Micros for Handicapped Users

Peter Saunders

Foreword by Baroness Masham

Helena Press

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Illustrations
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HELENA PRESS

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FOREWORD BY BARONESS MASHAM OF ILTON

President of the Spinal Injuries Association.

1984 with the hot Summer, has brought more than the usual amount of high lesion tetraplegics from diving accidents. These are all young people and when they break their necks many of them remain paralysed from the neck downwards. Unable to feel or move. With good treatment they have a long life ahead of them, but the quality of their life will without doubt be wider and better with the "new technology". The diving accidents I have mentioned are just one example of many of accidents that can have lasting effects of disability. There are blind people, deaf people, those with mental handicap and hundreds of others from all sorts of injuries and illnesses.

This book will give hope, advice and information for many who are disabled or for those who want to help them.

I have the greatest pleasure in saying thank you to the author.

We live in a new micro age. It is the ability, and not the disability which one should concentrate on. As one door shuts another often opens. I hope this book will do this for many people who are interested in projects in computing.

Masham of Ilton

Chapter One

WHAT CAN A MICRO DO?

A micro is capable of many tasks, given the right program and the right extras. For instance, a program could be a "word-processing" program, in which case you would need these extras: a screen, to show your words, and a printer to show your words on paper.

A micro enables you to put information in;
it processes that information;
it stores it in its memory;
it presents it (on a screen,
by sounds or speech,
by printed words or figures).

How does it work?

That question is answered in the specialist books and magazines. However, if a layman's answer will suffice: it works by computing – adding, subtracting and so on. Someone had the clever idea of assigning numbers to letters of the alphabet and to marks of punctuation; that allowed users to type in words and text so that a word-processing program could present them in print, on a screen or on paper.

The languages used in microcomputer programs exploit the micro's ability to calculate. They are full of concepts like: "if this . . . then that", "do this over and over again", "try this and if you don't get the answer you want then try that". If you were to keep up this sort of questioning, storing each answer in your memory, you would solve many problems in your daily life. For most of us there just isn't enough time and our memories aren't equal to the task.

And whereas a human being might hesitate before attempting to get information, for example by asking you a question, for reasons of tact or just plain hypocrisy, the micro (if it's programmed to do so) will cheerfully ask, in the middle of an enquiry about your life expectancy: "Do you smoke more than . . . cigarettes a day?". You suspect that it has remembered your age, your disability, and your attitude to stress, from earlier questions; and you suspect rightly. When it delivers its verdict you'll know that a statistician has probably helped the programmer and the micro has helped them both.

One reservation

A micro can calculate much more quickly than a human being; it can do many things more quickly; unfortunately, if a human being puts an error into the calculation the micro will repeat that error much more quickly and much more often than a human would!

How large is a micro?

It can be as small as a London telephone directory and about the same weight: a "lap" computer sits on your lap or on a wheelchair tray. It is about the weight of a telephone directory, too, has its own screen and runs most of the programs found in larger micros. Simply because these "lap" micros will fit easily on the tray of a wheelchair and because they are truly transportable you will see several references to them in this book.

The size of a microcomputer used to be dependent on having a box for the computer processor itself, a keyboard, a screen (with a cathode ray tube behind it), and one or two essential parts. Today the box seems to have disappeared; mostly its innards are tucked away under the keyboard in the form of wires and "chips"; the cathode ray tube may be replaced by the kind of display you have on a pocket calculator (giving a flat screen). It can show about twenty lines and each line can be about the length of a line on this page. Screens are also called "monitors".

A lap micro.

Keyboard size tends to remain as it always was, simply because people like to have spaces between the keys – but like everything else in this world of microcomputers even that need not be true. You will see in Chapter 5 details of various aids. These include alternatives to the QWERTY keyboard (if you look at the top row of letters on a conventional typewriter keyboard you'll see why it is so called).

However, if you want a larger micro there are plenty of them about, some with a screen attached to the keyboard area, some with a separate screen which receives your messages by infra-red ray, or something like it. The screen can be wide enough for you to see eighty characters across. (When you see this kind of remark in the ads remember that to a computer a space is also a character, just as much as this full stop is a character).

Is a screen essential?

The screen is available for sighted people but with modern technology everything on the screen (and much else) can be spoken to you. As you type the heading to your report, the voice accompanies you. It says, for example,

> "Centre–capital R lowercase e–p–o–r–t–left margin ten–right margin eighty–carriage return . . ."

Talking word-processors, voice-driven spreadsheets, talking calculators – you can even have the voice of Kenneth Kendall, the BBC newsreader, if you wish.

We have ways of making your micro talk!

A keyboard needs hands (but does it?)

But, you may say, I can't handle a keyboard because of my disability.

Keyboards aren't essential any more and for many purposes they can be replaced by a pad which you simply press, with finger, elbow, toes, pointer or whatever is easiest. There are overlays for keyboards: they offer only those symbols needed by one person for one kind of program. For example, in a certain kind of program a visually impaired user might be required to press a green square or a red circle. In the Special Schools they call this "the concept keyboard" because it gives a complete message instead of one letter or digit at a time.

There are also keyboard guards which ensure that only one key is struck at a time; and a "one-handed word processor" is also available (you will find details in Chapter 3). And there are "joysticks": instead of pressing a key you move the gadget like a gear lever and the display on your screen changes accordingly.

And there are "light pens" which you point at the screen or at some other sensitive piece of equipment. And there are . . . well, take a look at Chapter 5 and you'll see examples of the inventiveness and ingenuity of modern technology.

The extras

Before you begin you'll need to load information into the micro just as you need to play something on the tape of your cassette player. When you've done your calculations or entered your figures or written your letter you'll want to store it somewhere – just as you might want to record something on the tape of your cassette recorder.

You can load and store your micro work on a cassette (the same cassette you use in your cassette recorder) or on a disk (which looks like one you might play on a record player).

Some programs are stored on what is called a "cartridge", a small box the size of a packet of small envelopes, which you press into a socket on your micro.

Or the information you need (your program) may be stored inside your micro on what is called a ROM CHIP. And you may find you can store the results of your work on another chip, called a RAM CHIP. The names don't matter. Perhaps you remember £sd Few people ever knew what the individual symbols stood for – but everyone knew what £sd meant.

Another way of storing your ideas can be by printing them on paper. So you can store them on a cassette or on a disk or on a RAM CHIP – and also print them out on paper.

And the "program"?

A micro needs a program to tell it what to do. The micro is "hardware" and the program is "software".

In the olden days you had to learn a language in order to write a program for a micro. Nowadays you buy a program – after making sure that it's compatible with your micro.

Or, you may be able to collect programs out of the air, from TV or radio rather as you might record sound on a tape recorder.

There are also programs which write programs, program "generators". With a program generator a parent, for example, could first decide what to teach a child, then give the information on a screen or by sound, and finally test whether or not it has been learnt. (MICROTEXT, published by Acornsoft, is an example). There are business applications also, for example in the designing of invoices and other documents.

Or, if you're as bright as the contributors to THE TIMES Microcomputer Challenge (mentioned at length in Chapter 4), some of whom were aged fourteen or less, then you might wish to learn a computer language and write your own programs. This has been made considerably easier by the invention of *Basicode*, a kind of universal language, because programs can now be adapted so that they are compatible with most micros.

AC or DC?

What about the power supply, all those trailing wires and plugs and switches?

Forget it – nowadays you can buy a micro into which you just poke four AA-size batteries. The printer still needs mains electric power but they're working on that.

> That goes for anything else remotely technical in this book: it will be simpler in a couple of weeks' time.

Any more problems?

Well, there are two. And many more solutions.

Firstly, you need the money to buy or lease the micro.

There are ways of getting one provided. Have you looked in your Public Library recently? Many libraries have micros available for people to use.

Secondly, you will need to understand some of the jargon.

But that's becoming easier.

There is a third problem.

You'll need to know just what a micro can do *for you* or for the person you're caring for.

There is a growing awareness among the computer people that disability exists (that's a polite way of saying that manufacturers see the profitable side of producing micros for people with physical or mental disability). Demand has created supply. ACORN, for example, has a special department concerned with disabled users of its BBC microcomputer, details of which you will find in Chapter 12 (Manufacturers and suppliers).

Which system shall I get?

In this area of technology manufacturers and suppliers change their products rather quickly so I shall not be recommending any particular system in this book.

My concern is simply to demonstrate the possibilities and if you or your therapist find a use for any of the products, all well and good.

The first contact for a handicapped or disabled person could be the voluntary agency with which s/he is most often in touch. For example, a partially sighted person could get in touch with the RNIB. They are able to report on the latest developments in, for example, speech synthesis. (See, for example, the excellent advice in S.I.A. Newsletter No 32 – August 1984.)

If you explain your needs you may get help from your local Polytechnic or technical college. In both places there may be students who are quite anxious to devise something which will help a disabled person and at the same time help the student to gain credits in the course of study s/he is undertaking.

In the case of educational systems more programs are written for the Acorn BBC micro than for any other.

For those concerned with Special Education there are four "Special Education Micro-electronics Resource Centres" (SEMERC) in England, with similar organizations in the rest of Britain. Mention of their work is made throughout this book.

The voluntary agencies are engaged in research into ways in which micros can benefit their members. The RNID, for example, has produced a microcomputer system designed particularly around the needs of deaf children. MENCAP is actively engaged in research (A reference to *"Parents Voice"* appears in Chapter 9).

There is also a selection of recent research literature in Chapter 11.

The specialist microcomputer magazines can be extremely useful, since they not only report on current developments but also give an idea, through their advertisements, of current prices.

The British Computer Society (Committee for the Disabled) has lists of aids for the disabled and will be pleased to give advice.

Finally, many public libraries have specialist sections on micros – even if they haven't, the assistants are trained to put you on the right trail for specialist information.

To summarize: you'll need

(a) keyboard, with computer within or beside it, or a substitute-keyboard;
(b) a screen (monitor);
(c) a cassette unit or disk unit or cartridge or ROM and RAM CHIPS;
(d) a printer;
(e) a program;
(f) advice.

Some objections

"I can't afford it".

Some Public Libraries in the UK now offer facilities for using a micro and also lend out software (i.e. programs).

It is sometimes possible to get financial help from a Disablement Resettlement Officer (Chapter 6 has more on this).

Prices are falling anyway.

"I have poor eyesight and can't easily discriminate between colours".

Some screens (monitors) have white characters on a black background, some have green on a black background and some have orange on a greyish background. Others can show a wide range of colours. Like so much else in this field there are new developments every year.

But beware of attaching your micro to any old TV. Some makes of micro need a special monitor to stop the writing from wobbling on the screen – diagrams and pictures are not so bad to watch, but staring at partly-legible writing can be a pain.

"I might get an electric shock".

Be careful!

"I once looked at a book on micros and the language put me off".

