mngmt	3	10.50
B1	Baker & Company	Consl	6	31.50
A1	Arthur Adams & Co Ltd	Tax	9	63.00
A37	Mr & Mrs G Arkwright	Consl	5	26.25
B147	Brampton & Brown Ltd	Mngmt	3	10.50
A1	Arthur Adams & Co Ltd	Unc	11	38.50
A37	Mr & Mrs G Arkwright	Accnt	18	63.00
M1	Mathew & Sons	Consl	7	36.75
M1	Mathew & Sons	Unc	13	45.50
B2	Mr B Blimey	Consl	5	26.25
B1	Baker & Co	Tax	4	28.00
A37	Mr & Mrs G Arkwright	Accnt	12	42.00
A1	Arthur Adams & Co Ltd	Admin	6	21.00
M1	Mathew & Sons	Accnt	11	38.50

Chargeable 544.25 Unchargeable 105.00

Units: 150

H.P. SOFTWARE W.I.P., Fees & Debtors Program Manual.

WORK-IN-PROGRESS REPORT

CLIENT NAME	PARTNER TIME	MANAGER TIME	STAFF TIME	DISB.	TOTAL	FEES ON ACCOUNT	NET W.I.P.	FEES THIS PERIOD	%AGE RECOVERY	DEBTOR BALANCE
ALPHABET SOUP LTD.	245	50	876	101	1272	250	1022			345.00
J.H. PROUDMAN	46									
P.G. SANDERSON	16									
ALPHABET SOUP LTD.	307	50	876	101	1334	250	1084			345.00
FEE ON A/C ONLY								950		1092.50
CASH RECEIVED										-45.00
ALPHABET SOUP LTD.	307	50	876	101	1334	1200	134			1392.50
ARBUTHNOT STORES	10	300	95	0	405	0	405			
R.W. PRIEST	120									
ARBUTHNOT STORES	130	300	95	0	525	0	525			
ALFRED CAKES	100	0	0	0	100	0	100			
D.R. ANDERS		58								
FINAL FEE								175	104	201.25
ALFRED CAKES	0	0	0	0	0	0	0			201.25
ARNOLD D.E.	10	36	198	23	267	100	167			115.00
BURROWS S.C.	30	45	0	35	110	0	110			
BARTHOLEMEW S.C.	100	346	1898	215	2559	1000	1559			1150.00
J.H. PROUDMAN	24									
BARTHOLEMEW S.C.	124	346	1898	215	2583	1000	1583			1150.00
CREDIT NOTE								-250		-287.50
BARTHOLEMEW S.C.	124	346	1898	215	2583	1000	1583			962.50
CARROL'S CEILINGS LTD.	20	34	246	0	300	0	300			
P.G. SANDERSON	290									
D.J. FRANKS			98							
R.W. PRIEST	104									
CARROL'S CEILINGS LTD.	414	34	344	0	792	0	792			
CARTER B.U.	25	0	380	0	405	0	405			
R.W. PRIEST	16									
CARTER B.U.	41	0	380	0	421	0	421			
DANIEL FLOORS	0	0	50	0	50	0	50			805.50
J.H. PROUDMAN	243									
DISBURSEMENTS				13						
MNGR. ADJMTS.		-40								
DANIEL FLOORS	243	-40	50	13	266	0	266			805.50

COMPUTERS IN SMALL BUSINESSES

INTRODUCTION

Not every small business needs a micro, despite the claims of those trying to sell the machines, and the programs to go with them. £5,000 is about the minimum needed for a business machine, with software and peripherals. This still goes some way to employing somebody to do the job or jobs being considered for computerisation. On top of this sum, a business owner with no experience of computing and no access to free advice will be lucky to avoid hefty bills for advice and training, or considerable problems with the computer project.

It is easy to forget that a clerk works more or less for the 35 hours a week specified in the contract. The computer, on the other hand, works for as long as somebody sits at the keyboard and presses buttons. Apart from when it is printing, somebody has to be sat pressing buttons, and that somebody will have to be paid for the total time they are employed. If the computer can do the job in half the time it took the clerk, then it, and the operator, will be idle for the other half unless additional applications can be found. The machine can of course by left to get on with a long print job such as an invoice run, but even then it is dangerous to leave it completely unattended for long runs.

This is not an attempt to deter the eager accountant wanting to bring the micro revolution to small business clients, so much as a warning to tread carefully. A micro introduced into a business which does not really need it is in nobody's interest. Natural enthusiasm for the capacities and benefits of the ubiquitous machines has been known to get the better of many a hard-headed accountant, and this tendency must be guarded against.

On the one per cent rule commonly used in data processing a company would need a turnover of £500,000 before contemplating a £5,000 system. But such a simple rule is not necessarily

appropriate to micros in small businesses. A tiny business may be able to justify a micro where a larger company could not. The reason is that turnover is a poor guide to complexity. It is the numbers of customers, suppliers and stock items, and the frequency of invoicing, ordering and paying which matter when making a decision to computerise. A company with few products, selling large orders to a relatively static small number of customers and buying from the same few suppliers will be much less likely to need a computer than the business with a large and changeable number of product lines, a variety of suppliers and frequent deliveries.

The decision to computerise also rests on the present procedures adopted by the organisation. In the very small firm bookkeeping and clerical work may well be done by unpaid labour such as a relative of the owner, or by the owner personally at weekends or in what spare time can be mustered. The consequence is probably that the work is not done particularly well. Even if the person doing it is expert, the fact that it is fitted in amongst a host of other tasks means that the very minimum is done. The disorganised, incomplete records work which accountants regularly face bears witness to that. But another consequence is that any computerisation will incur completely additional costs. The costs of doing the work within the business using a micro may still be less than using a bureau, but they will be additional to the manual systems. Thus those costs will have to be justified. They can only be justified either by the additional information which will be provided, and the hard cash that might be saved, or because the business simply cannot carry on desperately sorting invoices and other records as the year end approaches, fending off anxious bank managers, VAT inspectors, accountants and the Inland Revenue.

A larger company is unlikely still to be relying on those informal or even non-existent systems. 'Small businesses' are officially those with less than 200 staff, and any company of a quarter that size must have sufficient account procedures to pay wages every week (otherwise the staff wouldn't be there!), pay suppliers fairly regularly (otherwise the staff would have nothing to work on) and collect money from customers (otherwise there would be no money to pay the staff).

The initial impetus for computerising in such a business may

well be the thought of trimming levels of costly office staff in order to keep the overheads down. However these aims are unlikely to be achieved so accountants would be well advised not to recommend computerisation on these grounds. What is more likely to happen is that costly clerical workers who understand bookkeeping and carry out their tasks meticulously are replaced by even more costly computer operators who have little or no idea about any accounting procedures and have a somewhat more relaxed attitude to their work. They will probably leave after a few years as well, rather than staying with the firm for decades. The problem is that the clerical workers who have maintained the manual system for years are a dying breed. As a result systems will have to become more formalised to cope with workers who are less knowledgeable about the business as well as about the books. And if a micro does anything it is bound to make accounting systems less casual.

That is not to suggest however that micros may be a necessary evil for small businesses but little else. Chosen carefully, and introduced thoughtfully into a small business which needs one, a micro can make a remarkable difference to the running of the enterprise as well as reducing the difficulty and perhaps the cost of producing annual accounts and other official returns. But accountants and owners must approach the purchase of their computer as they would any other item of equipment for the business. Even if the £5,000 is tax deductible it is still a lot of money to have tied up in a machine which sits around doing nothing for half the week. As was made clear in the first half of this book deciding that a micro is necessary is not easy. Finding the right combination of hardware and software is a complex and difficult task.

When it comes to buying business accounting software for micros the first requirements are, as ever, to know precisely what tasks are to be tackled, roughly in what way they are to be tackled, and very accurately, how big these jobs are in terms of computer storage. That means: how many customers, ledger accounts or stock records and how many transactions per period.

The buyer will need expert advice, which will be available from a good supplier, to determine the size of storage needed. But the advice given can only be as good as the information pro-

vided by the prospective buyer. It is far too easy to underestimate the size of existing systems, quite apart from failing to allow for future expansion. Few accountants would know how many customers or suppliers their ledgers contained, and even intelligent guesses will tend to overlook all the dormant accounts and the special separate accounts for customers with several sites or departments. The only way to arrive at an accurate figure is to count the ledger cards.

Similarly, it is difficult to estimate accurately the number of transactions per week or month, although this should be easier if consecutively numbered invoices are used. But then the buyer must make sure to take the peak month, and not an average.

Once accurate size estimates have been obtained, it is advisable to double those figures, to allow for real expansion in the number of accounts, and any apparent expansion that might be required because of the computerisation. Manual systems might cope with special routines outside of the basic ledgers, for example, which will be included in the main system once computerised.

Once the system capacities have been determined, the choice of system should focus on the software packages to be used. All the leading machines, whether from the major manufacturers such as IBM or Dec, the established micro-makers such as Apple, or the new entrants like Sirius, can run a variety of accounting packages. The choice of package should therefore come first, with the hardware choice taking a relatively low priority. There is one exception to that rule, concerning multi-user systems.

Many small businesses will want such a system, with several screens which can each be working on a different application or for example where a number of sales ledger clerks can each be working on the same application. Multi-user systems are increasingly common, but some were originally developed for single users and have since been upgraded. These will not always be as good as packages which were designed from the start for multiple users. Similarly, such systems should be run on machines built for multi-user operation.

There will still probably be a fairly wide choice once such technical considerations have been met, and once packages which will not meet the buyer's objectives have been eliminated.

There are currently a dozen or so leading accountancy package suppliers (see appendix) whose products will meet most small business needs, are widely available and run on many machines. Each has its own supporters but all are broadly comparable in what they will do, although with differences in emphasis and differences in approach.

Omicron systems, for example, have been designed primarily for the larger small business, or the subsidiary of a large company, which needs fairly extensive departmental reports and consolidations. This contrasts with many of the others, especially the more established suppliers such as Vlasak, Graffcom and Paxton, whose products were originally written as single user systems for companies which perhaps had only a single accounts clerk.

Some other packages are distinguished because they were developed for particular machines. ACT's Pulsar packages were specifically designed for the Sirius machine, for example, while Jarman and Systematics were both developed for the Apple.

Finally, some packages bear the marks of the companies for whom they were originally developed. BCL's systems, for example, are particularly suitable for distribution-oriented companies because that was the nature of the business which was the basis for the first system. Shortland's packages, on the other hand, were developed for a company with extensive international trade and can therefore handle multiple currencies easily, which is very rare for microcomputer packages.

One of these attributes might make one package particularly suitable for some potential buyers, but most ordinary companies will not require any special features and there will be little to choose, on paper, between many of the leading systems.

The deciding factors should then be the ease of use of the system, and the reports available from it.

The only way potential buyers can assess the ease of use is actually to use them. This is not the same as seeing a demonstration in the showroom or at an exhibition. Companies have been known to 'demonstrate' a system's capabilities by having a pre-prepared file which is printed out when the print routine is initiated, but which has nothing to do with the operations which have been carried out in the supposed demonstration. This is hopefully very uncommon, but even so a demonstration will

obviously be intended to highlight the system's best points and obscure its weaknesses.

A real test will involve the prospective buyer processing a batch of documents, preferably using the employee who will have to operate the system, and preferably with as many difficult documents as possible. A trial of this kind will also let the buyer know what happens when mistakes are made. The test should included deliberate errors, such as pressing the wrong keys – especially dangerous ones such as CONTROL, ESCAPE OR BREAK – pressing keys when operations are under way – especially RETURN – and generally doing as much as possible to cause a disaster.

This is the only way a (would-be) customer will discover how easy it is to recover from such inadvertent errors, as well as how easy the system is to use when the right operations are carried out.

Apart from the physical arrangement of the machine, including the presence of a numerical keypad for example, the format and intelligibility of 'menus' will be important for ease of use. Menus help guide the user through a system, indicating choices available, and moving from one to the other usually by a simple numerical choice, or by pressing the RETURN key.

The layout of screens for data entry is also important. There should be a wide variety of different screen layouts to cope with different circumstances, for example special journal vouchers for accruals and prepayments which are self-reversing, rather than requiring a new journal to be entered the following month. But the layouts themselves should also be clear and easy to use. Again, mistakes on entry will inevitably be made, and the ease of identification and correction of such errors is important.

An audible 'bleep', for example, can warn the operator of some errors, such as trying to enter data in the wrong part of the screen. Automatic checks on journals balancing are also useful, as are control total checks. Having identified an error before processing the data the operator should then be able to correct the mistake as quickly as possible.

A key issue, as in the practising office, is integration. A micro system should not simply mimic the manual systems it is replacing. It should wherever possible improve on them. One standard improvement is the ability of computer systems to use

the same data in different programs and different files, in rather the same way as a glorified version of a 'one-write' accounting system.

This is so easy for a computer that users should never have separate packages for sale, purchase and nominal ledgers and stock which do not link together if they are all to be run in the same office by the same people. Despite this, it is not uncommon for small businesses to acquire packages for each of these applications from quite different sources, and then find that an enormous amount of data input is required because the packages are not compatible, let alone integrated. With fully integrated packages totals from ledger processing will be transferred to the nominal ledger automatically within the system. There will be no need to enter a sales journal from the total of sales ledger postings, for example, and stock movements will also be automatically linked to sales and purchase ledgers.

'Automatically' here means without any further data entry in addition to the basic sales, purchase or stock entries. It does not necessarily mean at the touch of a button, however. Floppy disk systems with small capacities may be fully integrated (although claims for integration on such systems must be examined with great care) but a considerable amount of disk manoeuvring may well be required to make the integration work. With separate disks for each ledger they will probably have to be swopped about in the disk drives. But this is a small price to pay for arithmetical accuracy, double entry checks, increased speed and additional analyses which are not available with manual systems.

There is also a price to pay in money terms, since integration inevitably means more storage capacity, as with practising office systems.

Integration of the various accounting systems is much more important than is integration in the practising office. Much more data is shared between systems, and it is not possible to separate data in one system between different storage media. Practising accountants can work fairly efficiently with a disk for each client, for example, but this would not be sensible for a sales ledger system.

This does not necessarily mean that a small business will always need an integrated system, with hard disks and several

terminals. Even with an integrated system for a company having a couple of hundred customers and suppliers and a compact general ledger, floppy disks will be adequate.

Accountants should consider, however, whether all the accounting systems need to be computerised. Just because it makes sense to put the sales ledger on a micro, for example, it does not necessarily follow that the purchase ledger should also be on computer. If the company only has a very few suppliers and buys a small range of standard products there will be little advantage. The greater the complexity of purchases the more advantage there will be from computerised analysis and direct posting to the general ledger. Similarly, the greater the number of suppliers the greater the benefit from computerised operation of the purchase ledger, as well as the link to general ledger.

A different type of company, which buys many products from a variety of supplies, might identify a need for computerised purchase ledger and stock control systems. But if the company sells to only a few large customers the benefits of computerising the sales ledger are unlikely to be significant.

Even where sales, purchases and stock control are to be computerised there is an alternative to an integrated system, which might be appropriate for a company which had quite separate operations for each of these functions, and which did not need a computerised general ledger. Each system could then be run independently, operated by the warehouse, sales and buying departments, for example.

This small business section describes how the various payroll, stock control and ledger systems work from the accountant's point of view and illustrates the benefits to be obtained in terms of analyses and routine reporting. It also looks at the importance of the major features which are found in most packages.

Packages for general accounting applications in any business are discussed. But potential computer users should consider whether there are any suitable packages designed specifically for their industry.

Industry-specific packages exist for businesses ranging from forestry through clothing, hotels, and printing to transport. Such packages are designed to cope with the particular administrative and organisational problems of the specific industry. They are not normally designed around the

accounting system, but usually include accounting routines and produce accounting information. Unless the applications envisaged are purely accounting, an industry-specific package might be more suitable than a general package.