Me, too. However, there are now computer languages which are similar to English (or whatever your mother tongue is). Program writers are trying to make their programs "user-friendly". If you think about the hundreds of characters in Japanese you may sympathize with the efforts of Japanese researchers to be the first to develop a "natural" language for computers of the "fifth generation".

"I don't want to look stupid in front of my kids/my patient/my pupils/my spouse."

Everyone looks stupid at some time in their relationship with a micro. Expert demonstrators find that things go wrong (and they say

cunning things like, "She doesn't seem to like that", thus managing to transfer the mistake to a human female rather than to a package of wire and plastic).

"But my patient can only move his head/eyes/toes".

There are experts in electronics, many kicking their heels in the lower forms of our schools, who are capable of inventing and making switches and other aids for people with restricted movement. There are systems which require only the blink of an eyelid to produce information on a screen. (See Chapter 5 for details). And it's not unusual to see in a Special School a child wearing a helmet with a head-pointer attached with which he strikes the keys. Some attend the local technical college and learn to write computer programs, using only their head-pointer attachment to write.

"I've never learnt Braille".

There are micros on which you type normally and which produce Braille in printed form. See, for example, *MicroBrailler* in Chapter 5.

"All those rolls of green-lined paper with holes in . . ."

The days of music-paper and dust-free rooms are gone into the archives of the movie-makers. If you want to print a letter on plain paper you can do so, and single sheets at a time, too.

That's progress for you!

"It's no good – I'm too old/too young".

Later in this book you will see programs written by fourteen-year-old youngsters. You will also read the experiences of a seventy-five-year-old youngster, disabled and housebound.

Listening to the experts

Computer people tend to use rather pretentious language. When you start to look around you may meet expressions which turn you off; unfortunately, too, some salesmen use expressions which are intended to confuse rather than illuminate. My advice is: ask. If someone uses a word which sounds familiar but doesn't seem to make sense to you, ask what it means. Otherwise you may be misled by the many ambiguities in this field: *"write"*, for example, doesn't mean "write", and *"read"* doesn't mean "read".

Again, you would be wise to enquire about anything which doesn't make sense to you: there's not necessarily anything friendly about a "mouse"; and as for "dongle" . . .

Magazines like *Personal Computer World* and *Practical Computing* offer glossaries of terms which might otherwise perplex their readers; you will find these magazines very useful.

In the meantime, please use the Index of this book because I shall explain meanings as they crop up rather than weary you with translations at the start.

Questions to ask

The most important consideration for anyone borrowing, hiring or buying a micro is compatibility. When you read the advertisements check that the program (or "periferal", as extras are called) is compatible with what you already have or have in mind. Some experts advise that you start by looking for a suitable set of programs and then get the system ("hardware") which will run them.

Memory

Nowadays most micros come with enough memory to satisfy all users. Don't be misled by the actual size of a micro: a small "lap" micro may hold as much in its memory as a large table or desk model.

Think about the tasks you have in mind and then pose your question, such as, "Will it hold a thousand records of about fifteen lines in each record?" or "Can I store 150 pages of A5 sized text?". You may not get an immediate answer but at least the expert will know your requirements.

Don't be put off by the sharp intake of breath when you mention what you have in mind; other people may not have thought about your particular requirements.

For example, if you really want to use a micro to work out astrological predictions you will already have worked out how many calculations and of what sort you will need. Tell the expert what you have in mind and ask how much memory you'll need.

Language

It's worth your while to ask what language the system uses. Most use BASIC and most programs which you'll need are written in BASIC. However, it could be just possible that the system you have in mind runs on a different language (or several); in that case get a second opinion.

Guide book/Manual

They call this "the documentation". Take plenty of time to look at this; start by looking in the Index for something familiar. If there isn't an Index the book should at least deal with things in alphabetical order. You're going to need this book in a hurry when you want to know what to press.

Keyboard

You'll find references to keyboards and substitute keyboards elsewhere in this book.

If you are a touch typist check that you can see the screen adequately while you type – or does your wheelchair distance you from the display?

If so, remember that there are specialist firms which supply computer furniture which fits over a bed or enables you to clamp several things to your work space. (*"Orange Aids"* are mentioned on page 56).

Do the keys click as you want them to? (The click is put in as an extra to reassure you that the micro has accepted your keying-in).

Is the pressure OK for you? Or is a letter or digit repeated several times when you depress a key?

Can you type a £ sign? (You'll need to ask the same question when you inspect a printer).

Screen (monitor)

Is it large enough for you to see the display at different distances?

If it is a "lap" micro, can you adjust the viewing angle? Generally only one person at a time can see the display on a "lap" micro, so you'll need to hold it yourself or see it in position on your wheelchair tray.

Does the display annoy you in any way? Remember that you'll be staring at it for long periods at a stretch.

Colour

Is it suitable for **you**? If you intend to use the micro with a mentally handicapped person, will the colours be easily discriminated?

Sound

Can the volume be controlled?
Can speech be added (input)?
Can speech be recognized?
Music?

Printer

Do you want it to print letters and reports with good quality impression?
How long will a ribbon last?
Does it need special paper?
Are you going to want to print on a roll or fanfolded paper?
Will it print single sheets?
Is the noise going to upset anyone in the household?
Is speed of printing important to you?
Will printing stop automatically at the end of each page?

Cassette unit

Is there a counter? (Useful if you want to find a particular program in a hurry).

A micro-cassette may be more useful if space is limited. But ask about transferring programs from a standard tape recorder to your micro (data) recorder.

Disks

While you are using only a cassette for loading and running programs time does not seem all that important: you get used to doing other things at those times.

However, when the time comes for you to think about either speed of access or how to store and retrieve a great deal of information, then you will need a disk drive or some other method of storing your data.

Do you need a single disk drive or dual drive? (Don't make any sudden decision on this one unless you have a lot of money).

Disks tend to be more reliable than cassette tape but not always. Ask to see an actual disk inserted in the disk drive and formatted; it will give you an idea of what happens and it could just happen that the particular disk is defective. Unlikely – but it can happen.

Ask how you "back up" a disk so that you always have a duplicate of your important material (files).

And bear in mind that a "five year guarantee" is meaningless: if you lose your store of material it can't be replaced, except by your own hard work.

Other stores of memory

It is now possible to store information, programs – almost anything that can be transmitted – on a chip. The chip can be housed in the micro; instead of loading from a tape or disk you can simply press a key and see the information on your screen.

Running your first program

People forget how fearsome a micro can be at times and especially at the first attempt to run a program from cassette.

So here are some hints, based on many, many mistakes and a great deal of lost time.

First: let's assume you have bought a program on tape (software).

The most important advice is: **READ THE NOTES.** It's very tempting to try to run the cassette, much as one would any audio-cassette "just to see what's on it". The notes may contain warnings or hints which explain what might happen if you simply run the tape. So look at the notes and if they don't tell you how to "load" your program have another look at the guide book/manual issued with your micro.

If the program doesn't load at first, don't worry. You may get an error message on your screen – that is merely to let you know that you'll have to rewind the tape and think about what went wrong.

The two most frequent causes of error at this point are:

dirty head on the cassette player;

or wrong volume setting on your cassette.

This first loading of your program is crucial although your impatience is understandable. If the tape doesn't load you will send it back and get your money back; but after all the hassle of choosing a program, making sure it will be compatible with your system, checking so far as you can that the firm is reputable, you really don't want to have to return the merchandise. However, sometimes the thing really will not run and you'll have to face it.

Mostly, it will run. So try again and read the booklet or notes very carefully.

If it does run successfully you will want to make a back-up copy. If you don't, someone will tread on your cassette or the tape will stretch with frequent use or something dreadful will stop it from ever running again.

Chapter Two

WHAT CAN A MICRO DO – FOR YOU?

Attitudes are changing and the workplace is changing: we hear less about how convenient it is to have a blind piano-tuner visit the home and more about data processing which can be done by people with varying disabilities.

The advertisements for lap micros frequently show a shirtsleeved "executive" in his hotel-room, with *modem* cradled on the telephone rest and a clipboard of figures waiting to be keyed in. Next stop Tokyo, or Perth or Peking. Whichever of these places you may happen to live in can be *your* workplace, so long as your micro has this attachment (plus a word-processing program which includes all 7,310 Chinese characters). And while the rest of the population, the able-bods, are playing Bingo or watching TV you can be communicating, sending messages or lists of figures or both, anywhere in the world and at off-peak rates.

It's already happening. People are lifting the phone off the cradle, dialling a number and seeing or hearing a "Welcome" message, then keying in either their request for information or their response to someone else's request. Some of the press agencies allow you to consult their extensive files; some of the world's libraries allow you to get information on practically anything: their catalogues are databases and they are searched in seconds.

So welcome to the big world of information gathering and dissemination! With or without a keyboard, with or without a desk which slides over your bed or your wheelchair, with or without some of your senses you can take part in activities which may be work or may be leisure, depending on how you define them.

The new technology

There is another aid, also linked for the most part to the use of a micro. At the moment of writing there are businessmen and women all over the world wondering how to use it to maximize their profits and there are technical people wondering what else it will do. No-one has yet mentioned the potential for helping disabled and handicapped people but, given some hard questioning from your representative agency, they will.

The helper you've been waiting for is a robot. At the moment robots are waiting in the wings to enter the stage and their developers are making them more and more useful.

If you find it difficult to move, why should not a robot move for you? If you have difficulty in grasping, why should not a robot move to what you want and grasp it, turn it, bend it, move it, avoid bumping into people and things, carry it, put it down, switch it on or off and signal to you that it has done so?

In other words, why not avail yourself of the technology (the "new technology" as our masters call it) to enhance your leisure, perhaps to increase your job prospects but certainly to bring you closer to independence?

In the following chapters you will see programs written for disabled people. You will read about some of the most useful applications of a micro, namely: word-processing, compiling a database and using a spreadsheet. This practical illustration is followed by a survey of even more practical *aids to independent living.* Therapists are becoming increasingly aware of the help which a micro can give and of the various switches and gadgets which can be operated, sometimes by the blink of an eye. There follows a Chapter on using a micro to get and to hold a job; for those interested in micros in Special Schools there is a Chapter on some of the programs which teachers can inspect and use at a Special Education Micro Electronics Resource Centre *(SEMERC).* Parents and others may find some useful suggestions for ways in which they can educate their dependants, encouraged, perhaps, by the experiences of other parents as related in Chapter 9. Then follows a Chapter on independent living, again with examples of the uses of micros by a profoundly deaf young woman and by a disabled and housebound man.

The book concludes with a list of topics which have been the object of research into uses of micros by handicapped people and with a list of useful people and organizations.

The Open University "Awareness Pack"

As an example of the help which is available, albeit to teachers in this instance, here are some details of part of the "Micros in Schools" project of the Open University.

For what is usually called "a modest sum" you can buy the "Awareness Pack", after making sure that it is compatible with your micro. It introduces you to a micro in a non-condescending way with helpful diagrams showing how to connect a cassette recorder, among other things. It includes eight sample programs on cassette and a full description, not only on how they work but also with suggestions for using them with children in school. Even if you have no connection with education you could find that these programs give you confidence and perhaps even allow you to explain your micro to a child (although the chances are that you would become the learner).

One program is called "Eureka". It demonstrates a number of concepts in an amusing way. There is an outline of a bath with a plug and a tap. Press a key and the plug is put in the bath; press another and the water comes out of the tap. If you leave it like this, water floods out of the tap and eventually onto the floor – all this time recorded on a graph. You

begin to see the educational use of the program and the questions which a child might ask. Notice that so far you have pressed only two keys. Press another key and a man is in the bath; press a fourth key and he starts to sing. But he won't sing if there's no water in the bath. And when he gets in the bath you see the water level has risen. When he gets out, the level subsides. All this is recorded on the graph which quietly and smoothly draws itself as the program continues.

Useful for a normal child, yes, but it has also some appeal to a mentally handicapped youngster. He may learn to control something (in this case the flow of bath water, its level and the appearance of a man in the bath) by pressing the appropriate key. And if it takes him several hours or even days to recognize the correct key, this program surely has something to offer, even though it was written for people of normal intelligence.

There are other programs which introduce you to the possibilities of using a micro. You can list the names and telephone numbers of your acquaintances and then retrieve them individually by "keying in" their initials or their number or a part of their name: the basis of a data base.

You can observe and partly control the comings and goings of customers in a take-away food shop or bank. This program shows the customers arriving, the sales staff either serving them or taking a break, the customers who leave without buying anything; and at the end gives a record of the average length of each transaction.

In the program called *"Turtle"*, about which you will read further remarks in Chapter 8, it is possible to get a small shape, which looks a bit like a turtle, to execute movements which can become quite complicated. Programs like this can help you to see the possibilities of getting a robot to move around the house and carry out tasks.

There are other programs available commercially. I use this example simply to make you aware of one of the ways in which you can teach yourself about micros without anyone breathing down your neck.

It seems pointless to designate any one program as specifically therapeutic or educational or indeed of any particular use or interest. It is for the handicapped person or for the carer to work out whether it has potential.

Programs which help mentally impaired children to recognize shapes can also benefit others, for example, those recovering from a stroke.

There is a program which introduces shapes like triangles, squares and circles. The shapes appear in one colour at the top of the screen; as each one slowly descends it has to be matched with an identical triangle, or square or circle, by a keystroke, so that the original shape covers the shape to be matched, in the correct colour.

It may sound like child's play. It is the kind of assessment procedure used (as you will see in Chapter 10) for measuring and recording degrees of spinal injury and effectiveness of treatment.

It is hardly surprising that even in a court of law nowadays there are occasions when compensation for injuries may include the recommended provision of a micro. In a recent case, a brain-damaged child was awarded compensation with a comment from the judge that a micro might help

her to communicate. Her head teacher said, when the child had been using the micro for some time, "No one knows her potential: our target is to help her reach towards it."

Do it yourself

Most computing people, when you ask if they can solve a problem (they call it an *"application"*, so you would do well to use this word) think to themselves in what is called BASIC. This is a programming language, of which there are several, which is extensively used to teach students and hobbyists how to write computer programs.

So be prepared for some tut-tutting, followed by remarks like, "You'd need a lot of memory", or "Too many variables", or even "The strings would have to be concatenated". When you can get a word in edgewise you could point out that memory is not too difficult to obtain: even the cheapest micros nowadays have a great deal of memory available to them – something which was unheard of two years before they were put on the market. As for the other objections, and any other technical matters, there's no point in commenting. Your best plan is to say something encouraging, like, "I know it's not the sort of thing you're asked every day but someone told me that you were the best person to ask".

Sooner or later you may find that the answer to the programmer's problem lies in using a language other than BASIC. It has its limitations, as do all languages; but some are more adaptable to the kind of thing you want doing: controlling a robot, producing speech, playing around with words, simulating different environments, and so on.

To be fair, some of these languages take a long time to learn. But it's equally true to say that some languages are associated with particular purposes, like COBOL which is traditionally (if we can talk about traditions in a period when computing is still growing up) associated with what is called *"business applications"*. Why should such a language not be suitable for what you have in mind? Quite simply, because nobody thought of what you had in mind until you mentioned it.

Never be put off by remarks which suggest that what you want done is too complicated or would cost too much. One computer language which is currently being developed is LOGO – it's used by school-children in the UK!

If we but knew it we might discover that the problems being studied by space explorers in Washington, Sydney, Moscow, Peking and elsewhere are identical with those which could be of use to disabled or retarded citizens all over the world. One obvious problem in common is the need to make as much use as possible of a confined space. No doubt you can think of other examples as you read this.

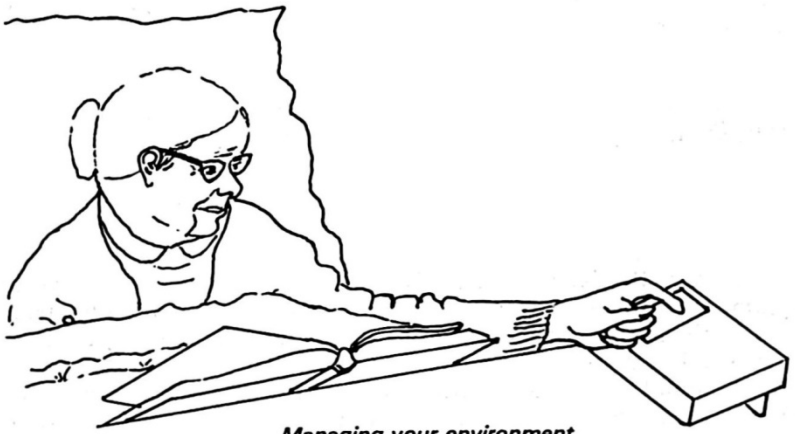
Do it yourself? Well, why not? If you have the time and a great deal of patience why not learn a computer language? You'll probably find the most accessible books have titles like, "Teach yourself BASIC"; it's probably as useful a way of starting as any. The point is that after a few days you will probably have a fair idea of whether, (a) you are up to learning this kind of thing, (b) it is going to help you to make like easier or more rewarding, for yourself and for others in the same boat.

The alternative is to get hold of some of the existing applications (i.e., *a program*) and try to make it work to suit your needs. If you have a mentally impaired child whose hand-and-eye co-ordination needs improving you could try using one of the many "arcade games" but slowed down to a point where the child can use it.

This isn't quite as easy as it sounds but it can be made easier if you know what you want and can explain it. The instructions may say, "Your task is to zapp as many aliens as you can by moving the joystick left, right, forward or back . . .". You know (or you think you know) that the child's capabilities don't extend to any of this.

But think ability, not disability. Supposing the task is changed to moving a coloured ball slowly across the top of the screen, very slowly at first, and finally (finally being several weeks later, perhaps) dropping it into a large bucket at the bottom of the screen. The skills are similar: you want to teach the child to aim. Your purpose is different: instead of the sub-human intention of killing, you want to help the child, in due course, to be able to feed himself by aiming with the aid of a spoon, *to help him towards independence.*

If this is the kind of thing you want done, you must think out your intentions and tell someone who is capable of writing a program. With a bit of luck s/he will not only be able to write a fairly simple program but will be able to suggest enhancements which will help the child even further; for example, a reward when the task is done, either in the shape of a funny face which suddenly appears on the screen or in the sound of a pop song which comes from the sound control of the micro.



Managing your environment.

So, to sum up: you could learn to write a program yourself – and after that you'll find the next program easier. Or you can find someone who can adapt an existing program – there are pupils and students who are looking for original ways of doing a project in computing and there are other people who are looking for a challenge of this sort.

. . . Or let your micro do it all

Micros don't get tired: useful for air-traffic control and ambulance centres – where 2 am is just as crucial as 9 am.

The trouble is that sometimes you can't get your micro to do what you want and you may feel desperate enough to try to learn a computer language. But learning micro languages is not to everyone's taste. For one thing, it takes time to learn a language and for another you could just find that you have wasted your time.

This is because there is a shift in emphasis on the part of the manufacturers – the experts who build a language into your micro. In the early days manufacturers wanted to make life easier for the computer rather than for the user; a language like BASIC was found to use little power and little memory, hence little strain on the computer. Newcomers struggled to master BASIC because that's all there was.

The only people around to guide the amateur were experts who had spent years on what they called "mainframe" machines. You remember those old TV documentaries with air-conditioned rooms containing only large metal cupboards and strange drums of what looked like cassette tape? In those days memory was expensive, so expensive that programmers were urged to try to get two lines into one and to cut down their words (but not their digits) to the minimum. This meant that there was no chance of telling the amateur user that s/he should do this or that. Instead, all you got was a peremptory order (the guide books called it a "command") usually with a question mark following it.

Imagine how a new micro owner felt when he started to run an expensive program which claimed to tell him how many years he would be paying off the mortgage and saw on the screen:

AMOUNT?

or even just

?

By contrast, the language LOGO makes it relatively easy to write a program, even to program a robot. Perhaps the early computer people just couldn't envisage a time when memory would be relatively cheap and easy to install in a micro.

The eventual aim is to do away with software programs written in "computer languages" and to have the micro simply accept and carry out instructions given in *"natural language"*.

A micro with instructions on the screen in Welsh has just been developed, as has one in Arabic – your turn will come!

Contemporary attempts to get micros to respond to "natural language", by the way, are given the name *"fifth generation"*. So you could just find that by the time you have mastered BASIC your micro will respond only to your own mother tongue.

ERRORS ARE PART OF THE FUN

It is important to realize at the outset that you are expected to make mistakes – indeed all micro systems have what are called "error messages" built in. They are usually paraded proudly in a special Appendix in your guide book and they may occupy several pages. So you see, if you never made a mistake the manufacturer would have been wasting his time.

Among the quaint sayings of computer folk is "Garbage in: garbage out". It's worth remembering this adage and bringing it out when someone is debugging your program because it will demonstrate your proper attitude of humility.

However, let's imagine you have read the guide book. You switch on your micro and do everything the books says, one stage at a time. Then everything stops, apart from a threatening message on the screen.

> Resist the temptation to panic: you haven't broken anything and you probably haven't done anything wrong. My advice is to switch the micro off and have a think about it all. The chances are that the particular error message was not written into the program you have loaded and had hoped to run. It may simply be one part of the system telling another part of the system that you can't go any further without altering something.

Here's an example.

During a word-processing session you have entered some text. You look up and down the screen to check that it makes sense. When you're satisfied, you press the key which tells your printer to print on paper and you get something like:

BF error in 3043

That's what they call a "friendly" message; a few years ago you would have had nothing but a blank screen and no response from any of the keys.

So this is why I say, "Switch off and have a think".