The following case study illustrates how and why one smallish business got into computing.

The company, which we will call Machine Toolers Ltd, was a family business which had been set up in the late 1960s to import a variety of machine tools. By the end of the 1970s it was expanding fast and the strain was beginning to show on its accounting systems, if not its owners.

Collecting debts was the most conspicuous problem identified by the company accountant. It was not so much a matter of people deliberately not paying on time as the company not getting the invoices out on time. And, as interest rates soared, the cost of that extra month's credit was a powerful argument for computerisation.

The company had been using a one-write system which did cut down the amount of work to be done. But it still meant a lot of writing and the accountant became convinced that automation was necessary. He found that invoices were not getting to customers until after the 20th of the month – a key date after which most customers left payment for another month.

The accountant anticipated that a microcomputer ledger system would enable him to produce invoices more quickly and help chase up slow payers. He also realised that it would produce more comprehensive analyses of transactions than he was able to manage with the manual system.

But having decided he needed a computer, he wasn't sure how to find the right one. As part of his search he went to a seminar organised by the local Chamber of Commerce, where several micro systems were demonstrated.

He decided right away that he liked the Apple II and went away to find some software for it, which he did after investigating various dealers in the area. His key criterion was price, but he was also influenced by the modular concept of the package he eventually plumped for. He bought sales, purchase and stock modules to run as an integrated system, with the aim of adding order processing and general ledger once the company was operating the first ones successfully.

This took about eight months, much longer than the accountant's initial expectation of three to four months. The difference was largely because he had underestimated the staff training required, and its impact in an already-busy office. It takes time to break the vicious circle of not having time to implement the systems which will save time!

Machine Toolers' total investment for the machine, with hard disk, and the three software modules, plus some external consultancy advice, amounted to £10,000. The system had to cope with 400 to 500 sales invoices a month and 200 different stock items.

The company, and the accountant, were pretty happy with their computerisation, even though it took a lot longer than anticipated. They were clearly fairly safe in deciding to use an Apple machine, which is well proven technically and for which there are many software packages available. But choosing the machine first breaks one of the golden rules. If the choice is for one of the less popular models this can narrow down the choice of software, which is what determines whether the system will do what is required.

The accountant was also sensible not to try too much at once. Indeed he might have been better just buying the sales ledger system, which clearly had the highest priority, and moving on only when the staff had become familiar with that system, and the machine.

But in the end, Machine Toolers improved their cash flow and had more information about their business – all for £10,000.

LEDGERS

Ledger packages usually come as part of a set 'module' although an individual package can be bought on its own. A full set of modules will include purchase, sales and nominal ledgers, stock control, and order processing. Other modules may also be available either for specific industry applications (such as hotels or estate agents) or for less common work such as management information and word processing.

If it is intended to buy more than one application package then it is advisable to acquire the packages from the same supplier, in the form of modules. This will mean that there is a better chance that all the packages are written in a similar fashion, have common menu styles and input routines and that they are more likely to be properly integrated. It is not necessary to buy all the modules at the same time. They can be bought separately, allowing each one to be implemented and brought to full performance before the next application is tackled.

If only one application is being computerised, or if there is to be no connection between applications nor any common operators, then clearly it does not matter whether a package is part of a modular set or not. Indeed there might be some cost saving by buying an individual package. In the rest of this section each application is described separately, with additional comments relevant to integrated modular systems.

WHO NEEDS THEM?

Computerised ledger systems should offer the user as a minimum all the information which is readily available under the old manual system, and make it available at least as readily as in the manual system. This basic requirement is often forgotten in the rush for all the extras which computerised systems should

also provide – in particular the routine statistical analyses and reports which small businesses normally never produce.

The trouble often is that accountants are so familiar with basic accounting systems that they take for granted important features such as being able to pick up a ledger card, take it to a desk, work with it then return it to the relevant tray. These are all automatically part of a manual system but would be omitted by many accountants specifying what they want from a computer system. Similarly, having a collection of ledger cards available for a client, going back a couple of years, is a natural part of such a system. But maintaining a client's transactions for that long, and in full detail, on a floppy disc system is out of the question. So the accountant has to examine just what will be available, and what is really necessary to run the business, and the accounts office, properly.

Accountants are normally the first to object to anyone spending money on anything which does not have an immediately apparent and easily-costed benefit. But when it comes to computers even they are frequently sold on the idea that the cost can be justified by the 'extra information' which will be available. Perhaps that is not so surprising given that accountants are in the information business and would have no jobs without the need for it. But any accountant should be careful about justifying a project on such nebulous grounds, even though many of the advantages of computerised systems for small businesses lie in the extra information, and in that information being produced without significant extra effort.

The moral then is clear. Make sure first that the essential accounting data will be produced properly, then assess carefully the financial value of extra information.

SETTING UP

A series of master files will be required to run the ledger systems, covering products, customers and suppliers and defining the business's ledger structure. Setting up the files properly is vital, and not as easy as it seems at first sight. And the worse the condition of the manual system being replaced, the more difficult it will be to introduce a computerised version, so if the reason for computerisation is lack of time to keep the books properly at the moment, expect problems.

In a manual system, for example, customers and suppliers probably do not have code numbers. They will be filed alphabetically in some sort of ledger system and numbers will not be necessary to find them. But some thought should be given to the coding structure used for the customer file, and indeed for all other master files too. Much will depend on how the system sorts the files and prints the reports. If some sorting is alphabetical, then it might be useful to have alphanumeric codes for customers, the first character being the first letter of the customer's name.

But beware of trying to make codes too complicated, and do too much. There will be a (fairly small) limit on the number of characters allowed in most codes, so it will probably not be possible to have separate sections defining the type of customer, geographical area, salesman responsible and everything else that might appear useful. And it is probably not necessary anyway. Four characters are enough to classify just about everything a small business might want analyse provided they are used simply as numbers. And in any case there may well be separate analysis indicators. So long as the necessary analyses can be obtained by defining the numbers which are contained in the various categories, it is not necessary to know that all numbers beginning with '10' refer to a particular salesman, product group or area. It may seem less convenient not to know a grouping immediately from a section of a code number, but code lists can easily be produced to provide quick reference where necessary and in any case most numbers will soon be recognised simply through usage.

Apart from a lack of coding many manual systems are also haphazard in the way discounts and carriage charges are applied or even in the way prices are arrived at. Informality of this kind cannot be transferred efficiently to a computer system. Entering special terms on every invoice is a waste of time. Every product must have a selling price which has to be common for all customers. Discounts, carriage terms and any other adjustments must be decided when setting up the files and there will be a limit on the number of different rates which can apply. Similarly a product must be defined before orders or deliveries can be entered for it. This discipline is often a source of complaints about computer systems which 'won't let me run the

business the way I want to'. Now if the business is to be run in a ramshackle and haphazard fashion, there is little point getting a computer to try to cope with it, especially a micro. Indeed there may well be significant benefits from forcing an owner to examine pricing and discounting policy, even if this is a painful and tortuous process.

Further problems will be encountered in the next stage of set-up, especially for the business whose records are not in good order. Existing balances have to be entered in the ledgers.

The problem here, of course, is knowing what the existing balances are, and more importantly how they are made up. A decision will have to be made on how the balances are to be entered in the computer system. If the ledgers operate on an 'open item' basis an account will hold details of all current items outstanding, once it is operating. To begin on this basis all the outstanding invoices for each customer and supplier will have to be entered.

This 'open item' approach will enable payments to be matched against specific invoices in the future. If the package does not operate on this basis then clearly the option is not available, but it will probably be important to select an open item system unless there will be relatively few outstanding invoices. Even with an open item system it may be decided not to enter all this detail on set up, particularly if there is a lot of old invoices outstanding. Purely from the data entry point of view it would entail considerable work. The alternatives would be to enter just the outstanding balances (by far the simplest approach) or to enter totals for each month outstanding. Once the system became operational any queries on these old amounts would still have to be handled using the manual system, but at least this approach avoids potentially massive data entry requirements, and makes it unnecessary to sort out all the accounts in advance of computerisation. Whether this last feature is an advantage or not will be up to the accountant to decide.

It is vital that this set-up process be closely controlled. Once completed, the balances will obviously have to be checked against those on the manual system. There are bound to be differences and it is important the number of errors are kept to a minimum, and that the differences are discovered as quickly as possible.

Errors will be likely to occur because large quantities of data are being input by staff who are still presumably new to computers altogether, as well as new to the particular system.

Control totals on batches of accounts will help to narrow down the area of possible error. As each batch is entered, control totals can be checked and any errors in that batch identified and corrected.

The same principle should be applied to the operation of the systems. One should enter data in batches, with checks on each batch, rather than allowing the operators to enter invoices or payments as they arise. Batch totals must be checked on input, and any corrections made, and the accountant should ensure that physical control of input is adequate, for example the authorisation of payments after checking against goods received, and consecutive numbering of invoices and invoice batches. Common controls such as these would normally exist in manual systems, but can sometimes be forgotten, or even ignored, when the computer system itself becomes the main concern.

SALES LEDGERS

A sales system will record invoices, credits and payments on each client's account, print invoices and statements, produce analyses of sales and debtors and print payment reminder letters. If it is linked to a sales order processing package it will also produce acknowledgements and delivery notes and report on the status of orders. If it is linked to a nominal ledger package it should automatically post period sales totals, possibly analysed by sales category, and total amounts received from debtors. It must also produce full VAT statistics.

Customer files must first be created containing all the basic details necessary to produce invoices and statements. Apart from name, address, customer contact, telephone number and the customer code within the system this information will also include discount, credit and payment terms and any special instructions relating to the client. Additional codes required for sales analyses will also have to be entered.

Product files will also be necessary if the manual entry of product details on invoices is to be avoided. These may be part of a stock control package if that is also integrated with the

system. Sufficient product details must be held on file to produce adequate information on acknowledgements, delivery notes and invoices and to enable values on relevant documents to be calculated. VAT codes are particularly important as well as any specific discount amounts or percentages relating to particular products. The product details must also contain analysis codes where appropriate, for example where there are several categories of sales.

These two master files enable documents to be produced, postings to be made and statistics prepared, from the input of customer and product codes, quantities of goods ordered, amounts received and adjustments.

Since there will be a considerable amount of input the efficiency of the entry procedures is very important. The construction of the system can make a difference to the amount of data which has to be entered and the extent of entry checks will affect the number of errors which subsequently have to be corrected. An integrated system will reduce the total number of entries across several systems, but the individual module or package can also make a difference. Even the physical layout and use of the keyboard can affect efficiency. Data entry will be much quicker where a numeric keypad can be used, for example, instead of the number keys in the top row of a typewriter layout. Since virtually all the entry in a good system will be numeric, this can be very important.

The sophistication of entry checks will also influence the overall speed of data entry. It should not be possible to enter customer codes which have not previously been set up, for example. The system should warn the operator that the code does not exist and not allow the entry to proceed. Other checks of a similar nature should be built into the system to minimise entry errors. Such errors cannot be eliminated completely, since the operator might enter a wrong code which applies to some other customer or product. But entry checks will help, as will good prompts on the screen. The value of such prompts should not be overestimated, however, since an experienced operator will rarely examine the screen at all because of complete familiarity with the system. On the other hand, the most errors will be made early in the system's life when operators are not

familiar with the screen formats, and it is then that prompts and screen checks will be most useful.

Efficiency of entry will be helped by comprehensive default information on the master files. Aspects such as VAT rates, for example, should be included on product files and displayed automatically when invoices are being entered. The operator should then be able either to accept the value displayed or to enter an override if necessary. These procedures should apply to as many variables as possible, including terms, carriage method and payment and discounts.

Entry of cash received is more complicated than raising an invoice, especially in an open item system, because there is more detail to be entered. Entry checks are therefore more important here. Apart from the customer code (which should be subject to the same automatic checks used when raising an invoice) other details of the payment must be established, such as cheque number or remittance advice number. Details of invoices being paid and discounts taken will then have to be worked out (if this is not done in advance of actual entry). The system should ensure that the total of the payment is applied, calculating an 'unapplied' balance if more than just whole invoices have been paid.

The cash application routines should be examined more closely than most aspects of the system. Potential buyers should make sure not only that the routines themselves are easily understandable, but also that the documentation is easily understood. This is the most complex aspect of a sales ledger system from the users' point of view, and is not easily explained because of the many options available when a payment is not simply for a single invoice. A package should help the operator through these complexities, and should enable the operator to check the allocation before continuing to the next customer. So it should make clear what has been done, as well as providing flexibility and ease of operation during the process.

A system should ensure that adequate facilities are available for making both debit and credit adjustments. Mistakes will be made from time to time in raising invoices and credit notes, and in entering data, and particularly when starting with a new system. Adjustment methods should be as straightforward as

possible and should ensure that all statistics are properly adjusted as well as the accounts themselves.

Once all adjustments have been made after the last postings for the period an end of period run will be required to generate the summary statistics and postings for the nominal ledger. This should also check that transaction details have been printed before such details are purged from the files and should warn the operator to take copies of files where appropriate.

Printing invoices and statements should be straightforward, and should be possible either as data is entered or at a later, more convenient time. A sophisticated system will allow special messages to be printed on invoices and statements, warning of holiday closures, for example, or urging prompt payment. This particular feature may be a luxury, but prospective computer buyers should make sure that it is possible to print specific customers' invoices or statements on their own, as well as a complete run for all of them.

A system of the kind described above will achieve all that would be expected of a manual system for a small business. The bonus with a micro package should be the additional reports which are automatically available. Aged lists of debtors is the most commonly quoted, and indeed probably the most immediately practicable. Reports can of course be prepared with a manual system, but the clerical effort involved is significant and is often not available. A micro package will produce a summarised debtors list analysed by months overdue, and should include the customer contact and 'phone number so that the report can be handed to a clerk who can use it directly for contacting the bad payers. A system which also includes a word processing module should also be capable of producing various classes of nasty letter for selected customers, again addressed to the relevant contact at the customer's business.

Other reports should also be available, analysing sales in a number of different ways. Users should be able to choose any or all of analysis by product, by sales rep, by area (if applicable) or by customer. This information could be of immense use to sales managers who have been struggling for years to maintain their own sales statistics outside the firm's accounting system, because it was either never available in the right form, or not soon enough, from the accounts office. Further facilities such as

exception reporting will be an added attraction, but will not be available with many software packages.

PURCHASE LEDGER

Naturally enough a purchase ledger system is very similar to a sales ledger. Suppliers replace customers and payments replace receipts, but just as in a manual system the requirements are much the same in terms of basic information, types of data to be entered and reports to be produced.

A system will maintain personal accounts for suppliers, handling invoices and credit notes, payments, refunds and other adjustments. It will print remittance advices where appropriate, analyse purchases by expense or product, and if linked to a nominal ledger module should post automatically to nominal ledger accounts. It must maintain and produce full VAT statistics.

Master files will be required holding supplier details necessary for correct payment and analysis. Coding should allow some analysis such as the priority for payment or the type of supplier. Normal terms available from the supplier should also be entered.

This enables one to use the system to calculate due dates of payment and discount amounts available.

Entry of invoices received should be fairly straightforward. It will be simpler than entering sales invoices because product details will not be required. But for a proper analysis of purchases the invoices must of course be coded prior to entry. The extent of possible codes here should be checked when investigating the system. If you have 20 different categories of purchase in the manual system, it will be a nuisance only to have nine potential categories in the package. The same remarks on efficiency of entry apply to purchase ledger systems as to others.

Payment of bills is likely to be the most difficult aspect of a purchase ledger system, because it may be quite different to the manual procedures. As ever with computer systems, informality must be sacrificed to some extent, although care should be taken to ensure that the package does allow sufficient flexibility for the real needs of the business. It should be possible to pay either specific invoices, parts of invoices or total amounts outstanding for any or all suppliers. It should also be possible to produce a

listing of amounts outstanding, with amounts due, before actually running the payment routine, so that decisions can be made on which suppliers to pay, and which invoices.

As far as possible payment routines should be organised so that a major run takes place once a month. Other payments may have to be made during the month but this should be avoided in order both to use the micro most efficiently, and to obviate confusion as to what has and has not been paid.

The system should give warnings if amounts are being paid which are not yet due, or if full discounts are not being taken on specific bills. But it should not prevent such a payment being made, or require tortuous methods of circumventing such warnings. A simple warning is sufficient, with the facility either to continue or to abort that payment, simply by pressing a particular key.

Reports from the purchase ledger systems are likely to be of less additional use to businesses than with the sales ledger system. Summaries of payments and analyses of purchases by expense type should be available, but the most useful report will probably be an analysis of bills outstanding with due dates. This may be helpful in planning cash requirements in the short term, especially if the business is having difficulty keeping within overdraft limits!

NOMINAL LEDGER

Unlike the previous two basic ledgers, a nominal ledger package may well be a complete addition to a small business's accounting routines. The business which relies on its owner's knowledge and awareness of what is happening, and simply hands over basic documents to the accountant once a year, will not maintain a nominal ledger. And the annual accounts it receives are unlikely to be in such detail as those produced by a ledger package, quite apart from being done only once a year several months after the year end.

The nominal ledger package will provide a business with monthly or quarterly as well as annual accounts compared with budget figures where they exist, adding some hard facts and figures to the owner's understanding of how the business has been performing. This valuable service can be provided by the accountant offering a computer bureau service or from within

the business itself. Relatively little extra input is required if the package is part of an integrated module set with sales and purchases, but some accounting expertise will be necessary to make correct end of period adjustments and produce meaningful profit statements. It should also produce full VAT analyses as a by product.

Setting up the structure of the nominal ledger will determine how flexible and useful the accounts will be. The flexibility available in the package is important, especially the number of accounts and sub-accounts available. Of course the larger the system, the more flexibility there will be, and the more costly it will be as well. Coding of accounts will normally determine how reports appear. Most packages will carry several sections or groups of accounts and these groups will be printed in a fixed manner. For example a system might have a sales group, production or direct costs, expenses, and other income or expenses in the profit and loss account, and the usual categories of current and long term assets and liabilities for the balance sheet. But within such groups there should be freedom to name whatever accounts the user wishes, up to a system limit of the number of permissible accounts in the group. There must be sufficient flexibility to allow accounts to be produced to fit the nature of the business, rather than to fit the capacity of the system or of the programmer.

As with the other ledger systems, account codes are probably not used in a manual nominal ledger system, unless the so called 'small business' is really quite large. Considerable thought will therefore need to be given not only to the coding structure but also to the individual codes themselves, to make sure that the accounts appear either as they do at present, or as they ought to do. Once this structure has been determined, it will be difficult, if not impossible to change it. Indeed a good system will prevent any major changes once postings have been made. The draft coding structure should, where possible, be tested with dummy information before the system becomes operational.

Once the accounts structure has been finalised opening balances can be entered. This will be done using a journal voucher and should be straightforward although it must be closely controlled and checked. The amount of entry will clearly be reduced if the system is set up at the beginning of a new

financial year, the main disadvantage of this approach being that there is usually a lot of other work to be done at that time! Either way, a trial balance should be produced once the opening balances have been entered and this should be carefully compared with the trial balance prepared under the manual system. Although the operation is straightforward, data can easily be posted to the wrong account, especially when a system has just come into operation, that is when operators are not familiar with either the system or the codes.

While many small businesses never prepare budgets, especially in detail, most ledger packages will have a facility for entering budget details and reporting periodic accounts with budget comparisons. The value of this facility will depend on how committed the business is to budgeting. It is clearly an attractive feature, and could prove a useful addition to most companies' reporting. But it will require budgets to be calculated in some detail, which may be beyond the resources or the enthusiasm of business owners or staff.

Assuming the enthusiasm and/or resources are available, however, the facilities for entering budgets should be an important criterion in package selection. There are wide differences in the flexibility available even amongst the leading packages.

The minimum requirement is to enter either a total for the year for each account which will automatically be broken down by accounting periods, or to enter each month's figure separately. There should be a choice of factors for breaking down the annual figure, including ideally the facility to set-up at least one user-defined table, for example defining the working days in each period.

The more options are available, the easier it will be to set up budgets. It will be useful, for example, to have a display of the current year's figures when deciding next year's budget, and to be able to define the new figures by reference to the old, for example a percentage increase on the current year. Ideally, the total for the year might be calculated on this basis, with the result broken down automatically by month, and each month then reviewed separately, with any alterations being reflected in the total.

The key to operating a nominal ledger system successfully is

good accounting control rather than good computing, assuming that you have bought an adequate package.

If the package is being used as a separate entity, data entry will be entirely through the journal system. If it is part of a modular system linked to sales and purchase ledgers, and possibly stock control, the data entry to the nominal will be largely automatic, from the end of period procedures in the other modules. Some shuffling of floppy disks will probably be required, but otherwise the journals will be needed only to enter accounting adjustments, such as correcting coding errors on expense accounts, and nontransactional items like depreciation and reserves.

Journal entries should be carefully controlled within the office, to ensure that adjustments are entered correctly and that there is full documentation for these adjustments. But the system should also help, by ensuring that all journals must balance, issuing a warning if this is not the case and preventing the operator from proceeding until a correction has been made. At the same time the system must not be so rigid as to prevent adjustments where necessary, or to make them difficult to carry out. Printouts of accounts should be available at any time to enable checks on key accounts, and it should be possible to print draft profit and loss statements and balance sheets without going through the period end routines. Any last minute amendments can then be made before finalising the accounts, just as in a manual system.

The period end routines must include full printing of transaction details, especially those which will be wiped out of memory to provide space for the new period's details. There should also be controls over journal numbering and sufficient space to define or describe the journal voucher adequately. This is partly a matter for the package, but partly the manual systems which surround it. Auditors often discover too late that a client has acquired a micro ledger system. Without proper accounting supervision of routines the year-end audit can be a nightmare, even if the system is adequate. But if the system is set up properly and the auditor is aware of it from the start, the output can provide a much better audit trail than is usually available in a small business manual system.

Used properly, and in conjunction with satisfactory manual

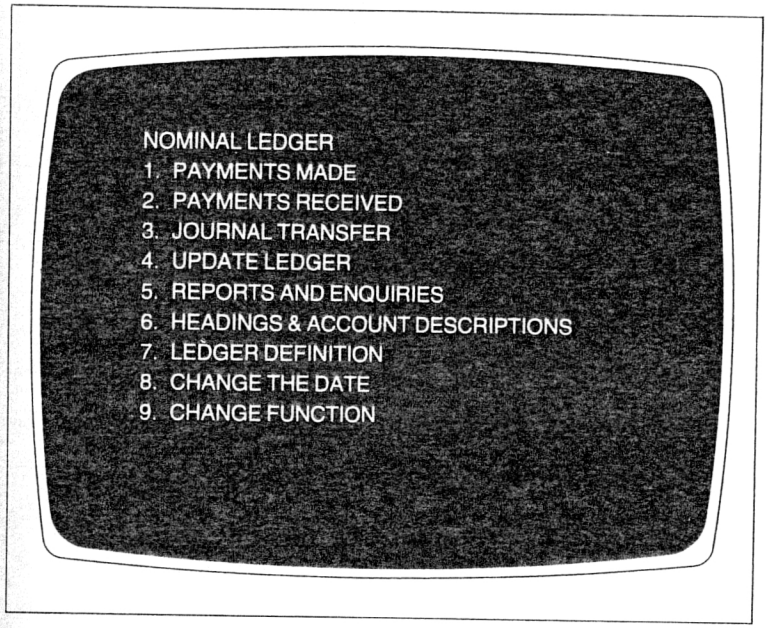
routines, a nominal ledger package can also provide the business with important periodic accounts, and will produce the year-end figures much quicker, and much more easily, than any manual system. It will remove the agonising task of taking out a trial balance and then trying to find out why it does not balance, spending hours adding up column upon column of figures and making more and more mistakes as the process drags on. The computer trial balance will not necessarily be faultless but it will balance, and if monthly accounts are produced this should ensure that any errors are narrowed down to the month in question.

KEYPOINTS

setting up – decide policy items
formalise accounts structure
clean up manual systems
classify outstanding balances

ease of use – menu simplicity
entry routines
cash application
payment routines
scope of coding
variety of options
error correction
budgets
audit trails
automatic checks

Output – variety of format
audit listings
analyses
data entry while printing



This is the initial menu which appears in the TABS system when the nominal ledger program is run. Users choose from the options, the one which is relevant to the job in hand.

A report produced under option 5 is also shown.

(Plain Listing) (Option 5.2)

This report shows a Trial Balance of the Nominal Ledger in its simplest form, i.e. plain listing of the Account numbers. Account descriptions and values only. The only total is shown at the bottom of the page.

This type of report would be generated where sub-totals for either Groups or Categories are not needed.

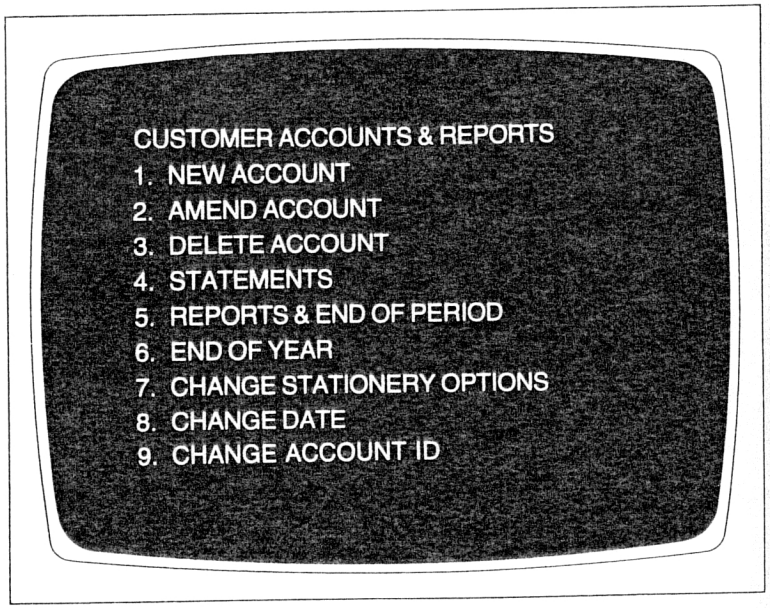
TRIAL BALANCE AUDIO VISUAL SEPTEMBER 1981 ON 25 9 81

ACCOUNT	DESCRIPTION	DEBIT	CREDIT
010101	ERROR SUSPENSE		140.51
010102	TELEVISIONS		637.00
010103	TAPE RECORDERS		1296.00
010104	RECORD PLAYERS		479.00
010106	VCR'S		1997.00
010203	TAPES		788.40
010204	POST & PACKING		4.00
010302	TELEVISIONS	1365.00	
010303	TAPE RECORDERS	880.00	
010304	RECORD PLAYERS	650.00	
010306	VCR'S	2455.00	
010403	TAPES	1827.50	
010405		169.50	
010502	INSTALLATION		202.00
010503	REPAIRS		89.00
010701	SALARIES	1405.26	
010702	TELEPHONE	245.98	
010707	EXHIBITIONS	1438.00	
010708	ADVERTISING	650.00	
010709	MARKETING	750.00	
010801	SALARIES	1465.10	
010901	DIRECTORS FEES	1237.46	
011001	OFFICE FURNITUR	1278.19	
011002	DEMO EQUIPMENT	746.30	
011003	MOTOR VEHICLES	8094.00	
011004	EQUIPMENT	1006.78	
011201	STOCK	2133.97	
011202	DEBTORS CONTROL	4548.91	
011204	BANK ACCOUNT		13878.04
011205	PETTY CASH	200.00	
011301	CREDITORS CONTR		1534.33
011303	PAYE NI CONTROL		1605.98
011304	WAGES CONTROL		2345.39
011305	VAT CONTROL	1449.70	
011401	SHARE CAPITAL		1000.00
011403	DIRECTORS LOANS		8000.00
	GRAND TOTALS	33996.65	33996.65

SALES LEDGER
1. INVOICES & CREDIT NOTES
2. RECEIPTS POSTING
3. AUDIT TRAIL
4. CUSTOMER ACCOUNTS & REPORTS
5. ACCOUNT ENQUIRIES
6. SALES CONTROLS
7. VAT ENQUIRY
8. AVAILABLE SPACE
9. CHANGE FUNCTION

This is the initial sales ledger menu which appears on the screen when the program is loaded.

The sub menu for option 4 is also shown as well as a listing produced under option 3.



This option leads to a further selection relevant to the Customer Accounts, and the reports which are generated from them.

AUDIO VISUAL LIMITED
SALES LEDGER AUDIT TRAIL ALL ENTRIES NO. 2 ON 28 2 82

ACC ID	NAME	TYPE	CODE	REF NO	GROSS	NET	VAT
GENERAL	GENERAL ACCOUNT	INV	25	19	31.33	27.25	4.08
GENERAL	GENERAL ACCOUNT	INV	90	19	2.71	2.45	0.26
GENERAL	GENERAL ACCOUNT	REC	1		34.04	34.04	
HOME	HOME RECORDING	INV	6	20	517.50	450.00	67.50
HOME	HOME RECORDING	INV	23	20	18.07	15.72	2.35
HOME	HOME RECORDING	INV	32	20	26.46	24.60	1.86
HOME	HOME RECORDING	REC	1	209081	562.00	562.00	
HOME	HOME RECORDING	ADJ CR	91	2	0.03		
PARFITT	ALAN PARFITT	INV	25	21	109.53	95.25	14.28
PARFITT	ALAN PARFITT	INV	90	21	6.24	5.75	0.49
PARFITT	ALAN PARFITT	REC	1	450912	115.77	115.77	
STUDIO	SOUNDS STUDIO	INV	3	22	316.25	275.00	41.25
STUDIO	SOUNDS STUDIO	INV	24	22	11.11	10.60	0.51
		TRANS	23	24	10.60		
VISUAL	VISUAL IMAGES LTD	INV	22	23	4.57	3.99	0.58
VISUAL	VISUAL IMAGES LTD	REC	1		4.57	4.57	

END OF AUDIT TRAIL

STOCK CONTROL

Stock control packages are in a different league to the ledger systems described in the previous chapter. They are much less important to the average small business, and are certainly less important to the accountant. Of course stock control is a vital aspect of controlling working capital and a stock control package may help with that financial objective. The benefits are more likely to be felt by stores managers and buyers than by accountants.

In any case the average small business (even using the definition of those with fewer than 200 employees) may well not have sufficient complexity to warrant a computerised stock control system unless they are in distribution. Manual systems for recording stocks of raw materials, work in progress or finished goods will only become too cumbersome when there is either a large number of items or a fast turnover. And obviously a large number of transactions will require significant storage capacities, which may make it difficult to fit an adequate system on a micro unless hard discs are used, thereby adding significantly to the cost.

From the accountant's point of view there may be some further appeal in a stock control system which is integrated with sales and purchase ledger modules since common master files may then be used and a certain amount of common input will also be possible. But accountants know enough about stock-taking problems to need some convincing that any computerised system will produce sufficiently accurate figures for the books, let alone good enough figures to run the business. Ultimately, it is unlikely that a micro-based stock control system can be justified purely on the benefits it provides in the accounts office. The advantages for buyers, sales administration

and, where appropriate, factory managers, are likely to be the deciding factors.