Your micro system is probably behaving in its own logical fashion and is interpreting a line of your BASIC program.

No doubt you would prefer something more meaningful, something like:

Switch the printer on, dummy!

Experts make mistakes like forgetting to switch on the printer: it happens all the time. This is no reason to throw away your micro. Just consider it as part of the fun of using a micro.

Very often when you get an error message on the screen your micro is trying to tell you something you already know but have forgotten.

When natural languages come along you'll get these messages in your native language – though you could be a little embarrassed if you get:

You said the maximum number of records was 1000
and now you've been and gone and entered 1001

The founder of a form of BASIC called *"Microsoft"*, Bill Gates, says that computer manuals need to be improved. He has proposed that a manual be printed in three pieces.

First should come the "cookbook": this gives the user sufficient knowledge to do some useful things with the micro.

Next should come the tutorial: this should explain how the micro works and how the keyboard operates.

The final part should be a reference section. There should also be a full index and a built-in HELP facility. The user should be able to press a special HELP key, probably coloured, and would then see a message on the screen saying exactly what was happening at that moment e.g. "waiting to print your document".

And the micro would save up these messages, would learn the kind of mistakes which the user made frequently and would thus be able to give a special tutorial to the user pointing out how s/he could avoid these frequent errors.

Learning more

Five diverse courses, some for all ages, are organized on Southampton University campus by Dr & Mrs Lionel Wardle.

Last year a new course for the physically handicapped had 400 applicants for 25 places. They can now provide 180 places.

Many handicapped people are not disabled when it comes to handling a computer and the comparatively cheap micros open up many job possibilities. There are two million disabled people in Britain; to spread knowledge of how computers can help them, the Wardles are organising courses for teachers of the physically handicapped, care assistants and therapists.

Dolphin Camps started in 1982 with financial assistance from the DoI's Education Unit. Each child has the use of a 48K Sinclair Spectrum or BBC micro (and possibly a Sinclair QL); staff ratio is one to five. After a week most beginners can do simple programming in BASIC or LOGO; more advanced children can learn Prolog, Forth, Pascal, advanced BASIC and machine code. All can experiment with graphics, computer aided design, networks and word processing or they can build a robot.

Interest is increasing in the LOGO language, conceived in the 1960's and largely developed by MIT and the Department of Artificial Intelligence, at the University of Edinburgh, who are again organizing courses.

For more information contact:

Lancaster University, Conference Office, University of Lancaster LA1 4YW

Loughborough University, Centre for Extension Studies, Loughborough University LE11 3TU

Millfield Village of Education, Street, Somerset BA16 0YD

Computer Park '84, 25 Bridge Street, Rothwell, Kettering, Northants NN14 2JW

Learning at Leisure, Dr & Mrs Lionel Wardle, 37 University Road, Southampton SO2 1TL

Camp Aldenham, Aldenham School, Elstree, Herts. WD6 3AJ

Dolphin Activities Ltd., 68 Churchway, London NW1 1LT

Camp Beaumont, Beaumont House, 73 Upper Richmond Road, London SW15 2SZ

The Management Centre, 2 Doughty Street, London WCIN 2PN

The Department of Artificial Intelligence, University of Edinburgh, K R Johnson, Forrest Hill, The University, Edinburgh EH1 2QL

Chapter Three

DATABASES, WORD PROCESSING and SPREADSHEETS

Yes, it's a formidable heading. But it's as well to get to grips with the main uses of a micro before reading in the next Chapter about the detailed programs which are becoming available for handicapped users.

The three "applications" in the title of this Chapter are the main uses in the world of business, so much so that many micro systems come complete with one or more of them included as what the suppliers call a "bundle" of programs. Not surprisingly, some people choose a particular make of micro *because* of the bundled programs included in the price.

And it is not unknown for an Occupational Therapy unit or an Adult Training Centre (Social Education Centre) to use its first micro only for administrative purposes.

It is tempting to list all the patients or all the students on a database: those who arrive by ambulance can be listed separately from those who come by bus; records of those who need medication can be pulled out of the database; and those who come by ambulance but who do not require medication can be listed elsewhere. Who can fail to be fascinated by the possibilities of sorting clients by using a database?

The same is true of both word processing and spreadsheet programs.

Small wonder that the Royal National Institute for the Blind has set up an electronic office project to investigate ways of training blind typists and secretaries in the new technology. As with so many ventures, it is the voluntary agencies which show governments where research is needed.

In the Spring of 1984 THE TIMES published a competition (National Microcomputer Challenge). Competitors were asked to provide a microcomputer project involving a novel and socially useful idea and the notion of helping handicapped users was proposed as an example.

Not surprisingly, a great many competitors sent in programs aimed specifically at helping handicapped users and in Chapter 4 you will see the kind of programs which won a mention.

Those accounts of programs include references to features of microcomputer work such as word-processing and data bases. As they also use some technical terms it seems sensible to mention them now.

Business uses

Microcomputers are being used increasingly in business to ease laborious clerical chores, such as filing and routine recording tasks. They also undertake tasks which would not be feasible manually – such as searching hundreds of records and finding information in a few seconds.

A micro is also an ideal tool for accounting because it not only stores information but it can calculate and finally present the updated figures.

Databases

A microcomputer is, among other things, an electronic storage system: what it stores are facts and figures. Its storage capacity is usually described as its "memory".

A card index storage system relies on memory. You remember to sort the cards, you remember the order in which they are sorted (whether alphabetical or numerical), where they are filed and how to retrieve a particular card. Your card index stores data and so it may be regarded as a data base.

Any microcomputer is capable of running a database program. Its advantage over a card index is (1) it holds hundreds of records in its memory – one British produced database, it is claimed, holds 64 million records – (2) when you give the correct instructions it will retrieve a record and present it on the screen or in print in a few seconds.

Before setting up a database someone must decide what s/he will want to look up. The answer is then used as a base/basis for what is called a "file". Thereafter every item of data entered (input) is automatically indexed and stored.

If you are fortunate enough to have help in setting up a database from a computer programmer s/he will ask you at the outset, "How many records?" Don't let this throw you – you'll need pencil and paper to work out the answer and to plan the format of each "record".

A database program offers you choices (options), in what is called a "menu", such as:

find a particular record?
delete a record?
add a record?
alter a record?
print a record?
sort them in alphabetical or numerical order?

By answering "Yes" to any of these questions you will find that you are asked further questions until the microcomputer knows exactly what you want (e.g. "Which record do you want printed? Several records? All records? Printed as a label or in columns? Or in rows? Or do you want the record to be shown on the screen but not printed because it is confidential?")

Here is an example of how a database might help a voluntary organization to keep track of the needs of its members (and also to check that subscriptions have been paid!): it is a list of twelve "fields" which together make up a "record".

Last name:
First names:
*Birth date:
No & street:
District:
Town:
Postcode:
*Membership no.:
Date of joining:
*Date last sub paid:
*Disability type (A/B/C/D..)
*Marital status:
(and so on . . .)

The microcomputer will do the following tasks:
list members in alphabetical order, in order of date of birth, in order of their joining dates, in order of category of disability etc. As with a card index, when you ask for a particular feature, e.g. membership number, each record is shown in full.

Personal letters by the hundred

Yes, it's a contradiction in terms but "personalized" letters (as you will have discovered, no doubt) are now sent out in their thousands. Mailing lists are bought and sold in the market place.

A database program can be used in conjunction with a word-processing program, to send letters to different categories of client.

For example a completed record like the following can be extracted from a database. Then the micro can instruct the printer to (1) print a circular letter to all firms which fall into a particular category (2) print a label by selecting certain fields on the records.

The items asterisked can be read on the screen but they will not be printed; the label will consist simply of the first six lines of the record, (the first six "fields") but excluding those with an asterisk.

*Contact:
Firm:
Dept:
No & Street:
District:
Town:
Postcode:
*Discount:
*Category:
Last order:
Invoice sent:
Owing:
Statement 1: (dated):
Statement 2: (dated):
Sales rep:
*Comment 1:
*Comment 2:

How confidential is the information?

Confidentiality can be ensured by means of a Password. Unless and until the authorized user types in this Password the database will not operate. With a voice-operated system the password will not be recognized unless it is spoken in a particular way.

Selected records

It is usually possible to include a separate line ("field") in a database which refers to the group to which a person or organization belongs (rather like the term "category" above.)

For example the Administration Unit of a hospital might have some of its employees coded as follows:

A = Therapists
B = Catering Staff
C = Social Workers
D = Consultants
X = Part Time Staff

If the Chief Administrator wished to send a circular about hygiene to all part time Catering Staff the database would be instructed to select from all Group BX records (all Group B plus all Group X).

Finding a name

If the person retrieving information forgets the full name of the person or organization whose record s/he wants to see, so long as some of the name is recalled and typed in, the computer will do its best to find the record by offering several names which seem to fit.

You will see a similar facility offered by word processing programs in the section which follows.

If you wish to select a set of records, for example all customers who individually owe a firm more than £100, the computer will guide you through a series of questions until you have stated the "criteria" of your selection. ("Specimen database records" in Chapter 6 gives further examples.)

If your database is used for recording accounts, it should be able to give you answers, immediately, to questions like:

show all the receipts for the last 3 months
print all payments over £20
list all petty cash disbursements

and it should be able to select certain records

eg print names of all people owing me more than £20 in the last 3 months

In other words, a database should be able to extract information in a way that satisfies your needs – and do it quickly.

And as program-writers strive to make their programs more "user-friendly" you should find, after every inspection of a record, that you are asked:

> Do you want to change this record? (with appropriate questions in response to an affirmative answer)
> and
> Are you sure?

Nine times out of ten this last question will annoy you. But as you get more tired (and therefore more careless) you will be glad that you have not destroyed a week's work through pressing the wrong key or touching the wrong gadget.

A detailed example of using a database will be found in Chapter 6.

Word Processing

Early word processing was done on what were called "dedicated" word processors: this merely meant that the equipment would do word processing and nothing else. Some of the keys, for example, were specially marked with symbols meaning "Centre this text" or "Start a new page".

Nowadays most word processing is done on microcomputers which will do many other things: for example, run a database or an accounting program.

Systems for one hand or one finger

"Smartkey II"

This has been developed by:

> Heritage Software
> 2130 S. Vermont Avenue
> Los Angeles
> CA 900007 USA

and is distributed in the U.K. by:

> P & P Micro Distributors Ltd.,
> New Hall Hey Road
> Rossendale, Lancashire BB4 6JG

This enables people who can use only one hand to use word-processing programs.

"Microwriter"

Microwriter is a small electronic box which allows people to write one-handed by touching only five keys, using a series of "chords" to select the different letters.

Details from:

> Microwriter Ltd.,
> 31 Southampton Row
> London WC1B 5HJ

A further development is the "Quinkey" which turns the Microwriter into a low-cost micro which can be used by five persons at once. For teaching children to compose stories or keep a diary Quinkey has already been found useful in schools in Newcastle upon Tyne.

What can a word processing program do?

It can count the number of words used: very useful for authors, publishers and printers.

It can do many proof-reading tasks and do them accurately. It will highlight incorrect words and punctuation on a screen (and in colour if you prefer). It can also do the following:

Abbreviations

If, before you compose your letter or report, you know that you are going to use a lengthy expression several times, you may tell the microcomputer in advance to save you time and trouble. You simply write, in advance, for example: "S" = "Department of Health & Social Security". From now on every time you type (1) the control key and (2) S the microcomputer will print "Department of Health & Social Security".

Highlights incorrect words and punctuation.

Check spelling

Spelling can be checked by means of a program which contains a "dictionary" of at least 32,000 words. The way it works is to present your text on the screen, page by page. If it finds a word which its "dictionary" doesn't recognize the word will be highlighted. So you may find the word "writing" highlighted, as if you have made an error; this is because although it has the word "write" in its dictionary it hasn't got "writing, written, writes, wrote" and so on.

However, if you know that you are likely to write a particular word frequently, like the word "micro" in this book, you can add it to the computer's dictionary quite easily. Thereafter the word will be accepted as correct.

EDITING A TEXT: HOW A WORD PROCESSOR CAN HELP

Finding a word or a number

The computer has been described as "a powerful idiot". If you ask it to find, for example, the word "aid" it will find every word which includes "aid"; for example, if you have used the words "afraid", "maids", or "raids" each of these will be found and displayed on the screen. To avoid this you would need to type:

(space) aid (space)

because the computer thinks a space is a letter of the alphabet or a digit.

The computer will also search for a word on the basis of a skeleton crossword. For example

b??e?i?s

would find the word BENEFITS.
(After all, you might wish to know how many "e's" there are in "benefits".)

And words either beginning or ending with a group of letters can be found: "-able" would include "enable" as well as "disable" and many others.

Inserting

You can insert a page or a paragraph, a sentence, a word, a letter, or a digit. As you type the text to be inserted you will see the original text moving down the screen to make way for this new, inserted, text.

Transferring text

It is possible to shuffle words and paragraphs around. This can be very useful if you have written a letter and wish to add, as an afterthought:

"Sorry you couldn't come to the meeting. Hope you are feeling better".

This can be transferred to the beginning of the letter where it could make a better impression.

Deleting a word or a sentence

You can make spaces at any point in the text: this enables you to add a word or a letter or to delete words, letters or digits.

Replacing a word or a number

If you discover, for example, after writing a lengthy report about an aid which you thought was "Spelitrite" that it is "SPELL-IT", the microcomputer will replace "Spelitrite" with "SPELL-IT" each time it occurs, in a matter of seconds.

Starting a new page

One of the commands you can give to the printer (by typing a particular set of characters at the keyboard) is "Stop printing now and don't resume until I have pressed a particular key". This allows you to change paper at will; otherwise you could find that a chapter ends a few lines into a new page, or that page 2 of your letter is composed of "Yours sincerely" only.

Numbering the pages of a report consecutively

The numbering should continue – after you have temporarily stopped printing in order to make corrections at the keyboard or to the alignment of the paper.

Adding a comment

If you are going to use the same remark frequently it can be stored and then brought into the text at one stroke of a key.

Style of writing

There is even a program available (in the USA at present) which purports to correct faulty writing style. The micro is programmed with a set of "rules": it tells the writer when he has been too wordy, when words are too short, too long or have been used too often.

These criteria are set in advance by the writer. And if that doesn't make you shudder consider another program: this "translates" a text into a more persuasive piece of writing and reads it back to you. You first choose the tone of voice you want to hear, from a choice of "male", "female" or "kid talk". It can also sing!

Memory

Obviously all these facilities themselves use up a good deal of memory so you should make sure that your system has enough memory left for you to be able to write your own letters and reports.

Some considerations/objections

(a) Some people may consider that a word processor encourages laziness because you can afford to type without worrying about mistakes, knowing that you can correct everything when you have input the text. Others say that they prefer to do just that; they consider that a word processor allows them to make rough notes or a rough draft while the ideas are still in their minds.

(b) Although a normal printed page shows about 80 characters across, many micro screens show only 40 characters. So words may be split in awkward places and the text on the screen is not displayed as it would be on the printed page. However, some systems allow you to see the text as it will appear on the page, with indentations, new paragraphs, centred headings etc. as you have indicated them.

Perhaps with tongue in cheek, some program writers refer to WYSIWYG ("what you see is what you get") meaning that the screen shows exactly where each word and sentence will appear on a printed page.

(c) Much depends on the quality of the manual; make sure you see it before you buy. You will need several hours, possibly days, before you uncover all the ramifications of your word processing system but, even so, you should be able to get a fair idea of what it does from looking at the index.

(d) Your word processing program and printer must be compatible. Don't be fobbed off with remarks like, "You'll need an interface, of course". If you've chosen a system which is not compatible with your printer you'll pay a great deal to have the connections put right.

(e) Finally, word processing requires different skills and different attitudes from any other form of composing. If you have been trained to type correctly you will find it difficult not to keep checking the words as they appear on the screen and perhaps correcting them immediately. That defeats the object of word processing. It is more economical of your time and effort simply to compose at your keyboard or substitute keyboard; you can come back to the editing later – much later if you have stored your text on cassette, disk or some other medium.

And by editing I don't mean simply correcting spelling. There are real rewards when you discover the satisfaction of deleting something which might have upset your reader or including a telling phrase.

But can I talk to it?

Yes, you can. And your micro can talk to you.

Speech production

Speech can be produced by a micro by means of "phonemes" (which, unlike some of the jargon, is a respectable linguistic term).

A phoneme is a unit of speech which can be linked with another to form intelligible speech. A user can therefore define units of a vocabulary which s/he wishes to use, including, for instance, people's names. The phonemes are not, of course based on any existing natural language because they can only be programmed to produce speech phonetically. (You can see the difficulties: an English word like "micro" would have to be taught to the computer as "mike" plus "roe").

Speech can be recognized

This feature is of some importance to people with delayed or restricted speech; they can practise speaking, knowing that only when the micro has

recognized their speech will the words appear on the screen – which, when you think of it, is a reward in itself; we all like to think someone listens to us!

A speech therapist can, for example, show a wave form on the screen. A deaf person can attempt to duplicate it by vocalising in a certain way: as s/he vocalises so the wave form changes and s/he can see how close the vocalisation is to the original model spoken by the therapist.

There is also the VOTRAX Type 'n Talk, a voice recognition system. This is available from:
D E Systems, 44 Cross Street, Widnes, Cheshire WA8 6LI
and a program to go with it can be obtained from:
Revelstone
97 The Willows, Frodsham, Warrington WA6 7QW

Finally, for business uses there are "voice-driven" financial databases and spreadsheets which respond to someone calling out figures instead of keying them in.

Other uses of speech recognition and speech production will be found in Chapter 5.

Integrated programs

Some word processing programs include a database element, in the form of calculations. You can leave off typing your report and call up figures which you have entered elsewhere. Then you can manipulate them as you wish: total them, sub-total them, add and subtract, etc., before returning to your word-processed report.

The same principle is also possible with some database programs: you can leave the calculations, write a report on them by means of a word-processing program and then go back to your calculations.

The trend continues with what are called *"integrated"* programs, or *"integrated accounts software"*.

As in some other spheres, "integrated" is sometimes used wrongly, so beware of buying a set of programs which claim to be integrated but are not.

A frequently used selling point is that a businessman may be enabled to make a decision correctly if he uses an "integrated" package of programs. Hence there are also programs devoted ("dedicated") to decision making.

Ideas Processor

This is another grandiose name for, in this case, a program which enables you to spill out your ideas at random, leaving it to the micro to sort them out.

Apart from business uses there is the possibility that this kind of program can help creativity in other areas.

Has it any advantage over scribbling down your ideas as they occur and later putting them in order? In theory, yes. You know from what you have read about a word processor that it can search for and find any occurrences of a given word or figure.

It doesn't take much imagination to see how a micro could accept your keying-in or speaking random thoughts and at the same time find similar words or figures and put them together. It also doesn't take much imagination to see that given the ambiguities of the English language the micro could make an utter hash of it.

There you are, planning your garden display. You write or say something about a rose and receive a message saying: *"You have already said the rose is bad"*. Your omniscient micro has directed your attention to an earlier thought about the rose of your watering can being blocked.

However, that line of reasoning is out of date, or will be when the Fifth Generation of computers arrives. They will have the benefits of artificial intelligence and hence will be able to disambiguate your thoughts and your language.

Consumer power

Developments in "integrated programs" have come about in response to pleas from the users of the software. Prior to this it was assumed that the programmers knew best and that if they understood a program everything was fine.

Handicapped users of micros must make their needs known: this is, after all, how the "one-handed word processor" came about.

And if, for example, handicapped users want speech to be integrated into a program then they will (ultimately) get it.

There are, by the way, already "voice-driven" spreadsheets; however, some users in busy offices rather object to a voice saying "MISTAKE!" when they are entering data.

Spreadsheets

Databases and word processing systems can each be used for social (ie non-business) purposes.

A spreadsheet, however, is essentially a tool for business use because it lends itself to calculations rather than to words.

Hence it is seen at its best in the working out of business accounts and especially in the prediction of future trends (in sales, or profits – or even losses). People use a spreadsheet to estimate costs and break-even points. If your goal is "How can I earn £N in X months with expected sales of Y articles" the spreadsheet will help you. It, too, can be incorporated into a set (a "suite" is the jargon term) of business programs: you have a package consisting of a word processing program, a database program, and a spreadsheet.

What is a spreadsheet?

It's one of the few terms in the vocabulary of micro-computing which are almost self-explanatory.

Remember the old days when people used to take a large sheet of drawing paper, a pencil and an eraser, then clear the dining room table? The reason for the eraser was obvious: there were going to be a great many errors in calculations. Perhaps a percentage here was overlooked,

perhaps an extra column became necessary to take account of a previously overlooked expense.

Spreadsheet programs are a logical development from calculators.

Instead of performing one calculation at a time they hold columns and rows of figures which are displayed on the screen.

The difference between a spreadsheet and a calculator is that a spreadsheet can include formulae. Change a figure and the spreadsheet will re-calculate the revised totals for you, right across the row or right down the column. Place, for example, "10%" in one square and thereafter you need only to refer to that square for 10% to be added or subtracted to whatever you have in mind.

Sounds complicated when you read it but most simple arithmetical calculations do. Suffice it to say that spreadsheets have been found time-saving and cost effective by many users.

Your spreadsheet program offers the opportunity to enter your figures at will, inspect them, update them, erase them, add to them – in fact to manipulate columns and rows of figures.

But how do you show a hundred columns of figures on a tiny screen?