If a company can justify a stock control package, what will it get out of a stock control system?

At its most sophisticated, a system will not only maintain details of stock quantities and movements for each item, whether raw material or finished goods, but will warn of imminent stock-outs, report and evaluate price variations from standard, analyse usage, and calculate parts requirements from orders of assemblies or assembled products. Relationships between parts and products should be two way, so that the user can see either which parts are required for a particular product or which products include a specified part. A good system should help in identifying 'shrinkage' and may be used in retail businesses in conjunction with a point of sale system.

SETTING UP

The stock item master file, as with master files in other systems, is the essential basis on which the system is built, and the amount of detail allowed by the system in building this file will determine how much subsequent analysis will be possible. The master file for each item holds the basic physical and cost information about that item, including the inevitable code number. Comments about code structures and the importance of getting the coding right apply as much, if not more so, to a stock system as to any of the ledger systems. In a fully integrated system the code will be used to identify the raw material part in the purchase module and a finished part in the sales module. It will also control analyses of groups of products, affecting the form of stock reporting, and will determine the combination of parts which make up products and assemblies, for production planning purposes.

Unit cost and possibly selling price information will also have to be entered on the master file. While this sounds straightforward it is usually found when setting up such files that there are a surprising number of items which have no standard cost, either because they are not standard items, because they are new, or old, or simply because nobody ever got around to working out what the standard price should be. This is an irritating problem which will nevertheless be important if the

system is to produce variance reports on purchases, or margin reports on sales. A few items with missing or erroneous costs will invalidate the reports and risk destroying the credibility of the system – a major consideration especially in stock control systems. An apparently minor entry which can also cause immense problems is the unit of measure which will apply to the particular stock item. This can be particularly difficult where the business operates with many different units, and especially with small items which are counted in hundreds or thousands. It is all too easy to use a price per hundred when quantities are being entered in tens or thousands.

More difficult still is the entry of minimum stock levels and reorder quantities which will be required if the system includes forecasting options and order prompt routines warning of imminent stock-outs or new sales orders which cannot be met. This will be particularly difficult for most small businesses because they will probably not have formalised calculations covering these requirements. New parts may well be ordered when the storeman sees existing stocks are getting low. ('Existing stocks' may even be assessed by an investigatory kick of a skip lying on the warehouse floor.) The order quantity may be determined by time-honoured tradition, by the standard amount the supplier is willing to deliver, or simply by how much can be fitted into the bay. If extra orders come in, the response will be to order more frequently, even if it would be more economical to buy larger quantities less often.

Small businesses are hardly likely to indulge in operations research techniques to determine economic order quantities and frequencies, and to update these figures regularly based on recent experience of orders. This is not to say that the facilities offered by the system are useless. But they may well have only a limited amount to offer many small businesses, unless the business is prepared and able to take a much more rigorous approach to what is probably a fairly informal and low priority task.

Having established these parameters where appropriate, set up will be completed by entering the opening balances of stock items in hand. This will of course require a full stocktaking and it may therefore be decided to begin the system at the start of a new year, or at a half year if stocks are normally counted then as

well. As with other systems it is debatable whether this is a good idea. Office staff are likely to be busier at these times anyway, without the additional burden of entering what will be an enormous volume of data. Once the stock details are entered they will have to be reconciled to the physical stocktake, in value and quantity terms, and this may take some time. Then at least a month's parallel running should be anticipated. If the entry and agreement process is delayed, either because of the number of errors which are discovered, or the amount of other work, the implementation period can be lengthened unacceptably.

Such delays can sow the seeds of doubt in users' minds which will make it even more difficult to operate a system effectively. On the other hand there will never be a good time to undertake such a task, and if it is not associated with an existing stocktake an extra count will obviously have to be arranged. This too is unlikely to be popular with staff, even if it does mean overtime and extra pay.

Apart from stock on hand, if the package is part of a sales or purchase order processing system, purchase or manufacturing orders and sales orders on hand will also have to be entered so that quantities allocated to customers and quantities 'coming round' from the factory or from suppliers can be calculated at the starting date.

This is also tricky, because the business itself must carry on, with goods coming in and products being despatched, so the computerisation is chasing a moving target. The paperwork which describes orders to suppliers and from customers must continue to flow in and out of the business during the computerisation process. It cannot be stopped for long even for the sake of the computer system, unlike, for example, accounting information which can be frozen for a time while ledgers are set up. Care must therefore be taken to identify orders which pre-date the system and to distinguish between those which have been completed and those which have not but are not taken account of in the opening figures and must therefore be put through. Some help may be available from the system in checking inputs, if items dated before the start date are disallowed, but there are always likely to be strange cases which for some reason are dated in advance or otherwise do not fit into standard practice and therefore evade such checks. Careful sorting should identify

such items, otherwise they will only be discovered, if at all, during parallel running.

RUNNING

Stock data will be updated either automatically through integrated sales or purchase order systems, or directly by a stock transaction routine if such modules are not connected to the system. Even with fully integrated systems there will always be a need for direct entry to the stock system, since adjustments will be bound to arise outside of the invoice systems.

Quantity variations following a stock check will only get on the records through an adjustment transaction in the stock system itself. Goods may also be received for which there is no record of a purchase order, or be delivered when a sales order has not been recorded in the system. Control must be exercised over the use of such adjustments, however, since movements in the stock file will affect nominal ledger entries in an integrated system. In any case errors of this kind should be investigated since there has clearly been some mistake in the purchase or sales routines. Action may then have to be taken to improve controls. The corollary of this, however, is that a system should be written in such a fashion as to allow such adjustments to be made, rather than merely using information from sales or purchases. A manual system must be constructed to try to ensure that all stock movements *are* recorded, whether they are part of the main physical transactions or not. Some kind of documentation must be used, for example, to record goods sent to exhibitions, samples and test products. These movements are likely to be relatively small but will wreck the system if ignored or missed.

The way in which cost and price changes are dealt with should be examined closely, especially in a system integrated with the nominal ledger. The system must be flexible enough, and hold sufficient costs, to allow proper FIFO (first in first out) costing for stock valuation purposes, but to apply the correct cost to sales when calculating margins. It is clearly useless from an accounting point of view for the entire stock quantity to be valued at the latest cost price. Similarly, if sales ledger is integrated with a finished goods system, customers should not

be charged at the latest price if their orders were taken at earlier prices: at least not automatically!

Individual status reports should of course be available within the system, both on the screen and in printed form, for specific enquiries. Ideally exception reporting should also be provided. This may take the form of order prompts, where those products at or below the standard re-order level are printed, so that decisions may be made on ordering and orders placed. In this kind of 'turnround' operation, as with supplier payment decisions, the amount of re-entry of data necessary is important. It is unlikely that the person making the decision on re-order (or payment) will do so sitting at the micro and entering the data. Indeed this would probably be very inefficient. So a printout of possible orders will be generated, and decisions recorded on it for entry into the system. For maximum efficiency the printout should be displayed on the screen and a simple entry should be all that is required to enter the order decision.

Separate routines may be available for entering quantities received and issued and for making adjustments. The entries must have adequate referencing to source documents and it is useful to have the facility to enter comments against particular entries which will be printed on transaction records.

A record of all transactions should be an automatic and inevitable part of the stock system, just as with the ledger packages, so that a physical record of all movements can be stored for audit or other purposes. The system should not allow transactions to be purged, for example in period end routines, without printing having been done.

Various management reports should also be available, the complexity and variability of which will depend on the sophistication of the package being used. It should be possible to prepare reports on stock levels analysed according to item number, product group and supplier, possibly with sub-analyses within each major category. Stocks might be sorted by supplier, for example, but listed by product group within that category.

These reports might prove valuable aids to stock management in businesses with significant complexity and movement of stocks. But a stock system is probably the most difficult of those

considered here to operate on a micro, because of the need for a great deal of data, much of which is not part of the accounting system. Special clerical systems may be required to capture or organise data needed for the stock system.

Because of its complexity it is more desirable than ever for the user to go slowly, beginning perhaps with a simple stock records system operating on its own and perhaps only initially for certain groups of stock. Once that has been mastered it can be extended to all items and perhaps eventually integrated with the accounting systems.

The small business which tries to computerise everything from the outset is probably asking for trouble. There is nothing worse for both the business and the future of the computer itself than customers or suppliers being told – as so often seems to happen – that the computer 'got the stocks wrong'.

KEYPOINTS

setting up – codes
standard costs and prices
minimum stock levels
opening balances

operation – direct entry
error adjustments
control of stock movements
cost and price changes
stock valuation rules
referencing
management reports

PAYROLL

Computers are probably more commonly used for calculating wages and salaries than for any other small business application. This is hardly surprising given the nature of the task, and it is useful since it means there are plenty of packages available which the potential buyer can be confident of using – although that is not to say the usual caution should not be exercised in selecting a system. But there are more likely to be existing users of a payroll package whose requirements are more or less identical, than for any ledger package.

Payroll applications are so common and relatively uniform for a number of reasons. The importance of the application is one. Every business has to make sure its payroll works, consistently and accurately, if not spectacularly. It has to work for the employees, who will not be happy if the pay packet or cheque fails to turn up at the end of the week or month. And it has to work for the Inland Revenue, who must not only get paid every month but also receive the annual summaries and analyses at the end of the tax year.

The nature of the job also makes it a natural application for computers. It is closely defined in a manual system, both in the calculation of gross pay and in the deductions to arrive at net pay. The rules may not be simple but they are well established and have been so for many years. They are also rigid. The rules for calculating employees' earnings change infrequently, if at all, even though earnings rates may alter quite frequently. The rules for deductions from earnings are similarly fixed, although we are currently going through a remarkable period of change with new sick pay rules and others either implemented or in the pipeline.

Curiously these very characteristics may, however, make payroll less attractive than other accounting applications for a

small business micro system. It may make more sense for the business to use a bureau system instead. As payroll is such a common job, cheap bureau systems abound. Moreover the usual disadvantages of using bureaux for accounting work do not really apply to payroll. It is an application which has very fixed schedules and fixed requirements, which suits a bureau. Businesses are unlikely to want to run two payrolls instead of one, nor are they likely to want special reports, or reports at times which have not been specified. There is also the aspect of confidentiality, although this cuts both ways. Using a bureau may limit the handling of wage and salary information within the business, which may be thought desirable, but of course it also opens up this information to people outside the business, working in the bureau.

A further factor is reliability, which certainly ought to be greater with a bureau than with a micro in the business. While micros are increasingly sturdy there is always the chance of a hardware breakdown, and possibly more of a chance of an inexperienced or distracted operator mangling a disk. With proper back-up procedures such disasters can always be recovered, but with a payroll time is short – especially a weekly one. Customers and suppliers may not notice a week's gap while records are reconstructed, but if the micro payroll system is not working, staff will still have to be paid. Problems can of course occur at bureaux too, but here it is reasonable to expect more comprehensive back-up facilities.

Potential users will finally have to consider current problems caused by changes in government regulations on associated issues which affect payroll calculations. There have already been some minor procedural changes which affect a few companies – tax refunds for strikers, for example. But a major amendment to the sick pay scheme was implemented in April 1983 and other alterations may follow, for example further changes to the tax treatment of perks such as company cars. This introduction of new rules represents a remarkable hiccup in what has traditionally been a very stable area. Indeed, it may well cause some problems for users, and producers, of payroll packages. New buyers of packages can perhaps rest assured that any now being sold can cope with the changes which might come into effect over the next year or so – at least the changes

which have been announced. But there may be others, and the smaller packages may have difficulty assimilating them, quite apart from the problem of staff having to learn new routines and regulations. It may make sense then to let a bureau worry about keeping up to date.

But assuming a micro package is going to be used, what has to be done, and what will the system produce? Essentially just the same as a manual system, although with automatic reports and possibly with some personnel statistics as well.

SETTING UP

Setting up is likely to be easier than with any other application, because the existing records should be in a much more suitable format than the manual versions of other applications. That is not to say that the same care and attention to detail need not be shown. But much of the basic static details required for the master files will already be available on the manual records, or can readily be drawn up. Most businesses use code numbers to identify workers, for example, even on a manual system, and important details such as national insurance number, tax code and pension scheme membership are obviously all contained on workers' records, and must be up-to-date.

But the computer system will need extra information which may not need to be recorded at all on the manual cards. Pay periods and methods of payment, for example, may be determined easily in a manual system depending on the type of worker, the department or the grade. In setting up a micro system, however, these items will probably have to be entered for each worker. These additional entries should not be resented. Once again, the flexibility of the system will largely be determined by the extent of the information allowed on the master files. In a payroll system this applies not merely to the reporting capabilities, which are probably less important anyway than in other applications, but to the ease with which wages and salaries can be calculated.

Gross pay calculations can be remarkably complex in some businesses. There can also be a surprising variety of payment systems within the same company. This is particularly true if piece rates are used for some workers. Piece rate payment system invariably become highly complex as custom and

practice amend what was perhaps a straightforward calculation. A variety of extra payments will be introduced to allow for machine breakdowns, poor quality materials, shortage of work and other problems which inhibit the workers' earning capacity. These allowances may well be paid at different rates, some possibly relating to the individual worker's own earnings over the previous period, others being at basic pay or some factor of it.

Such complexities may well tempt the user to carry on with calculator and pencil up to the gross pay stage, using a package purely to work out the net pay calculations, print the payslips and do the associated work. This would be a pity, since it will not be making full use of the computer's power not only to work out pay but to provide subsequent analyses as a by-product.

For the most complex pay requirements a package will clearly have to be very flexible. For ease of entry and calculation there will probably be a number of standard screen formats, but this number will be limited. So a business with many different types of payment calculations may have trouble fitting its requirements into the pay schemes available in the package. One potential benefit of encountering such a problem might be, however, that the mess of payment schemes is rationalised, although it would be unfortunate (but not surprising) for such a move to be blamed on the poor computer since this will produce or reinforce negative attitudes to computerisation.

Setting up the rules for the various types of payment scheme will probably be the most difficult part of initialisation. It will certainly have to be thoroughly tested, preferably with a batch of the most varied and most complex pay calculations which can be dreamed up. A full pay run must also be done to identify any snags in the format or procedure, and the first live run should of course be done in parallel with the manual system. This is one application where mistakes cannot be allowed.

Once the system has been satisfactorily tested, year to date figures must be entered, assuming it is beginning part way through a tax year. These figures will of course be readily available from the cards used in the manual system so this procedure should not be particularly difficult, although as always in setting up a new system there will be a considerable amount of data entry. The details must of course be checked carefully

against the manual totals after entry, although the parallel run will throw up any differences.

OPERATING

Running a payroll system on a micro should prove little trouble for an experienced wages clerk so long as the system is adequate to the business's needs and the training is comprehensive. While the actual calculations will take much less time than on the manual system, however, the operator is not likely to have the time saved free. A micro system needs various extra manual clerical routines outside the system, for example making adjustments which are not allowed in a computer system or updating the master files. Such work will be greatest with a volatile labour force. Sudden departures or a high number of transfers between departments will probably require considerable amendments to the system. If an amendment is needed after a wage or salary is calculated, as can happen when an employee leaves or when special payments or deductions are required at the last minute, the micro system should not allow the operator simply to go back and change the figures – for obvious security reasons – as can be done with a manual system. Complicated adjustments may then have to be made in subsequent weeks, or separate manual records be maintained to supplement the computer output.

Amendments to master files should be made once in a pay period. These will include leavers and joiners, changes to pay rates, departments, tax or national insurance codes. The system must be capable of properly recording employees whose codes change during the year, causing problems in year end reporting. It should also print P45s and other standard tax forms.