There is a "window" which gives the illusion of moving across as many columns as you wish. It will also move up and down rows as you command. So by using various keys and commands you can move the window to any part of the spreadsheet.

Simply by keeping one finger on the cursor key you can get the micro to present you with the rest of the previously unseen figures in that row or that column. Or, if you can't wait that long you can enter another formula (like, "Show me square *17E*, the one where I inspect Column E, Row 17") and you will get that square winking at you, or talking to you.

The result of each re-calculation is shown instantaneously, so much so that it can be disconcerting at first. You think, "Now how did I enter the wrong figure?" It takes a few searches up and down the column, right and left across the row, before you realize that several figures have changed as a result of your one keystroke. The saving of time and temper can be imagined: no more shouting at human beings who interrupt you when you are trying to hold several concepts in your head!

Preparing the ground

As with a database, you will need to work out (with old-fashioned pencil, eraser and paper) just what you want to do. The same question as before: "How many records do you want?" will be asked.

Only this time it becomes: "How many columns and how many rows do you want?"

Take your time over this: if you ask the program for too few you'll have to start again sooner or later.

And if you ask for too many you may find that your printer can't cope with so many columns across one page.

A spreadsheet program can handle this, in fact. It simply prints what it can on one page and then tells you to insert another page – and another

when that one is printed. So if you can stick five or six pages together you can inspect your printed hundred columns.

Another point to be prepared for is that each column will presumably be wide enough only to take six or seven figures, plus a space on either side. There won't be room for many words, or at least not for expressions like "Total members who have not paid their subs . . .". The program will expect you to give a code number or letter to each column and another to each row.

This will allow you and your micro to identify any one square; for example, as *D2,* meaning "Column D and Row 2 in that column".

Memory

As with wordprocessing and data bases, it is important to realize that the number and kind of jobs which the program can do is dependent on the memory in your micro.

A spreadsheet program that contains 100 squares will set aside the memory for each of those squares as soon as you switch on that program. This is irrespective of whether you use ten squares for your calculation or the full hundred.

Some examples

multiply D2 by G4 and add J1
(multiply one week's postage by 4 and add stationery costs);

G+
(total all items in column G);

B1 + F2
(add 10% to transport costs and see what happens to all the other affected items);

This last calculation is called:

"WHAT IF?"

and it is, in theory, the basis of many a profitable prediction.

It is the "decision-making" application on the appeal of which many spreadsheets are advertised; understandably so, because most of us would like to think that our major decisions are made rationally (so that we can add the emotional reasons later).

Perhaps the "WHAT IF?" application is also used by Important People to run the economy of the country!

Chapter Four

PROGRAMS FOR DISABLED PEOPLE

THE TIMES was the first national newspaper in the U.K. to encourage the writing of programs for disabled people. This it did through the NATIONAL MICROCOMPUTER CHALLENGE in 1984. The following selected list of entrants shows the variety of programs submitted.

Each of these entrants has contributed to this book a brief outline of his/her program and these are printed here in the words of the authors.

Winner of the first place:
Jeffrey Cooke,
152 Galliagh Park, Derry, N. Ireland

ACOUSTIC BRAILLE

"Acoustic Braille: The Needs

Acoustic Braille is designed to help the handicapped. The initial stages (ie with Prototype 1) cater primarily for the blind but later more specific editions may also have applications for the deaf and mute.

Unfortunately, even in a time of rapid development of computers the hardware and software developed for use by the blind have been expensive and rare. The danger is that as the use of computers becomes increasingly common and necessary skill in society in general, lack of computer facilities geared to the blind's specific requirements will further disadvantage him.

The computer can enable the blind to develop links with the sighted majority of society, a majority from which they feel segregated and which often employs forms of communication in which the blind cannot participate. A computer which the blind can use with a degree of economy and speed would be useful in every phase of their lives. At school it could be a teaching aid, at work a means of control of equipment, and at home a hobby.

Acoustic Braille: How it works

A primary requirement is that the system must be cheap and readily available. The computer equipment for the blind available at the moment is very expensive: I therefore have restricted costs by making the system completely software and usable on any home computer, even the cheapest (ie with sound). Since few users have had previous experience with computers the system will have to be very easy to use and fully understandable. No confusing concepts should be introduced which may prove deceptive to the unsighted.

I have chosen Braille as a system of code within which the computer will communicate with the blind user. Braille has the obvious advantage of being well known by the user, and can furthermore be manipulated by the computer.

Since the Visual Display Unit or TV can not be used as a communication medium between the user and the computer, the use of sound was substituted. Fortunately most home micros come with a selection of many different sound effects making the programming simple. The user will learn to associate sounds with questions and program-areas as well as with English or "Braille-represented English".

Typing on a large scale typewriter or QWERTY keyboard may prove difficult and time-consuming to learn, so I have cut down the keyboard to four keys. The entry, editing and displaying of English can all be completed by using these keys. No extra-computer buttons are needed as I cover the other keys not being used.

Braille is composed of a series of characters made up of six dots each, in three rows and two columns. These dots are numbered from one to six. There is either a raised or flat dot at each of these six positions. Thus, to relay one character to the user, the computer goes through each of six dot locations: for a raised dot it makes a high note and for a flat dot it makes a low note. Hence, one character is made up of a series of six notes varying between two pitches.

When Braille is being typed into the machine the same series of six dots is used. Where the user wishes to place a dot he touches key "N" and key "M" where there is a flat dot. After six entries he has entered one Alpha-numerical character in Braille. The corresponding sounds are played so that the user may detect a mistake and, using another key, return and correct it.

The translation of Braille to English can be done automatically after a word or sentence has been entered. The computer holds the lists of Braille and English alphabets and, by comparing the two and also checking some variables can translate even abbreviated Braille into full English.

To guide the user through the program I have clearly indicated certain areas by the use of various tunes such as "If I were a Rich Man", "Jingle Bells" and others. To indicate the need for various inputs of different types, distinct sounds are used. On hearing such a sound the user can answer a simple question using 'yes' or 'no'.

Acoustic Braille: the Uses

The uses for such a Braille based system are innumerable. A blind computer operator can now write and type letters, memos and notes which can be recalled at a later date, as well as understood by people ignorant of Braille. Since a computer system is being used the blind user can control all the peripheral equipment. The entered Braille translated to English may be printed out on a line printer or retained on disc as a file. In this way a letter or memo could be saved for later use. Letters and memos previously saved on magnetic or non corruptible media may be reloaded into the machine and reinterpreted.

Acoustic Braille: The Future or Now

Future systems of electronic mail or Ceefax can be fully controlled using a small computer compatible with the system's connections. All computer operated or computer controlled equipment can be controlled or programmed. The blind user can extend his knowledge into the ever-expanding world of computers without constantly needing a sighted friend. A short Acoustic Braille program could be placed in memory and applied to the use of various other programs, such as chess.

I have completed Prototype I of the Acoustic Braille program and in its initial stages it has proved tremendously useful to the blind user. Although a few underdeveloped ideas with Prototype I may hold back processing times, Prototype II – which has already been designed – will overcome these.

Communication is the main area of improvement in the quality of a blind user's life. A blind person can now send completely compatible, typed letters to businesses and organisations. Not only the blind will benefit as the new entry-system can cater for handicapped persons with little hand movement as well as those without speech. For example, a severely handicapped person who cannot orally communicate could enter Braille into the machine and have it displayed to others on a small liquid crystal display.

An ambitious application of this system would be to enter the relevant details of all the handicapped people in a certain area into a central government office computer. In the event of a government letter being sent to these people, it could be typed in Optical Character Recognisable type. On receiving the letter a small light pen could be passed over the letter and its contents loaded into the computer memory. The OCR typing could be done by a computer printer using a golf ball with special OCR characters.

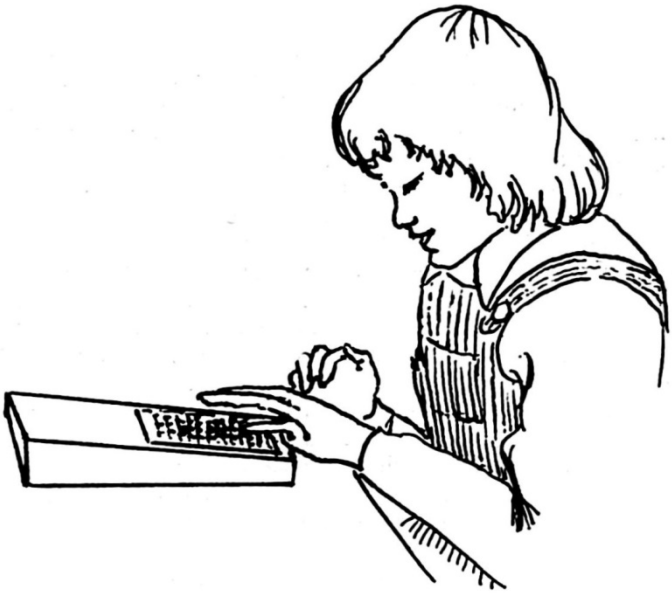
In this way the blind could receive and decode their own mail. This is an advantage in business as some correspondence may be confidential. Again increased independence is achieved through Acoustic Braille. With such a system many blind people could feel sufficiently independent and confident to run their own home-based businesses, perhaps providing services for the blind or handicapped.

Acoustic Braille-related programming languages such as ABASIC could be developed (ie Acoustic Braille All-purpose Symbolic Instruction Code). It may be noted that the top programmer in New York is blind!

A dedicated Acoustic Braille Computer (ABC) could be designed which would include all the Acoustic Braille developments as well as many more. The price could be kept down by the constantly falling price of microelectronics. If, however, our blind computer-user already has a computer, a ROM chip could be hooked on to his computer and it would already be programmed with Acoustic Braille (much like a game cartridge).

The program of Acoustic Braille was kept simple in programming technique for this purpose: it can be easily switched from one computer to another.

In the imminent realisation of speech synthesis, the computer controlled voice will eventually replace the Acoustic Braille beeps, but until an inexpensive, reliable, comprehensible and versatile speech synthesizer is released, Acoustic Braille is the only alternative.



Extension of your resources.

After studying the Braille system of dots I have created a system of entering Braille into a computer using a joystick and four buttons. This method could be much faster than the existing method.

Through the many hours of development and programming spent on Acoustic Braille, I have helped to release a blind young man into the world of computers and I hope to do so for many, many others."

John Adrian,
Kelsey Park School, Manor Way, Beckenham, Kent

"We received your letter recently, and are very proud that you think our project should be given a mention in your book. In looking at the example paragraph you sent us, it seems that you are recommending the programs for the purpose of readers who could be helped by them. This is fine, but we consider that at this moment they are not ready for commercial release.