For the majority of normal calculations and payments the operator will enter the basic details, such as hours worked or work done, add any adjustments such as bonuses or overtime and the system will produce the gross pay and the gross-to-net calculations. The package should allow 'static' pay amounts as well as entering new data each pay period, for weekly or monthly salaried employees. The only adjustments then would be for holidays outside the normal period or for sickness or special bonuses. It is important to have the ability to enter adjustments

either as absolute amounts, as percentages of basic pay rates (for overtime) or as fractions of the pay. Basic entry checks should also prevent inputs of hours in excess of a maximum, for example, and should query payments outside a specified range.

The system produces payslips, and should allow sufficient flexibility to encompass the details required for the particular company as well as for official requirements. It also produces a cash analysis where appropriate to assist in making up pay packets.

A number of standard management reports will be available analysing pay by department or job type, and possibly providing comparisons with budgets or standard costs. Analysis must include employer costs such as National Insurance contributions, even though these are not part of the pay calculation. Analysis of gross pay calculations should also be available, highlighting variances, special payments and overtime and providing labour efficiency details. This kind of analysis may be linked to a production control package in a modular system.

A payroll package operating as part of an integrated accounting system will also post totals automatically to the nominal, analysed where appropriate into different departments or types of labour, and including tax and National Insurance amounts. It is of course important for accounting and auditing purposes that full records are printed and retained.

These will also be required at the end of the tax year to reconcile year end statements with accounting information and payments to the Inland Revenue during the year. The agony of trying to reconcile figures such as these after a year of many and varied staff changes will not necessarily be removed by a micro system. But it should be reduced. Whatever the problems of using a package, the micro's adding up should be impeccable, and purely arithmetical problems in producing annual returns should not occur. The usual problems of wrong code numbers and mistakes in making adjustments, however, may well remain.

KEYPOINTS

Bureau advantages

set up – payment calculation methods
data entry
validation

operation – amendments
code changes
analyses
year-end procedures

FIXED ASSETS

Plant registers can be the bane of an accountant's life, whether it be the accountant in industry who has to maintain them or the auditor who has to verify them. Factory managers and engineers are notorious for moving equipment around the factory or from site to site, and of cannibalising one machine to help make a few others work a while longer.

Major asset movements are not the problem. Capital expenditure is always very tightly controlled, with production personnel normally having to fight for every bit of new investment. Sales of equipment are also usually tightly controlled, or at least usually recorded within the accounting system because of the cash flow.

Other movements of machinery, however, do not involve a direct financial transaction and are therefore usually very difficult for accountants to monitor. For one reason or another machines tend to disappear, are transferred between factories and departments, or simply stop working and are left gathering dust in a store room, without anybody telling the people who are supposed to maintain an up-to-date plant register. To complicate matters further there are always bits and pieces such as desks or small tools with loose general classifications for which there are few details available.

PHYSICAL PROBLEMS

The physical problems associated with machinery are unlike most that accountants have to deal with. Most of their work is concerned with more notional aspects of business – keeping track of numbers rather than things, and of cash movements which can easily be identified even if they cannot always easily be explained or analysed. Similar problems of physical recording are present with stocks, but parts and products are usually

more easily identified than is machinery, and movements are frequent and routine, with associated documentation an automatic part of everybody's work.

This problem of keeping in touch with the movements and condition of equipment is only one aspect of maintaining plant registers. It is a problem which is unlikely to be solved by computers of whatever sophistication since it is essentially one of data capture rather than data handling. The engineers are unlikely to be persuaded by a computer's needs any more than they are by the needs of the firm's accountants.

ACCOUNTING PROBLEMS

Other difficulties are more susceptible to resolution by a computer. Leaving aside the problems of keeping track of the plant, the task of maintaining an adequate plant register is a clerical one. Large amounts of information probably have to be handled, but the information is in exactly the same form for each item of equipment, relatively little manipulation of the information is required, and amendments are infrequent.

On the other hand those very attributes are unlikely to make the plant register a priority for computerisation. The accountants can generally forget about it from one year end to the next. Then while it is a nuisance at year end to have clerks spending a long time just adding up and taking away depreciation amounts which will normally be exactly the same as for previous years, most of the work can be done in the slack times before the year end workload mounts up. In between year ends depreciation is charged to monthly and quarterly accounts at fixed amounts determined when the previous accounts were completed and the plant register last updated. This process is entirely a bookkeeping matter. If anybody ever wants to know anything about any of the machinery, the last person they would ask is the accountant, unless it is to find its book value in order to get an idea of how much profit will be made when selling it off.

CURRENT COST ACCOUNTING

For some companies, however, all this has changed. Businesses with over £5 million turnover, and those which have a Stock Exchange quotation even though they may not be very large, now have to produce current cost accounts to supplement their

normal ones. Or at least they are supposed to produce current cost accounts, even though many may not actually do so. And it is intended that all companies will eventually have to do so.

CCA requires rather more attention to be paid to assets than in historical cost accounts. Strict compliance with the requirement for a depreciation adjustment to reflect the cost of replacing machinery would require the frequent evaluation of the true remaining life of all plant and new estimates of its replacement cost. While the responsibility for actually carrying out these operations does not lie with the accountants they do have to ensure this happens and reflect the results in the books. In a year or two these figures will probably also have to be audited, even though at present this is not a statutory requirement.

Recording all this extra information in addition to the basic details and costs of the equipment would be a chore most accountants are ready enough to do without. For most companies however it is quite impracticable to examine most items of machinery every year to assess remaining useful lives and replacement costs. Indices of cost changes are then used instead, applied to relevant groups of equipment. For this the accountant has to find a relevant index for each group of machinery and do all the calculations necessary to work out the total replacement depreciation. This is even more of a chore, and where there are a moderate number of items of plant, especially in different groups requiring different indices, a computer solution becomes more attractive.

Now while current cost accounting may act as an incentive for accountants to turn to computer package solutions, it also poses problems – for the accountant as well as the package supplier.

CCA is still an experiment, and it is not possible to predict confidently whether it will survive its experimental period. If it does there are doubts as to what form any eventual accounting standard will take. An asset package bought now will therefore have to be capable not only of coping with the existing requirements but also be flexible enough to handle the compulsory rules which might eventually result from the continuing debate.

There is no way for a buyer to know now what those rules will eventually be (or even if there will be any) any more than a package supplier. So the credibility of the supplier is even more

important for those companies affected by this particular requirement.

The buyer can only try to make sure that the supplier will still be in business in a few years' time when a current cost system becomes mandatory, and that the supplier is capable of producing a revised version of the system which will cope with the eventual rules.

SET UP AND OPERATION

The process of setting up a computerised plant register is probably less difficult than for any of the other applications. That will of course depend on the state of the physical records, and as with other applications these should be put in order before computerisation is attempted.

In this case the timescales involved make the actual process of setting up the master files more leisurely than with most jobs. Since maintenance of the register is not an onerous task, the physical system can be continued for some time while the computerised records are built up. The computerised system can be reconciled with the physical register at the beginning of the year, with all amendments being entered together after it has been set up. There are unlikely to be huge numbers of such amendments, so the process of setting up the computer records can carry on a little at a time whenever staff have a gap in their workload.

Creation of the master file structure will also require, as with other accounting applications, careful consideration of coding. Correct coding structure can not only help produce the most useful reports, it can also reduce the amount of entry needed to amend the register, especially with CCA indices.

The master records will contain codes defining the various categories of equipment, and sub categories, the locations and types of equipment, the relevant class for inflation adjustment, for insurance classification where appropriate and for taxation treatment. The extent of these codes will determine the reports which might be available, and will also influence how much common information can be handled on control files: the more the better, since, if common data can be stored on control files, this will not have to be entered individually for each item of equipment. For example, if the inflation index had to be stored

separately on each record, the effort would be hardly less than doing the calculations manually. Each year's updated index figure would have to be updated on each record. With the relevant index held on a control file, however, just one updating will be necessary for each group of assets. As many groups of assets will be possible as there are fields on the control file. Similar considerations apply to other definition codes, where control information is held, and amended as necessary, on a separate file.

Each asset record will of course have to contain its own reference code, the cost of the item, depreciation and written down value, insurance and CCA replacement cost and estimated useful life. Reference information such as location and purchase date will also be required. Despite the use of a control file to apply indices and write-down periods to groups of assets, it should also be possible to enter such details on each asset record. It will probably be necessary to treat some assets individually, but in any case such a facility may well become necessary. Potential users should ensure that a system allows sufficient flexibility to cater for any special requirements, which could include column headings. It is useful to have spare fields available which can be used for companies' individual requirements as well as for any future requirement of CCA.

Since in most companies there are so many different categories of asset, and so many ways of analysing equipment for different purposes which may not be of great interest to the accountant, this is one application where it is probably essential to involve non-accounting staff in the conversion to a computerised system. This is particularly worth bearing in mind for the creation of the coding structure, but will also be necessary for decisions on which CCA indices to use. This is an important decision, partly because if CCA accounts are to be audited the relevant indices will have to have the approval of the auditors, but partly because if indices subsequently have to be changed this will entail a lengthy process of amending master records.

If the system is established well it should enable relatively easy asset register management, even with CCA accounts. It can also aid the actual asset management of the company.

Good systems will produce reports which can be of considerable assistance to engineering or production managers as well as

the usual reports which would be expected for the accountants themselves. It should be possible to obtain a full list of any group or classification of asset showing all relevant information for each asset in that group, or a summarised version of the same thing. Summaries by department or location should also be available and these should be useful to department managers. It should be possible to make enquiries on the state of any asset individually both on the screen and in printed form. Exception reporting, for example, to highlight items in a specified age range, is an attractive feature but probably a luxury for most businesses.

These features should of course be in addition to the routine accounting reports, procedures and information. A full printout of all transactions should be compulsory before any year end or period end run. Transactions fall into a number of categories – additions, disposals, transfers between location, and adjustments. Full details of each of these should be available.

In some systems summary information can be transferred automatically to the nominal ledger. This requires a fully-integrated modular system. Since there are so few accounting entries to be made from the fixed assets system, however, the value of complete integration is questionable for most small companies, it is probably just as simple for the relevant entries to be input using a journal voucher.

The main value of fixed asset systems is that they obviate the need for concentrated clerical labour in updating and reconciling plant registers. Any company which has a significant number of assets (say over 200) could usefully and fairly easily run a fixed assets system on an existing micro. It would hardly be the kind of system to justify buying a micro in the first place, but given that the price of a micro package is only a couple of hundred pounds a company with a micro which had some spare capacity could benefit from such a package. Many companies have found that, apart from relieving the accountants' workload, a package also gives them valuable management information for making better physical use of their assets.

KEYPOINTS

current cost accounting requirements
coding
parallel running
control data
non-accounting requirements
reporting

WORD PROCESSING

Electronic typewriters and dedicated word processing machines are the fastest growing sector of the remarkable office electronics market. The number of installations in 1981 was something like half as much again as in 1980 and has been estimated at about a third of all spending on typing equipment. This boom pattern should see the use of electronic typewriters overtaking their more mundane counterparts in the next two or three years, by which time the use of dedicated word processors should have doubled. (Dedicated machines are designed for that function alone, rather than being computers which can carry out a variety of tasks including word processing.)

So where do small businesses, which have probably been making do with well-used if not pre-war manual typewriters, stand in the face of this headlong rush for automation? Should accountants be pencilling in capital expenditure on word processing equipment for next year's budget?

The answer, which will come as no surprise, is: 'it all depends', and the first thing it all depends on is what is meant by word processing. Firstly there are a few different kinds of equipment which all might be described to some extent as word processors. But, more importantly for the small business, there are various different applications which might or might not qualify for word processing treatment. There is also a bewildering array of special features available on wp systems, some of which are very important, some of which are virtually irrelevant.

EQUIPMENT

Electronic typewriters are just what their title implies. In appearance they are little different to an advanced electric machine and the appearance of the output will be much the same on the basic models, which will cost about the same. But

even basic models will have some facility for easy correction of text – much easier than the lift-off tape which is available on some electric machines. They will probably also allow some variety of format, such as centring of text and easy variation of margins.

Some models have a single line display (and are thus termed 'thin window' word processors) which may help in correcting and rearranging text. More advanced, and therefore more expensive, versions allow pages of text to be stored on magnetic cards or tiny disks, enabling much more comprehensive correction and amendment to be done without re-entering text. They will also offer still more advanced formatting facilities, but will still not have the full screen of a micro, which is so useful for editing text.

Although they offer remarkable features for under £1,000 these machines cannot really be said to provide word processing facilities suitable for most small businesses. Many, however, can be linked to micros and used as high quality printers. If one wanted to spend this amount of money on a typewriter an electronic one is certainly a good idea. Hard questions should be asked, though, as to why the company cannot make do with a reconditioned electric machine for a few hundred pounds.

At the other end of the scale the 'real' word processors are dedicated to wp and nothing else. They are essentially micros which have been built and programmed specifically for this task. That means they can incorporate many features for text creation, editing and printing, and will be specially designed for ease of use. Some, for example, have 'Tall' screens so that the display is identical to a sheet of paper.

Dedicated machines will also be much better than ordinary micros at linking together in a multi-user system. With all this it is not surprising that they cost much more than a thin window machine, and more than a micro with a wp package. £10,000 is the average price.

Most small businesses which do not have very special word processing requirements will therefore opt for a wp package to run on an existing micro. There are several well-established packages available, the most popular being 'Wordstar'.

A package can be bought for only £300, so the difference in price between this approach and acquiring a dedicated machine

is enormous (although of course the cost of the micro is not being included here) and for most small business applications the difference in performance is negligible.

It is not merely the quality of the package that counts, however. The micro it is to be used on must be considered as well. Using a micro wp package can be an horrendous experience, especially for first time users. The package may well contain every feature anyone could possibly need but these features will be called up with special commands which probably require a combination of key depressions. Such combinations, usually involving the 'control' key, are difficult to remember unless the operator uses the system a lot. They may also be physically difficult to perform because of the position of the relevant keys, especially if the operation has to be performed with only one hand, with the other holding papers.

A specially-tailored micro, however, will have a series of function keys to perform the major operations. This obviates the need to press two keys for most operations, and since the keys will be labelled even the task of remembering which key does which operation will also be removed.

A system of this kind still does not compete fully with a dedicated wp machine, which will probably have many more functions and a few special features as well. The small business though can probably well do without these extras any way. Whatever the applications, though, it is vital to ensure that the system gives ease of movement about the screen. The cursor (the flashing blob which inhabits all VDU screens) is the pen nib – or for many accountants, the pencil point – and the system must allow the user to move the pen precisely where it is wanted very quickly. Keyboards which do not have special cursor control keys will not allow this, since combinations of 'control' and letter keys will be required. This may be acceptable for accounting applications where movement is limited, but it will be a nuisance at the very least in text manipulation.

Which other features are important will depend on the applications for which the system is to be used. Ease of editing text will matter especially if long documents rather than ordinary letters are being generated. Merging of text is important if form letters are to be produced, bringing together the same text with different date and addresses, for example. If the company has to

produce many contracts of slightly different form the system should be able to construct documents from a series of standard paragraphs.

Although these are all basic features they will not all be included in a wp package. Some have to be bought as separate modules, at extra cost. Other facilities may well be included in the basic package, but their value is more questionable. A spelling checker is boasted by many systems, which, though it sounds a dramatic advantage has limited practical value. Its operation can be quite slow, its dictionary quite small, and in any case it will not know for example that the operator meant to type 'hair' instead of 'heir'. Automatic hyphenation also falls into this category. It is probably only necessary with fully justified printing anyway, and few small businesses need such sophistications for most of the documents they print.

The ability to construct standard forms is another questionable advantage. If a business is using accounting packages there will be no need to design invoices, statements, orders or remittance advices, and the scope for significant use of other complicated forms is limited in most small businesses. If the forms are not complicated they probably do not need special facilities.

Similarly, the ability to handle arithmetic and to manipulate columns will not impress many small business users, but it may be useful in some applications, for example drawing up contracts. Some advanced accounting packages allow the user to link, say, the sales ledger module into wp to produce customer letters or special reports.

One technical requirement which can easily be missed is the ability to print out work while still using the machine for a new job. This is known as spooling.

It is not always possible, but if operators have to sit around while a stream of letters are printed it will hardly be conducive to efficient working. The alternative of organising printing when the machine is not going to be used for anything else is time consuming. It can also mean leaving it to churn away during lunch breaks.

The quality of printing is another largely technical issue. The package will organise bold type faces, underlining and other usual typographical refinements as well as helping to organise

good page and document layout. But the appearance of the final product also depends on the quality of the printer. It is usually assumed that a 'letter quality' printer is necessary for ordinary correspondence, as well as for form letters and reports. But a printer of this kind costs a further £1,500 over and above the price of a basic version which would be used for internal documents. The need for this additional cost is doubtful for many businesses. Printers can now be bought for as little as £400 which are still clearly 'computer printers' but produce a good enough quality for most applications. Indeed they probably produce a better letter than an ageing manual typewriter which may have been used for years quite satisfactorily. Printers such as these will be relatively slow by computer standards (80 characters per second) but will be nearly twice as fast as a 'letter quality' machine which could be an advantage when printing a series of documents. They will also probably only accommodate a standard A4 page width, but even if wider documents are desired, the printer may well be able to operate in a condensed print mode, effectively giving a wide page already photo-reduced to fit an A4 format. Of course if a business is sending out mailshots to prospective customers they have to look their best. But the advantage of an obviously word-processed 'personalised' letter over a printed version personally addressed is perhaps not as great as is generally assumed.

The improved appearance of the final text may be the most obvious advantage of word processing over ordinary typewriters, but appearance is not all. It will almost certainly be determined by the quality of the printer rather than the package itself.

There can be considerable differences between the various packages available. Printing itself, for example, can be very difficult to control with some systems. The most useful method is, as with most micro systems, for the user to call up a 'menu' which defines the printing requirements, as with the 'Spellbinder' package. There will normally be a dozen or so parameters covering spacing, headings, margins and special characters, each of which can be defined in several ways. Such a menu should make it easy not only to set up the initial format, but also to change it as required. It should also be possible, usually by inserting special characters in the text, to change the

format defined in the menu, if this is required, part way through a document.

While output is important, ease of operation is more so, at least to the operator. The system will affect this in a number of ways, some of which will depend on the way a package has been adapted to a particular machine. The major systems such as 'Wordstar' and 'Spellbinder', for example, will operate differently on different machines, specially if they are supplied as part of an integrated system. The machine will then probably have specially designed function keys to make the package easier to use.

The system should also be written so that the operator is prevented from doing great damage and is helped to do the right things.

It should not be possible, for example, to erase text accidentally merely by pressing a single wrong key. The most helpful systems ask 'really?' or something similar when text is to be removed, and require two keys to be pressed simultaneously, or an affirmative response to a check question on the screen.

Similarly, when the memory is full, the system should warn the user, prevent further entry and retain everything that has so far been entered. With some systems existing text can be corrupted. Aural warnings in the form of bleeps are often used on such occasions and when errors are made. These are particularly useful for skilled typists who seldom look at the screen. Inexperienced users might well get lost, however, even if they know something is wrong. Systems which can display 'help' messages at such times can therefore substantially improve the ease of use.

But the greatest benefit of wp systems should be that text can easily be amended once entered. This is not always the case, unfortunately, especially for people new to the system. Methods of editing vary considerably, and the only way is to try the system and see how easy it is to move around words, sentences, paragraphs or whole pages.

APPLICATIONS

Mailshots, however, will probably not be a major application for most small businesses, though the main jobs done with wp vary according to the nature of the business.

For the average manufacturing business, routine correspondence may be quite important. This would seem at first sight to be a comparatively expensive way of typing letters, but if the micro is already in the office and available at times for certain mundane tasks it should not be shunned. Once the typist is familiar with the machine and the package, the speed of letter production and the appearance of the finished letter are as good as with a high quality electric typewriter.

Ordinary correspondence hardly uses the facilities of wp to the full, however. The letter is simply typed in, using headlining features to arrange the address and date. The editing facilities help the typist to correct any mistakes and make any adjustments necessary for a more suitable layout. The letter can then be saved on disk until it is approved by the author, any amendments being made by calling up the letter from the disk and using the editing facilities again. (A careful record is necessary of which disk and which file name have been used to store the letter.)

Standard letters such as responses to product queries or requests for quotes, job applications or references, can all be stored on a disk. A specific letter can be produced by taking the basic standard and entering the relevant details -- name and address, current date, product names and prices, job details – appropriate to the particular purpose. Or in some applications a more advanced approach is appropriate, calling up a list of standard paragraphs and choosing between alternatives. A response to a job enquiry, for example, might be in the form of a straight negative, a conditional 'yes' with an application form, or an invitation to an interview, together with a selection of jobs which might be open. The classic application of this kind is for drawing up contracts or other legal documents, but there are few small companies which require documents of this type.

A special case of document creation which should apply to all businesses is the production of payment requests. This job is slightly more complicated than the individual letter described above. A batch of such letters will have to be sent out at intervals, probably with grades of nastiness depending on the seriousness of the debt.

Various conditions therefore have to be examined before the letters can be produced, and in deciding which letters should go

to which customers. A sales ledger package may well contain a special program for doing this kind of job, since ideally the debtors ledger should be examined automatically within the computer system, and the relevant letters allocated to customers. This is clearly much more than a word processing job since the amount outstanding must be inserted in the body of the letter.

At a less automated level a clerk can sort through a computerised address list of customers and note which of those requires which level of debt letter. Customer codes can then be entered to produce a standard letter for each customer, personally addressed. This is some improvement over the manual alternatives of either typing each letter individually or producing form letters which then have to be individually addressed, perhaps with an amount inserted by hand in a convenient space in the letter. Other applications of this nature, using the sorting power of the micro applied to lists of customers, suppliers products or parts, may be useful to many businesses. The volume of such work should be carefully evaluated, however, if this is to be a major factor in the decision to acquire a micro. The ability to reproduce mail lists, selectively if necessary, looks attractive but small volumes can probably be handled much more efficiently using a copying service!

These major applications involve relatively short documents. It is unlikely that most small businesses, especially in manufacturing, will need the ability of micro wp packages to handle large volumes of text. This power should by no means be underrated. It is enabling these words to be written much more easily than otherwise both in the physical sense and in producing a finished version more easily because of the speed of amendments.

Most companies though are not in the business of producing lengthy reports. If these are required, as may be the case in for example, a service company then the wp package will be useful on a micro. Quite long reports can be written and saved together – up to 4,000 words depending on the system. Longer work can simply be broken up into sections, or can be worked on section by section as appropriate. Writing the report itself is easier if it is the author entering the text, a condition which is however unlikely. Once written, drafts can be printed for review, comment and alteration. The alterations are easily made by editing the original copy, and further drafts can be produced if necessary. The final version can then be printed, in a completely different format to the draft, or indeed in several different formats if that should be required.

As with so many other micro applications, wp is exciting in its potential for many businesses. But a word of caution here. The excitement may be greater than the hard financial benefit, depending very largely on the volumes of work which have to be processed, and bearing in mind the alternatives to using a wp system that are available. For low volumes, outside services – such as the copy shop or a wp bureau – will probably be cheaper and may be more convenient. It is not simply the cost of the wp package which has to be taken into account. At £300 this will probably be insignificant to all but the most desperate business. But using the micro for wp means that it cannot be used for other applications, for which it may be more beneficial. So the machine which is tied up and the convenience of using it must also be taken into account.

KEYPOINTS

dedicated machines

keyboard – cursor movement
special function keys

operation – accidental errors
help messages
menus
aural warnings

editing – changing text
moving text

printing – definition of layout
flexibility
spooling

OTHER APPLICATIONS

INTRODUCTION

The distinctions between various classes of computers and computing are growing ever more blurred. Mainframes are still clearly mainframes, kept in their special rooms in large companies well away from any user and tended by their own specialists. But the power of mainframes is becoming more readily available to the end user, with advances in distributed processing and in linking smaller machines to the mainframes.

The main difficulty, however, is in deciding where microcomputers end and minicomputers begin.

Purely in terms of what the machines can do, the differences are shrinking as micro technology and storage devices improve. Dramatic advances in communication between different machines in different locations mean that even if the nature of the machine on the desk makes it clearly a micro the information it can access and the scope for transmission of results make it more powerful and more flexible than the title 'personal computer' might suggest.

These technological hardware advances have been matched by improvements in packaged software which make it increasingly possible for users to manage their own systems and manipulate their own data in highly flexible ways. The major software company MSA, for example, has launched a package which will link its mainframe products and its Peachtree micro packages. For a few hundred pounds micro and mainframe can 'talk' to each other easily, passing data back and forth, for example between a small factory or subsidiary and head office.

This final section examines how micros and even the micro-micro pocket computers can be useful for accountancy applications in both large and small businesses. It also explores the potential of financial modelling in a number of application areas – again appropriate to businesses of any size.

These developments can make true distributed computing a possibility in large companies, and can expand the potential of micros for smaller ones. Distributed processing has been a popular concept for some time in data processing circles. But by and large it has meant the user still being slave to the requirements – and perhaps the whims – of the data processing professionals. Accountants in large companies need to be able to develop their own applications in some areas, especially those which a dp department will never get round to. They need access to a variety of information sources and need to be able to manipulate that information easily in different ways for different purposes, producing reports appropriate to the particular circumstances, rather than making do with reports which will be merely adequate for most purposes.

For the smaller business the ability to communicate between micros in different locations is likely to be less important. But collecting data with a pocket machine could be useful, as indeed it could to the auditor who spends a considerable amount of time away from the office, and consequently away from the micro.

Financial modelling should be no less useful to the small business than the corporate planner or management accountant in a major company. Cash flow forecasting for example is just as vital for the small company, where the necessary manipulation of figures could well be more difficult when done manually and more time-consuming for the hard pressed owner who has many other vital tasks.

In all companies these technologies and techniques may help to increase the effectiveness of the computer users, and of the companies as a whole. In the hands of 'amateurs' – users – the computing power may be used less efficiently than in the hands of 'experts' – data processing professionals. But the effectiveness of the business depends more on the efficient use of people than of computers, and as computing power becomes ever cheaper, companies can afford to 'waste' it if their overall performance is improved.

NETWORKS & POCKET COMPUTERS

The speed of technological advance and the variety of application areas make it difficult to define just what 'networking' means. When does a small machine cease to be a glorified calculator and become a pocket computer? In the networking field the variety of names used to describe, and to brand, particular systems adds further complications. Apart from the brand names of rival versions, there is little unanimity as to what the general term for text transmission systems should be. Viewdata, though more common in the UK, is under strong attack by the proponents of 'videotext'. The lack of an informative track record for most of the products makes it difficult for a potential user to assess the remarkable claims made by developers and sellers, and to work out which applications, if any, are appropriate in a particular business.

VIDEOTEXT

At the lowest end of the scale a few micros linked together can be described as a network, while on the other hand this general area also encompasses the public Prestel service and the TV versions – Ceefax and Oracle. There are distinct differences between the two ends of this spectrum which are important in defining potential application areas. Videotext is not a system for text processing. It is an information system, providing access to and display of information. The information is stored in central computers and displayed on remote TV screens, adapted to take the service in addition to their usual function.

Public information services use the telephone system (Prestel) or the TV airwaves (Ceefax and Oracle) to transmit reference information. Storage on computers allows frequent and timely updating by information providers, and immediate access by users. The aim is to remove time delays in the trans-

mission of information on paper through the postal system or the reprinting of reference works and to make fast-changing information available quickly to a wide audience.

Despite continued attempts to attract a significant private audience, Prestel is still predominantly a business service, but even so, and despite the wide range, and depth, of information now available the usefulness for most businesses will be severely limited. There are few instances, especially in small business, where there will be enough specific facts which are so important that the latest versions must be immediately available, and where there is no alternative method of obtaining them.

Accountants are more likely to be interested in what are termed 'private viewdata' systems. As the name implies these are of the same general nature as Prestel but the information they carry is 'private' to a selected user group. Text is carried in frames or pages, just as on Prestel and is accessed through adapted TV sets by calling up relevant pages.

There are two different kinds of application where such a system might be, and indeed is beginning to be, used. In the first, the system resides entirely within the organisation, although possibly linking various buildings or locations. A database is built up of product or financial information. This database is then available to users throughout the group, as an alternative or supplement to usual reports. Daily sales and margin information, for example, could be made available more quickly on a viewdata system than by the usual method of printing and copying reports and then having to circulate them throughout the company. Clearly only fairly short reports can easily be displayed on a TV screen, although more than one screen can be used for extensions of the basic information. Indeed this is where such systems come into their own. A manager should be able to access the basic information, which would normally be available on a paper report, and then work through other pages following up specific lines of enquiry of particular interest. A written report which allowed the same depth and range of information to such a variety of users would clearly be enormously long and in most circumstances would be completely impracticable. A manager would normally have to contact the relevant department to follow up specific lines of enquiry.

The second kind of application is more diverse in terms of users but probably more specific in terms of information. A system allows users to access product information, for example, detailing latest prices, availability and stock levels. Users in retail outlets could then order items via the system, or salesmen could be aware of the latest product position before setting out on their daily round. Users either can be within the organisation, for example decentralised depots or shops ordering from a decentralised warehouse, or can be customers.

Clearly both of these applications are only appropriate for larger organisations, although small businesses may well be on the end of one of them ordering supplies. At the moment, and for the immediate future, costs are likely to be high, however, especially for long distance communications, and the technical problems of organising the networks will require considerable specialised skill. Accountants in larger companies however should seriously consider the potential for distributing and collecting financial information in this way, and the potential effects on the accountants' domain of such information being readily available to managers throughout the organisation, and out of the direct control of the accountants.

NETWORKS

As already indicated, Videotext or Viewdata is not really about text or data processing so much as information handling and transmission, although clearly the text and data have to be entered into the system and users may be able to edit information in the database under certain strict conditions. The networks are primarily communications systems, linking computers to video terminals.

'Real' computer networks, on the other hand, link computers to other computers, and offer much greater scope for users in all kinds of organisations. Here the technology, especially for linking micros together, is even newer than that in the videotext field. Since the potential is much larger, however, developments are rapid.

Linking computers together is in itself not new. Remote terminals have been used for many years, communicating with computers in different cities, countries and even continents using the telephone system. Major computer installations also

involve communications between the central mainframe, intelligent terminals in user departments and ancillary equipment such as printers. The flow of work in the system has to be carefully organised and controlled to ensure quick response for users and security of data with large numbers of simultaneous users. Speed of transmission of data is also highly important.

Micro networks are now becoming available which offer a middle way between the high speed/low distance of the computer room and the relatively low speed/long distance of inter-site communications. Local area networks, based in one site, promise to overcome the greatest technical weakness of the micro: relatively small storage and programming power: the greatest organisational problem: different data on the same subject being built up by different people; and the practical problem of expensive printers being needed for many machines. The aim of a micro network is to link a collection of micros to each other, and to central facilities such as high quality printing and mass storage. Each user can then use the micro on its own just as if it were detached from the network, but can also access centrally stored information, use more expensive (and higher quality) printing techniques than would be sensible with just a single machine, and can also communicate with other micros (and their users) on the network. The potential for 'electronic mail' alone is enormous in many large organisations.