Another point is that however it may look in THE TIMES, our entry was actually submitted by five people; it was just registered in one name. The five entrants were:

John Adrian (12) Anwar Ali (12)
Ian George (14) Simon Moss (13)
Adam Tibbalds (13)

We understand that you do not wish to publish any of our ideas and what you want to publish is fine by us, as long as the two points already mentioned are taken into account.

On to the actual use of micros by Dyslexic people, and how they can help. In our original entry we gave reasons why the use of computers would help Dyslexics, especially children.

i) They are able to provide essential repetition until a point has been understood and remembered.
ii) Exciting, moving graphics are possible, to make the point more memorable.
iii) Special rewards and a time limit can add to the fun of using the program.
iv) Playing with buttons on a keyboard would be much more fun than writing on worksheets.
v) With computers, answers can be checked immediately, rather than waiting for the teacher to mark the worksheet, and if wrong another attempt can be offered.
vi) While children are using the computer, their teacher can spend extra time helping somebody else.

We hope that this part of our 'Helping Dyslexics' project will be of some help to your work."

Peter Chase
17 Millers Road, Toft,
Cambridge, CB3 7RX
(aged 14 years)

He describes his program as: "Hardware design backed up by a few short programs. The design was for a matrix board which could be interfaced to a computer and which sensed the positions of various objects on the matrix. These objects could be just about anything so the board could be used for a wide variety of games and for some more serious tasks.

A package (hardware and software) for blind persons to use in schools homes and business."

His detailed explanation follows.

"The aim of the project is to enable blind children and adults to learn to program computers for themselves using simple adaptations of existing hardware with specially written manuals and software.

The project's main innovation is a design for a three-dimensional board interfaced to the computer, on which can be arranged blocks to form mazes or pieces for board games, the position of which are fed into the computer's memory. This will allow blind children (and adults!) to share the pleasure and excitement that sighted people get from playing action computer games.

Hardware

The BBC model B (1.2 OS) is an ideal machine for the project as it has a proper QWERTY keyboard which is robust and has full travel. An ACORN Speech Synthesis System provides the audible feedback from the keyboard

and speech in programs, supplementing the already excellent sound capabilities of the BBC computer. A disk system is required for storage of programs and data (cassette systems are too unreliable for use by the blind). A cheap TV would be useful so that sighted people could encourage and help the blind programmer.

Adaptations to the hardware include raised labelling of the keys (Braille or standard letters) and Braille labelling of all ports (eg Disc, Printer) and switches. These can be stick-on labels.

Although not essential as part of the initial package, a printer would allow programs to be checked and studied. A dot-matrix printer could be adapted to print raised characters which the blind could read. The size of the print head would obviously need to be large enough for the blind to distinguish the raised letters and symbols. Ideally the printer would switch to inked characters, so that programs, letters etc could be exchanged with sighted persons.

Software

There are three essential elements of software for the project to help the blind program and enjoy computers.

First, there should be audiofeedback from the keyboard so that the blind can learn to type efficiently. There is an audiosignal for power on. The other keys must 'say' their character when pressed. This can be achieved using the ACORN Speech Chip with specially written software and a custom-built PHROM cartridge containing the letter sounds and symbols of the keyboard. A program is available which shows how this would be done. As I do not have access to a Speech Chip, my program gives different tones for the keys but I have shown how to adapt the program to accommodate the Speech Synthesis system. It is designed to load and operate automatically when shift and break are depressed.

Obviously the main key to learning to program is a clear and interesting manual. To encourage the blind this must include exciting programs using sound stimuli in place of visual ones. The instruction manual would be supplied on cassette but with a Braille version so that programs can be typed in and then checked easily.

Third component of this 'computers for the blind' project is a selection of software. Supplied on disk with the audiofeedback program would be (i) an audiotyping tutor (ii) a selection of music programs including a rhythm maker and an organ keyboard and (iii) several games to play with the 3-D games board such as Pacman, Car racer, Chess, Othello, Checkers etc.

The three-dimensional games board

The board comprises a matrix of conductive strips which are strobed like a computer keyboard to find which lines are shorted out. The figure (not shown here) shows an 8 × 8 matrix but this can be larger (16 × 16, 32 × 32 etc) depending on its use.

Mazes are built using the special blocks which press down and short out strips underneath. When the maze is complete the games program is run and the pattern of blocks is registered in the computer via the interface. Games

are played with a 'pen' which the blind person moves over the board, its position again being registered as it presses down. A choice of maze games will be available. At the lowest level the player must negotiate the maze without touching the blocks in the shortest time. The game starts when the pen is on the start cell, the speech output being 'Start', collision with the walls giving an explosive sound, and the finish cell giving speech output 'Finish – You took x seconds'. At the next stage of play a 'ghost' character is generated by the computer which the player can chase through the maze, its position being indicated by a variable pitch and length bleep and collision with the player by a suitably exciting sound. Further advancements of the game would involve being chased by the ghost or constant switching between chaser and chased. As the mazes can be changed many variations of games can be played with the same program.

As well as these action games, the matrix is ideal for playing many types of board games. For instance, a set of chess pieces could be supplied with a program to run the game. Provided the board is set up correctly initially, the computer would register all moves made by the blind person and output its own moves via the speech system. Similarly draughts, Othello, Chinese checkers etc could all be played on the board.

Business uses

Finally, I would like to put forward a few ideas to encourage blind people to use computers in their business life whether in offices or at home. The Braille/inked character printer detailed under Hardware, would be essential for writing letters, accounts, documents etc and typing them for sighted colleagues. I would also like to see the development of a reasonably cheap and reliable OCR machine (optical character reader), so that blind people can feed in typed letters, documents etc and the contents passed to the computer and output either as speech or via the Braille printer. In this way a blind person could have total independence to run a business."

William Dawson
40 Cambridge Road, Linthorpe,
Middlesborough, Cleveland TS5 5LE

"The competition entry was designed to add sign language 'sub-titles' to video material in a studio rather than a home situation. It is not really practical with present equipment and we are not planning to publish it.

However the entry was made on behalf of a resource unit based at Beverley School for the Deaf, in Middlesborough, which is about to appoint two computer programmers, to work on the production of software for use in the school by deaf children. I envisage that this will include modifications to existing educational programs (copyright permitting) and the writing of original programs to the requirements or suggestions of the teachers. If any of these proved successful, in practice, I would hope to make them available to other interested parties."

M. P. Doyle
37 Bright Street,
Skipton BD23 1QQ

Mr. Doyle gives this account of his entry.

"Among the winners was M. P. Doyle who submitted an entry based on research and development of the Microelectronics Education Program "Microprimer" software.

These programs, which will run on a BBC Model B microcomputer with a Concept Keyboard and Votrax Type 'n Talk, demonstrate the illusory nature of claims that current generation microcomputers are any real aid to the handicapped. He claimed that until microcomputers are designed for Concept input, rather than constrained to typewriter keyboards and provide Audiotext as a standard output option, a significant proportion of the population, particularly the young or handicapped, will be discriminated against.

Notes: low cost and more versatile; easier to program."

Paramjit Singh (aged 16)
45 Oxford Road, West Bromwich B70 8PF

His father gives this account of the entry:

"His project is aimed at the young people with speech deficiencies. The output is through an ordinary television set and a speaker. The input had to be directed through a good quality microphone.

The setup is quite effective, yet very simple. The computer draws a face on the screen, highlighting the mouth, displays a word and using a speech synthesis circuit pronounces it. But it also shows the appropriate lip and tongue movement. This is repeated several times, until the child thinks he/she can pronounce it. When this stage is reached, the computer asks the user to pronounce it and by applying an error factor analyses it.

The error factor is needed for two reasons. First, since the computer has to convert this analog signal to a digital form and has to try to match it with what it knows to be correct, the match will never be perfect and therefore this is allowable by saying "If it's a bit out, it is correct."

The second reason is that it helps the child progress in the pronunciation of words. At first, as the child is just learning to use the machine, the error factor will be high, so that even if the input matches slightly with the 'correct' pronunciation the system will say it's correct and encourage the child to go on. As the child progresses the error factor becomes smaller and smaller leading to the stage where the child has to pronounce the words with some accuracy.

When the child gets anything correct the system responds with a great explosion of sound and graphics to make the child feel he/she has achieved something.

Note: It is called "Speakeasy" and is under development. The program is intended for use with the BBC Micro."

Rev. Colin G. Brockie
51 Portland Road, Kilmarnock,
Ayr KA1 2EQ

"My program is intended to teach both hearing and deaf people the Deaf Sign Language and the Manual Alphabet. It will teach and test the signs and will provide a dictionary of signs. Regional 'dialects' or differences in signs will be easy to incorporate and new or altered signs can easily be entered to up-date the program. It is intended that the program be developed to run on any cheap microcomputer. As well as the deaf, social workers, chaplains and others requiring to communicate with the deaf will find the program an asset."

Susan Rowlatt
Lilac Cottage, 8 Byfield Road
Isleworth, Middlesex TW7 7AF

Her account of her program:

"The programme was to help partially sighted people make use of the National Library system more effectively. To do this the type, author and preferences were entered on the computer together with their names, addresses etc and also the books they had read already in the Ulverscroft series.

The listing was kept up to date as a new book was requested by each subscriber. The idea behind it being that libraries are not always close to the handicapped user and secondly the user may suffer from any number of illnesses which may mean that their mobility is limited.

Each fortnight the subscriber is sent out a new book with reference to their preferred taste allowing for a special request and the old one collected. This delivery could be done by volunteers or "Meals on Wheels" WRVS members. Originally I had limited it to the Ulverscroft editions as these seemed to be adapted to the use of the partially sighted."

Chapter Five

YOU ARE IN CONTROL

Today's gadgets are tomorrow's aids for the housebound and disabled user of a micro. Here are some examples.

Joystick

The joystick was invented to help children to guide an image across or up or down a screen so that they could play a game. Now the joystick is of immense value to people who find it difficult to use a normal keyboard.

Icons

In turn it led to the development of "icons": pictures on the screen representing possible tasks which the computer would carry out. In a business program, for example, there may be icons on the screen to show that another stage in the computation of accounts is available; a wastepaper basket, an outline of a card index, a filing cabinet, a letter head, and so on. The user doesn't even need to touch the icon on the screen, much less type anything into a keyboard. He has a replica of the screen printed on a sheet of paper in front of him; by moving a small (hand held, if necessary) object on his own bit of paper he causes one of the icons on the screen to be pointed at. If, for example, the wastepaper basket is pointed at, he gets a message on the screen asking if he wants to erase the last information.

Mouse

The gadget which he moves is called, by the way, a "mouse". (No doubt there's an excellent reason for this.) The mouse is connected to the micro by a lead: as you move the mouse across the desk the movement is reproduced on the screen by a pointer.

A mouse is one of several pointing devices useful to disabled persons; others are joysticks and trackballs, originally used by the military and by air traffic controllers. The "cursor" can also be controlled by knee controls or by head movements, as we see later in this Chapter.