Such a system has great potential for both large and small organisations, although its initial experimental nature and relatively high cost will restrict major networks to larger enterprises in the immediate future. Nevertheless the potential advantages are probably greater in small businesses and small practices. Although high quality printing and hard disk storage would be out of the question for every micro in such an organisation, there could well be a case to be made for several micros each concerned primarily with one application, but sharing some information and drawing on facilities such as the printer.

Many small businesses are already operating several of the systems covered in this book. The accounts office will have a micro for ledger applications. Another may be installed in the stores for purchase order entry and stock control. Yet another may be used in the sales office for sales order entry and finished

goods stock control. One or more of these machines may also be used for word processing. Alternatively, in some circumstances, a dedicated word processor may be justified which could link in to a network. The costs of organising such a network are likely to be less than buying a single computer which would run all the applications, although obviously this would require careful analysis. But as network technology improves and prices drop such a set-up may well make more sense to many small businesses than buying a single machine with various terminals.

POCKET COMPUTERS

Pocket calculators have been getting smaller and more sophisticated for years. Now a number of companies, led by Sharp, Hewlett Packard, Texas Instruments and Epson, have introduced machines which are so much more than calculators that they have been dubbed 'pocket computers'. They are not only programmable but can also hold a certain amount of data, and yet they are still (just about) small enough to fit into a sizeable pocket.

They offer a powerful option for many organisations. They can be used either as computers in their own right or as highly portable data capture terminals. As computers they have very little storage and so cannot be used for jobs involving significant volumes of data. But they serve as highly mobile and relatively sophisticated programming machines, useful for repetitive computations requiring small amounts of input. As portable terminals they are immensely useful, even if some require quite a large pocket to fit into. They can be a quick and accurate means of recording data at locations remote from where the computer is kept.

It is as portable terminals that these machines are likely to be of most use to accountants. The cost is no lower than that of basic 'home computers' which provide greater storage, and the only advantage is complete portability. Such a machine might be useful, in addition to performing the occasional complex calculation, for helping the busy traveller to learn the Basic programming language. If peripatetic letter writing is necessary, again these machines can be helpful. Output can be transferred to a larger machine if necessary, as indeed can programs, once written. Few businesses are likely to require extreme

portability, however, and given the cheapness of more powerful computers these machines cannot really be classed as business computers when used for this kind of application.

Portable terminals, on the other hand, could have a wide range of applications, especially for practising accountants. For decentralised companies they may also be a relatively cheap alternative to the private viewdata systems described earlier. They can be used to collect data from storeroom bays or shop shelves for stock control, stocktaking or re-ordering purposes. The data can then be transferred to a warehouse or depot via telephone lines and used in a central data processing system. One existing application for stock re-ordering is in a chain of stores each of which needs to order goods weekly. Shelf counts are entered in the terminals which are programmed with reorder levels and therefore calculate which items need to be ordered. Overnight, the orders are transmitted automatically by 'phone lines to the central warehouse where picking notes are produced, stock details updated and the delivery process initiated.

Similar applications are possible wherever data of a limited nature can be recorded directly, rather than being written down and subsequently keyed in to a computer system. Current examples include meter reading with instant billing and market research on buses. Communications to or from salesmen to the head office sales department is another obvious possibility.

In the area of specifically financial applications, stocktaking is probably the most immediate candidate with high potential. This would be particularly so for a company with many remote locations, especially shops, where stocktaking itself can be time-consuming and analysing the manually recorded data can be a monumental task, quite apart from the problems of trying to reconcile the details with book stocks. With a portable terminal the stocktaker need only enter the stock code and the quantity. There is no scope for misreading scribbled numbers and totals can be arrived at very quickly for checking purposes on the spot. Details can then be transmitted automatically if required and compared with stock details held on computer.

For auditors too these terminals can be a boon. Hand-held terminals can be used as a routine method of data capture for use when visiting clients. Account codes and amounts are entered

while at the client's offices and the data is then entered in the micro for processing back at the office.

The scope for all these applications in the financial area is enormous. But the paperless electronic office is still a long way off and the diversity of equipment offered to satisfy requirements in this area is baffling to the lay user both in terms of costs involved and the quite different ways available for achieving ostensibly the same result. It is not an area to be explored without expert guidance.

MODELLING

Financial modelling is probably the most exciting of all computer applications for accountants. It applies to the most interesting areas of an accountant's work and is the most immediate and most flexible of computing tools accountants are likely to come across. It is at its most immediate on a micro.

The term itself, and the very special way in which it tends to be regarded in the computing industry, do little to endear the technique to the potential user, let alone suggest its capabilities and virtues. In many cases the claims made for modelling systems ignore the most practical advantages for accountants and concentrate instead on what is no doubt sophisticated computing but is of peripheral interest in most circumstances. The famous 'what if' feature is the best example of this misunderstanding. Modelling enables users to run alternative scenarios and so discover the answer to questions such as 'what if oil prices rise?' or 'what if sales drop 5%?'. Many of these questions can often be answered using the traditional back of an envelope, however, and misleadingly suggest a much more minor role for modelling than could be the case. Its value in routine accounting tasks, especially in the management accounting area, is much underrated.

The most common use of modelling packages is in the budgeting and planning area, but not for the *ad hoc* calculations which feature in the 'what if' examples. Modelling is ideal for actually constructing the budgets in the first place, as well as for performing extra calculations afterwards.

Budgeting is a complex process of trial and error which involves considerable recalculation. Initial estimates of sales and costs often have to be adjusted before a satisfactory position is established. In larger companies, budgets normally have to be agreed between departmental managers and their superiors and

subordinates. This process almost inevitably involves changes to sales and margin details as well as overhead amounts. Making all these changes manually is tedious and open to error. Using a modelling package the changes can be made quickly and accurately.

Other applications in the management accounting field include cash flow forecasting, investment appraisal, consolidation and presentation of routine period reports, and foreign exchange management.

Modelling has a whole range of applications in the practising office, in large and in small companies. It is often derided by data processing professionals as being merely 'playing with numbers' as though it were like treating the computer as a glorified calculator. But it is to even the most advanced calculator as word processing is to an electric typewriter. In fact the analogy is quite a useful one because modelling could be described as 'number processing'.

All accounting computer applications are of course about processing numbers, but this term gives some indication of the ease with which modelling enables accountants to process numbers, just as word processing enables easy manipulation of words – without any specialist computing knowledge or experience.

The key difference between modelling and the other applications considered in this book is that modelling does not normally handle 'transactions' as, for example, ledger systems do. (Although it has to be said that the limits of its use are wide, and at least one user has been heard of who does stock control with a modelling system.)

There is a remarkable number of modelling systems available, the most popular being VisiCalc which has sold ½ million copies worldwide. They all operate from a similar basic principle of creating an electronic analysis sheet or matrix into which is entered numerical and descriptive data. Locations are defined by the intersection of rows and columns and calculations performed using simple instructions applied to items in the matrix, or series of items.

The basic difference in micro modelling systems is between those such as VisiCalc and all its 'Calc' imitators which display the matrix, or at least a portion of it, on the screen at all times

and require the user to work only through the matrix, and those such as MicroModeller which adopt a more conventional programming approach, akin to the original mainframe modelling systems. With the VisiCalc system, for example, data is entered in, say, row 5, column C by moving the cursor to that location and entering the relevant number. Calculations are performed on it by moving to another location and defining the calculation, for example specifying in row 5, column D the formula (5,0)*2.35. The original number multiplied by 2.35 will then be displayed in 5,D. The alternative approach exemplified with MicroModeller is actually to write programs specifying the data and the logic of the matrix. This is more flexible, but less straightforward.

Either way a complex computer program is written very quickly without the user having to know anything about programming or having to learn a special language. The 'programming' type of system effectively uses a very high-level language but it is very English-like and very closely defined.

Once the 'program' has been written, data can be entered and amended quickly, different calculations performed on the same data or the same calculations on different data, and the results printed and stored as with other computer systems.

Such easy and speedy manipulation of quite large volumes of data makes modelling eminently suitable for many different applications, from long term planning to monthly consolidations, from cash forecasting to margin analysis. It is appropriate for both one-off jobs like annual budgeting and regular jobs such as monthly reporting. The main advantage, apart from the actual speed of calculation in the first place, is being able to rework calculations after management review has come up with amended plans – or indeed amended results in some cases! Flexible printing options are available with most packages to prepare reports without any need for further typing. And since the cheapest micro package is now only £39 the cost is negligible for businesses or practices which already have a micro.

DEVELOPMENT

Like other micro applications, modelling was developed initially on mainframes. It grew in the early 1970s mainly for use

on international timesharing services or large mainframes, initially for using data stored on major databases or for manipulating large volumes of numbers in multinational groups with worldwide locations.

The first systems enabled users to define the model through a terminal linked to the timeshared computer. The model definition was largely concerned with report specification, built around a central set of rules as to how calculations were to be performed. Complex sets of calculations and file handling generally required normal programming using a high level language.

The advent of screen based systems and eventually of micros has removed much of the need for defining report formats with a series of instructions as was the case in the early systems. Users are normally given a series of options with simple answers entered through the keyboard which fix column widths, suppress rows or columns and add extras such as underlining, as well as specifying the number of decimal places required and other basic aspects such as whether commas should be included in large numbers. Some of these options might appear to be superficial niceties, but early micro systems were conspicuously lacking in printing flexibility. If work is to be done on micro modelling systems, which can then be presented straight to management meetings or to clients, the state of the printed report is highly important. This aspect has not been overlooked by the larger package suppliers who have gone to great lengths to provide sophisticated report generators.

FEATURES

Because of the tremendous sales potential in micro modelling packages, developments have been many and brisk over the past couple of years. And despite the various packages all operating on the same basic 'electronic analysis paper' principle there are now important differences between the packages, of which printing flexibility is only one.

First is the question of size. This will not be a limiting factor in many applications since something like 50,000 locations can be used for any one model in most systems. That is 100 columns and 500 rows, which should be enough for most ordinary applications and could allow several reports to be produced within

the same model. After all, a 12 month analysis with quarterly totals only takes up 17 columns including row descriptions, and only about 55 rows fit on the long side of an A4 sheet. Of course the size of the model could be limited by the micro memory, but there should be no problem with a business micro having a minimum 64k memory.

In some applications, however, the same model will be used for a number of different departments, factories or subsidiaries which will then have to be consolidated to give a report for the division or company as a whole. Not all packages are able to handle such consolidations, although Microplan can and new versions are appearing all the time with this kind of enhancement.

What else to look for in a modelling package depends very largely on the requirements of the applications which will be run, and of the personal preferences of the user. A number of packages are available for all common machines which all have very similar features. Buyers should choose which to use on the basis of which package matches their own particular preferences. It is the modelling system which someone feels happiest using which will be the best, out of a collection of alternatives which can all do roughly the same things on the same machine.

New systems based on VisiCalc appear frequently, and a new generation of spreadsheet packages is on the way which will be much easier to use, especially in linking to other packages. In the meantime, packages which have extra facilities, especially for file handling and reporting, are welcome improvements.

Flexibility is the main consideration, both in entering data and in how that data is manipulated. In most applications, the same calculations will need to be carried out on a series of numbers, for example for various products or departments. The calculations on each one will be the same, with a total for the group, probably in the next column or row. It should not be necessary to define the calculations separately for each box. The package should allow the definition of a collection of boxes all of which require the same calculation but on different data. The ease with which such calculations can be defined, and the data arranged to fit in to them, is very important. Having to repeat the same formula time and time again because it is not possible

to specify a collection of boxes with the same formula is not only frustrating, it probably leads to mistakes, and could even lead to the abandonment of the package altogether, because for small problems it may well end up being quicker to use a calculator.

As with word processing packages, movement around the screen, and around the 'analysis paper' are a key to ease of use. Systems usually allow the user to enter a 'go to' command with a specified location. But most of the time the required location is not known precisely. It is much better to use cursor movement keys to manoeuvre around the table. Not all micros though have a keypad which allows simple cursor movement. As with word processing, some require combinations of the control key and another to move the cursor at all. This may become acceptable after a while, but compared to keypad movement it is very frustrating.

Some packages now have comprehensive prompts or help messages.

The Microplan approach offers something of a halfway house between the simple spreadsheet of VisiCalc and the 'programming' in Micromodeller. Microplan displays a menu listing the current options available, which are selected by entering code numbers. The initial menu offers the user a choice of operations, for example formatting the table, entering data or performing calculations. Subsidiary menus list the options within these broad categories.

This is an easy way for beginners to learn the system but it can be annoyingly slow for experienced users. The menus also take a significant part of the screen, which in any case only shows a small part of the full table in any sizeable model. Advanced users require a facility to suppress such menus and help messages and to short circuit the more laborious sequences of command entry.

One feature which can aid ease of use for exprienced users is a simple programming capability. This hardly amounts to programming, but it does allow the user to store a series of commands which would otherwise have to be entered through the keyboard at the time the operation is run. This can be particularly useful in consolidation, since several different files will have to be called up.

Buyers should beware the usual 'bells and whistles' attached to most good modelling packages. These are usually statistical

functions, or financial calculations such as compound interest, discounting and annuities which are so rarely used by most accountants as to be irrelevant in shaping their choice of a package, and indeed in its operation. Some features in this category though are very useful. In particular the option of creating rows or columns by reference to an initial figure can save considerable time, and obviate the use of pocket calculators. A number of different options will be required, though. The user should be allowed to enter an initial figure and then specify how it is to be changed, choosing from a fixed percentage increase or decrease, or a fixed amount alteration. Variable changes will of course have to be entered separately in each box.

A final feature which is frequently touted as an added advantage for reports printed with modelling packages (and others) is a colour graphics system. Users should be even more cautious about such trimmings than about most micro attachments. In small businesses especially, this feature is luxurious to say the least. Even where the extra cost is not enormous, the value of colour graphics is debatable. They certainly look pretty, and may impress some managers, but the information to be gleaned from them is probably marginal unless the presentation is particularly complicated. Graphics packages or features certainly save an enormous amount of effort in drawing pie charts and graphs, but how many applications really need graphical reports anyway?

SETTING UP A MODEL

Most early attempts at modelling consist of computerising work which is presently done manually, with the inevitable calculator. So the basic form of the model should be fairly clear from the outset. The existing manual analysis paper defines the overall layout, data to be entered, relationships between various items and the calculations required. The only really new aspect will probably be the printing of the output. In a manual system this may involve passing scribbled sheets to typists, with the inevitable delay, checking and correcting. Or it may simply require photocopying of the working sheet, with readers consequently struggling to decipher often-corrected numbers. A modelling package, on the other hand, will enable the results

to be printed clearly and extensive print options should produce results which are easy to understand and which highlight the most relevant figures in the analysis.

The most straightforward way will be to create a replica of the manual version on the computer. This will not necessarily create the most efficient model, however, and there may be additional calculations which can be done with the modelling package, which were omitted in the manual version. Even a simple model copied from the manual routines is not as easy to set up as might be thought.

Defining all the relationships in a model takes some time, even (or perhaps especially) when the user is very familiar with the job. Modelling systems, just like other computer programs, are not intelligent. Detailed and specific instructions have to be given on how to handle every item in the matrix. This may be a complex job, even in a fairly small table. In particular, care should be taken in deciding how data will be arranged since this can affect the ease of calculation, for example where the same calculations are required for a series of figures. The order in which calculations are done is also important, and the ease with which the user can change the order. Columns and rows are calculated separately, with all of one or the other being done first. So if it is necessary to transfer a calculated figure to an earlier column, and this figure is then to be used in subsequent calculations, the user will have to take steps to ensure that the calculations are done in the correct order, and indeed that, even with an extra calculation run, the correct result can be achieved. In some cases the unsuspecting user can build a loop. It is always easiest to build outwards and downwards from the top left of the table, avoiding wherever possible taking figures back to earlier rows or columns.

Apart from these amendments to manual layouts modellers may find that extra calculations can be done which were not worth attempting in the manual system, either because of the number of calculations required, or the complexity of the arithmetic. Caution should be exercised here, though. Keep your models simple, especially at the start.

Despite the ease with which models can be built, even quite small jobs probably take much longer than the new user might imagine. Just setting up the relationships, entering the headings

and defining the print format can take a couple of days, since mistakes will be made, new and better ways of achieving the objective will occur to you half way through and require a fresh start. Once built, the model will have to be thoroughly tested, just like any other computer application. This too will take time.

Finally, the user must not forget documentation. This does not come naturally to most accountant modellers, who are often too eager to get on with the next stage of the model to worry about recording precisely what has been done in the previous stage. But it is one aspect of using computers to which the professionals rightly adhere, and which 'amateurs' must learn to respect. This is particularly the case for models which are part of a routine system used every month, quarter or year. The model inevitably has to be run sooner or later by someone other than its architect, and if replacement personnel cannot understand it all the effort in building it will have been wasted. In complex models it is also vital for the user to keep a running record of how the model is built and amendments which are made. Otherwise confusion takes over and errors arise. Keeping track of calculations and instructions is made easier in most systems by the separate display of formulas on control and editing lines, rather than simply showing the results of the formulas in the relevant box of the matrix.

USING A MODEL

Once a model is built and tested it should be extremely easy to use, although once again it is necessary for all but one-off jobs to have full instructions for what data is to be supplied and where it should be entered, and operational instructions, for example for the order of calculations or the chaining to other models or files.

Running an individual model simply requires the input of new data, or amendments to previous figures, and pressing the run command key. Running more complex models requires calling up files, possibly intermediate storage of results and consolidation with other files.

The supreme merit of modelling for planning work is the ease with which alternative scenarios can be assessed. The model can be rerun with higher prices, lower volumes, different costs or staffing levels. This makes modelling ideal for routine budgeting and cash forecasting, as well as long term strategic

planning. Users should beware, however of trying to run too many alternatives. The result could simply be confusion from the proliferation of alternatives. A large number of runs can be tried in order to identify the key factors in a particular model, but once this has been achieved the number of alternatives for reporting or analysis purposes should be kept to a minimum. A careful record must also be kept of the amendments made for each run if confusion is not to arise as to which results apply to which assumptions. A facility for holding the major assumptions in the body of the report should be built in where possible.

Using models for routine reporting requires stricter control of data than in manual systems, as in other computing applications. Consolidating monthly reports from various subsidiaries, for example, or various product groups, should be regarded with the same thoroughness as it would in a manual system. The accounting requirements will be just as strict even though the job is being done with a modelling package, and even though many of the rules can be built into the structure of the model. Again, full documentation will be necessary, and full printouts showing the relevant consolidation adjustments.

KEYPOINTS

versatility and ease of use
model capacities
consolidation
cursor movement
help messages and menus
programming
statistical features
copying manual tables
simplicity
documentation

MicroPlan will show the following display:

```
                    MODE=NORMAL  ORDER=R/C ROW=1-50  COL=1-20
   ROW  1  <--
ENTER COMMAND:
                                                                  1 FORMAT:
ROW                                                               2 DATA:
---          ----1----  ----2----  ----3----  ----4----  ----5----  3 MATH:
 1                0.0        0.0        0.0        0.0        0.0  4 FINANCE:
 2                0.0        0.0        0.0        0.0        0.0  5 PRINT:
 3                0.0        0.0        0.0        0.0        0.0  6 STATUS:
 4                0.0        0.0        0.0        0.0        0.0  7 HELP
 5                0.0        0.0        0.0        0.0        0.0  8
 6                0.0        0.0        0.0        0.0        0.0  9 STOP
 7                0.0        0.0        0.0        0.0        0.0  10 UTILITY:
 8                0.0        0.0        0.0        0.0        0.0  11 PROGRAM:
 9                0.0        0.0        0.0        0.0        0.0  12
10                0.0        0.0        0.0        0.0        0.0  13
11                0.0        0.0        0.0        0.0        0.0  14
12                0.0        0.0        0.0        0.0        0.0  15
13                0.0        0.0        0.0        0.0        0.0  16
14                0.0        0.0        0.0        0.0        0.0  17
15                0.0        0.0        0.0        0.0        0.0  18 FORMAT:
16                0.0        0.0        0.0        0.0        0.0  19   ROWS:
17                0.0        0.0        0.0        0.0        0.0  20 ROW TITLE
```

Now, MicroPlan is ready to solve your problems.

DOING A SIMPLE PROJECTION

Let's do a simple 5-year projection. Prepare the following report in MicroPlan.

5-year projection						
		1	2	3	4	5
1	sales	$1,000 growing at 10% per year				
2	cost of goods	45% of sales				
3	sales and admin	20% of sales				
4	research and dev	constant $300 per year				
5	total costs	sum all costs				
6	gross profit	sales less total costs				

You will proceed through the following steps:

1. Enter titles for each row of the 5-year projection.
2. Enter or compute values for each row.
3. Make a change and watch MicroPlan automatically do what-if analysis.
4. Print a report.

NTER COMMAND: **33 <RETURN>** Select row 10.

ROW (1-50): **10 <RETURN>**

NTER COMMAND: **31 <RETURN>** Enter percentages.

CHOOSE (VALUES=0,CONSTANT=1,GROW=2,INCR=3): **3 <RETURN>**

BASE VALUE: **45 <RETURN>**

RATE: **-1 <RETURN>**

NTER COMMAND: **33 <RETURN>** Select row 2.

ROW (1-50): **2 <RETURN>**

NTER COMMAND: **70 <RETURN>** Calculate percentage.

ROW (1-50): **10 <RETURN>**

ROW (1-50): **1 <RETURN>**

NTER COMMAND: **98 <RETURN>** Compute new results.

he screen will show the following:

```
                    MODE=NORMAL  ORDER=R/C ROW=1-6   COL=1-5
   ROW  1 (SALES) <--
ENTER COMMAND:
                                                                  90 STATUS:
ROW                                                               91   RANGE:
---          ----1----  ----2----  ----3----  ----4----  ----5----  92 ROW RANGE
 1 SALES       1,000.0    1,100.0    1,210.0    1,331.0    1,464.1  93 COL RANGE
 2 COST OF GOOD  450.0      484.0      520.3      559.0      600.3  94
 3 SALES AND AD  200.0      220.0      242.0      266.2      292.8  95   MODE:
 4 RESEARCH AND  300.0      300.0      300.0      300.0      300.0  96 RUN PGM
 5 TOTAL COSTS   950.0    1,004.0    1,062.3    1,125.2    1,193.1  97 PROGRAM
 6 GROSS PROFIT   50.0       96.0      147.7      205.8      271.0  98 COMPUTE
 7                 0.0        0.0        0.0        0.0        0.0  99 NORMAL
 8                 0.0        0.0        0.0        0.0        0.0  100 DELETE
 9                 0.0        0.0        0.0        0.0        0.0  101
10 % C.O.G.S.     45.0       44.0       43.0       42.0       41.0  102 ORDER
11                 0.0        0.0        0.0        0.0        0.0  103
12                 0.0        0.0        0.0        0.0        0.0  104
13                 0.0        0.0        0.0        0.0        0.0  105  UTILITY:
14                 0.0        0.0        0.0        0.0        0.0  106 LOAD ALL
15                 0.0        0.0        0.0        0.0        0.0  107 SAVE ALL
16                 0.0        0.0        0.0        0.0        0.0  108 SET DRIVE
17                 0.0        0.0        0.0        0.0        0.0  109 SET UP
```

OMPUTING ORDER

hen the COMPUTE command is used, MicroPlan will compute for all ows of the row range. You can also compute for all columns of he column range by setting the computing order using the ORDER 102) command.

ORDER allows you to choose among four options:

1. ROW/ONLY Compute only rows.
2. COL/ONLY Compute only columns.
3. ROW/COL Compute all rows; then all columns.
4. COL/ROW Compute all columns; then all rows.

The ORDER command displays the current computing order on the top line of the screen. Initially, it is displayed as 'ORDER=R/C'. This is an abbreviation for option 3, rows then columns.

Suppose you have added a total column to the 5-year projection. You want MicroPlan to compute this total everytime you use the COMPUTE command. By choosing option 3 of the ORDER command as follows:

ENTER COMMAND: **102 <RETURN>** Set computing ORDER.

(ROW/ONLY=1,COL/ONLY=2,ROW/COL=3,COL/ROW=4): **3 <RETURN>**

MicroPlan will perform computations for all rows, then all columns for all future COMPUTE commands. Notice that the computing order in the top line of your screen has been set to 'ORDER=R/C'.

APPENDIX

There are literally dozens of serious business microcomputers and software packages available, and more are launched with remarkable frequency. There is little to choose between many of the offerings, and a thorough evaluation of all the software and hardware available would take so long that it is impracticable for small businesses and practices. A serious attempt must be made, however, to define the business or practice needs and to ensure that these are met by the chosen system.

The hardware market is changing considerably, following the entry of the leading computer and business equipment manufacturers like IBM, Dec, Olivetti and Philips. These companies, and a number of new competitors from the Far East, are threatening the early supremacy of the original generation of micro makers - Apple, Tandy and Commodore - who are fighting back with improved versions of their own machines. Apart from all these major names there are at least 20 other machines which might be suitable for your applications.

While the major manufacturers appear at first sight to be the safest bet amongst this host of imponderables one major drawback might be the lack of an easy growth path. These companies are all still interested in selling their larger machines and are in no hurry to convince users that a number of micros might be a better solution than a single minicomputer. Microcomputer companies might therefore offer a range which is more easily expandable.

Suppliers sell to small businesses through dealers rather than direct, so the quality of the dealer, and the support available from the dealer, are important considerations. Lists of dealers for both software and hardware are available from the manufacturers, the leading companies in business and accounting software are listed here:

Business package suppliers

A.C.T. ACT House, 111 Hadley Road, Edgbaston, Birmingham

Business Computer Services, The Pagoda, Theobald Street, Borehamwood, Herts

Compact, Cape House, Cape Place, Dorking, Surrey

Jarman Systems, 6A Dolphin Square, Tring, Herts

Omicron, 69 Wimpole Street, London W1

Padmede Business Systems, 351 Fleet Road, Fleet, Hampshire

Paxton Computers, 28 New Street, Huntingdon, Cambs

Peachtree Software, 43–53 Moorbridge Road, Maidenhead, Berks

Shortlands Computing Services, Shortlands, London W6

Systematics International, Cleves House, Hamlet Road, Haverhill, Suffolk

TABS, Sopers House, Chantry Way, Andover, Hampshire

VLASAK, Vlasak House, 8 Stuart Road, High Wycombe, Bucks

Practising office systems

British Olivetti, 86–88 Upper Richmond Road, Putney, London SW15

CBSL, Wroughton Place, Cardiff

Computer Services Midlands, Refuge Assurance House, Sutton New Road, Birmingham B23

Jenson Computer Systems, 30 Queen Square, Bristol, Avon

Star Computer, 64 Great Eastern Street, London EC2

MGE Systems, 111 Wardour Street, London W1

It is in the nature of these markets that new companies emerge frequently with improvements on existing products, often growing rapidly to overtake existing market leaders in a very short time.

There are four general sources of information on the latest products and suppliers which will help to identify these new companies, and help potential buyers investigate the products available – exhibitions, publications and consultants being the traditional ones, now supplemented by the National Computing Centre's network of Microsystems Centres.

Fourteen such Centres were in operation by early 1983, with a further one planned for the Strathclyde region. The Centres are intended to be independent sources of advice for prospective buyers of small computer systems. They provide training as well as 'hands-on' experience, away from the normal commercial pressures to buy particular products which exist in dealers' showrooms.

The initial locations are:

Central London	11 New Fetter Lane, London EC4
South West London	Kingston Regional Management Centre, Coombe Martin, Kingston Hill, Kingston on Thames
Ulster	Ulster Polytechnic, Shore Road, Newtonabbey, Co Antrim
S Yorkshire	Sheffield City Polytechnic, Dyson House, Sheffield 1
W Yorkshire	Leeds Polytechnic, Queenswood House, Beckett Park, Leeds 6

Milton Keynes	Information Technology Exchange, Civic Offices (Level 3), 1 Saxon Gate, Central Milton Keynes
Avon	Bank of England Chambers, Wine Street, Bristol 1
Hertfordshire	De Havilland College, Elstree Way, Borehamwood, Herts
Waverley	Inmap, 21 Lansdowne Crescent, Edinburgh 12
East Midlands	Trent Polytechnic, Burton Street, Nottingham 1
Merseyside	Merseyside Innovation Centre, 131 Mount Pleasant, Liverpool L3
South Wales	Polytechnic of Wales, Pontypridd, Glamorgan
Manchester	Salbec House, 100 Broughton Road, Salford
Tyne & Wear	Newcastle Polytechnic, Coach Lane Campus, Newcastle 7

A growing number of exhibitions feature some element of computing. There are seven major national ones which are particularly appropriate for small business and practice systems, and these are listed below.

These shows can be very helpful in identifying suitable products, but beware. First, many are dominated by hardware, second, just because a demonstration is working it does not mean you will be able to buy that product within the following few months, and third, look but don't buy, and unless you want to be deluged with sales literature don't give anybody your name.

It is impossible to evaluate products properly amid the hurly-burly of an exhibition, so if you see something you think you like, take the literature and follow it up later.

In chronological order, the shows are:

Which Computer? Show now established as the major exhibition in the business computing field. Held at the National Exhibition Centre outside Birmingham in January each year. A good spread of machines, peripherals and programs are on show, from the smallest to quite large systems.

Info '83/'84/'85 etc, at the Barbican Centre in London in February. A broad-based show covering communications and office automation as well as straightforward computing, biased towards larger organisations and systems.

The Business Computer Show, in May at Wembley Conference Centre. This has grown from an exclusively microcomputer show to include mini systems.

Office Automation Show also at the Barbican, in June. Aimed mainly at large company automation including electronic mail and integrated computing.

Personal Computer World Show in September at the Barbican. As its name implies, it is very much oriented towards small machines, and is still struggling to separate business computing from the hobbyist market.

The Accountants' Exhibition again at the Barbican, in October. Not exclusively concerned with computing, but obviously aimed entirely at accountants.

Software Expo at Wembley in November. Solely concerned with software and therefore a welcome escape from machines, and with a good representation of financial software.

PUBLICATIONS

A wide and growing range of magazines are available either on subscription or through newsagents, which try to help buyers choose the right systems and implement them correctly. Apart from specific reviews of both machines and packages, these also provide a marketplace for new products, although buyers should obviously treat advertisers' claims with caution.

The International Directory of Software is a comprehensive collection of software packages, the majority of which are in the

accounting area. Packages are categorised according to application and the listings show the kind of machines they run on as well as numbers of users. A microcomputer version of the directory will also be available from July 1983.

They are both available from VNU Publications, 53 Frith Street, London W1, or you should find a copy in good libraries.

CONSULTANTS

The Computer Services Association (5th floor, Hanover House, 73/74 High Holborn, London WC1, telephone 01-405 3161) will supply details of its members offering consultancy services, as well as in other fields. The CSA is the trade body for the computer service industry, but is dominated by larger organisations.

The Association of Professional Computer Consultants is a relatively new organisation established specifically for computer consultants who are completely independent of any supplier or software house. The nature of the industry means that its membership is therefore fairly small, but the APCC will tell you about any members in your vicinity, and they are mostly concerned with smaller businesses. The APCC is based at 109 Baker Street, London NW1.

The Institute of Management Consultants' members do not all specialise in computing, but many have expertise in that area. The IMC is at 23–24 Cromwell Place, London SW7.

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