Light pens

The light pen is another gadget which has helped many children (and adults who prefer to use their fingers rather than their minds) to "zapp" aliens who they think are invading "their" earth.

Used by a disabled person it is capable of overcoming many disabilities.

Switches

These can be operated by the micro itself: signals can sense the whereabouts of different things and messages are sent to the micro-computer. Some micros respond even to a blink or to any eye movement.

> With aids such as these a disabled person can control the environment. Not only does this lead to more independent living at home but it also offers possibilities for paid employment.

Special Aids to Employment for Disabled Workers

The Manpower Services Commission is able to buy and issue on free loan any special tools or equipment which a disabled person needs to obtain or keep employment.

A special aid need not be equipment designed specifically for disabled people. It can be any item of equipment that enables a disabled person to do a job which an able-bodied person could do without it.

The MSC can advise on the best type of equipment for a particular disabled employee and will issue the aid on loan for as long as it is needed. Equipment no longer required is returned to the MSC.

The sorts of Aid the MSC have issued include:

Braille measuring devices, eg Braille rules and micrometers and electronic inspection instruments, including measuring equipment with audio output;

communication aids, eg electronic writing systems for people with impaired hand movements or speech, page turners, tape recorders, talking calculators and pocket memos;

telephone aids, eg amplifiers, loud speaking telephones and inductive loop systems, communicating terminals for the deaf and tactile indicators or audio output for blind switchboard operators;

special chairs for back support, easy-rise stools, electric and stand-up wheelchairs;

special machines or tools and special work benches;

desk magnifiers, closed-circuit television systems for partially sighted people; Braille and talking terminals and electronic devices to store and retrieve Braille or audio information for blind people; *micro-computers for physically handicapped people.*

Grants can be paid to help employers with adaptations necessary to recruit or retain a disabled person and/or to enable a disabled person to perform his or her job as effectively as an able-bodied colleague. (If the adaptation will benefit the firm generally the employer will normally be required to contribute).

Applications or requests for advice from employers or disabled people should go to the Disablement Resettlement Officer or the Disablement Advisory Service Manager, both of whom can be contacted through the local job centre.

Another Government-sponsored aid

The Concerned Technology
(Organised for the Department of Trade and Industry)

The Concerned Technology travelling exhibition comprises a unique collection of many of the Information Technology aids available. They range from a variety of switches (the most basic input device), through toys and computer-based developmental aids like the Turtle and the BBC Buggy, to a sophisticated work-station for the visually handicapped and environmental control systems for people with restricted movement.

Aids for the blind, the deaf, the physically handicapped and the mentally handicapped are included.

Help from the Royal National Institute for the Deaf

The following information has been made available by the Royal National Institute for the Deaf.

Further information may be obtained from the Librarian, RNID, 105 Gower Street, London WC1E 6AH.

Indicators

Indicators respond instantaneously to sound. They have no "memory", so the indication is present only so long as the sound continues.

SAM – The Sound Activated Monkey: make a sound and SAM climbs the pole. Sensitivity and speed of descent (after sound stops) are adjustable. External microphone. Battery/mains.

From: Mediscus Products Limited, Westminster Road, Wareham, Dorset.

Speech Light: A hand held unit with a lamp that flashes when there is a sound. External microphone. Other devices can be attached. Battery powered.

From: Cyber Electronics Co. Limited, Davement Square, Addiscombe, Croydon CRO 6RD

VSF Indicator: An RNID designed device which has three coloured lights which show if a sound has voice (larynx vibration) has friction (as in 'f' or 'th') or is an 's'. External microphone, battery powered, sensitivity control for 's'.

From: A & M Hearing Aids, Kelvin Way, Crawley, Sussex RH10 2LS

GSR Monitor: This device does not respond to sound at all. It measures your "galvanic skin response" and indicates whether the user is tense or relaxed by means of an audible tone with variable pitch (higher pitch for "more tense", lower for "more relaxed"). Its use in therapy is to help individuals to become aware of unnecessary bodily tension, which might affect their speech production. An additional visual meter is used with hearing-impaired persons. Battery powered.

From: Andrew Stephens Co., 71 Dickson Road, Blackpool.

Displays

They all have "memory" to allow careful examination of the displayed information. Because the eye is very different from the ear, this "memory" is vital to the successful use of visual feedback for speech work.

Pitch and Pitch/Energy displays:

Siemens SI-80: This is a pitch energy display which is the only display with twin microphones and controls and a built-in tape recorder for language lab type work. It has two frequency ranges for pitch, an amplitude mode and a voiceless fricative mode. There are various time scales, and a connection for an optional hard copy output. The pitch is displayed on a linear scale which makes visual comparison of speakers with different voice pitches difficult.

From: Phonophone Acoustics Ltd, Acoustics House, California Estate, Aylesbury, Bucks HP21 8HAT.

Visispeech: An RNID design. A TV display and a computer in one. Microphone input. Full control over display parameters. Multiple lines, cursor, has user guidance and menu selection built into the "friendly" programme. Hard copy, data storage and statistical analysis options. This system will continue to be developed for display of other speech features, as well as hearing aid testing, audiometry and educational computing tasks.

From: Jessop Acoustics Ltd., Unit, 7 Long Street, London E2.

Vocal Two: A pitch/energy display on a TV monitor. Microphone input. Three times scales, three frequency bands (each only one octave wide, and non-overlapping). Timebase 2, 4, or 8 seconds. Two lines. Slow response on pitch tracking. No hard copy option.

Made by Madsen Electronics, Canada

From: P C Werth Ltd., 45 Nightingale Lane, London SW12

Voicing Display (larynx on/off)

C-Speech: Shows voiced vs voiceless energy (not pitch). Built-in memory provides a split-screen, variable timebase display on a domestic TV.

From: SCI Instruments, Spirella Building, Bridge Road, Letchworth, Herts. SG6 4ET.

Electropalatograph: A computer-based display of place of contact of tongue and palate. Requires a Commodore computer. Requires a custom-made, individual mould of palate for each user. Under continuing development at the University of Reading.

Phonetics Lab., Department of Linguistic Sciences, Reading University, Whiteknights Campus, Reading.

Computing for the Deaf
Other sources of information

Dr Bernard Chapman, School of Education Research Unit, University of Bristol, Berkely Square, Bristol BS8 – Developing Rebus system for accelerating language development and language disordered children.

Dr Rostron and Dr Sewell, Hull University, Psychology Department, Hull HU6 7RX – Programs for TRS80, SWTP and Apple. Research for interactive programs for deaf children.

Tim Southgate and Prue Fuller, Ormerod School, Waynflete Road, Headington, Oxford OX3 8DD – Investigating use of micros as communication and learning aids.

Help from the Royal National Institute for the Blind

Details of aids are obtainable from:
RNIB
Sales Department, 224-228 Great Portland Street, London W1N 6AA.

New Technology Aids for Blind People.

The development of information technology systems has increased the types of aid available to help disabled people at work.

Many of the new systems use the human voice to replace the conventional typewriter keyboard.

Voice Input Ltd.'s Votan system, for example, uses both speech input and synthesised speech output so that the user can input data, interrogate, and actually run a computer by speech rather than a keyboard.

A number of systems have already replaced keyboards in companies such as British Aerospace and Lloyds Register of Shipping.

Other useful addresses for those concerned with Computing for the Blind

Royal National Institute for the Blind
224 Great Portland Street
London
W1N 6AA

Also: The Reference Librarian
Royal National Institute for the Blind, Braille House,
338-346 Goswell Road, London EC1V 7JE

British Computer Society Committee for the Disabled,
13 Mansfield Street,
London
W1M 0BP

(Interested readers may wish to look at "Working with Computers", published by the RNIB. The booklet includes descriptions of various aids (eg the Brailink, Versabraille and Optacon). It also includes a brief account of the work of *Frank Ellis*, Chairman of the British Computer Society's Specialist Group for the Disabled, to whom I am indebted for advice about the content of this book.)

British Computer Association of the Blind
BCM
PO Box 95
London WC1N

"Computer Aids for the Blind" – a government-funded research project headed by Lewis Wolfson at:
The Royal National College of the Blind, Hereford

Chorleywood College for Girls with Little or No Sight is funded by the Department of Industry to run a pilot study looking at applications of microcomputer-based Braille translation throughout the school.

Information from:
Mr D R Crosby
Chorleywood College
Dog Kennel Lane
Chorleywood, Herts
WD3 5ER

Computer Access for the Blind:
the Open University is developing a Synthetic Speech Outlet for the Blind with the support of the Department of Industry. A booklet entitled "Computing and the Blind" describing this and other projects can be obtained from:

Dr Thomas Vincent
The Open University
70 Manchester Road
Chorlton-cum-Hardy
Manchester
M21 1PQ

Dr Vincent's research also includes the following projects:
1. Home-based computing facilities for blind undergraduate students.
2. Word processing and information retrieval for Blind Adults. (This includes a talking database which offers search and retrieval facilities.)

Braille Keyboards may be linked to computers with equipment made by:
Telesensory Systems Inc
10 Barleymow Passage
Chiswick
London W4 4PH

Information from St Dunstan's

"An Aid to Living, Leisure and Communication"

The advent of the Speech System fitted internally in the BBC Model B Micro Computer prompted St Dunstan's to sponsor a research project to ascertain whether a totally blind person could use this computer to enhance the quality of life.

Although the vocabulary is limited and the speech output is therefore mainly in serial form, ie character by character, its usefulness has been demonstrated as an aid to the blind by the following programs specially written for and proved by the project. Further programs are in preparation for leisure activities such as dominoes and cribbage.

NB Although a visual monitor is unnecessary, reference is made to "screen" to simplify the description of the programs below.

"PRINT READ" – Characters are spoken as they are printed on to the screen either from Keyboard input or generated by the computer.

"SCREEN READ" – Lines of text previously printed on to the screen can be selected and "read" in addition to the "PRINT READ" facility.

"VOCAB" – This is a data retrieval programme enabling the user to "search" the vocabulary of the speech system to find if a particular whole "spoken" word is available and thus to compile phrases of instruction to assist the user with a specific programme.

"DATA FILE" – Information is firstly stored and then subsequently retrieved quickly when needed. The blind user can establish a personal address book, telephone directory, an index or a record collection, a notebook of personal confidential information, etc. This "paperless" system is well suited to the needs of the non-Braillist who cannot readily get sighted help.

"DIARY" – Entries can be made, amended and referred to at will.

"TEXT 10" – A simple text-editing programme enabling the user to compose text on the computer and amend before printing out.

"QRA" – A blind Radio Amateur can use this programme to ascertain the distance and direction of the "ham" to whom he is speaking.

"CW" – A Morse Code trainer programme to help a blind person qualify for the Class "A" Amateur Radio Licence.

(Enquiries to: Peter H H Jones, BEM, 69 Prospect Road, Sheffield S17 4JB)

Another aid for visually impaired people

VIEWSCAN

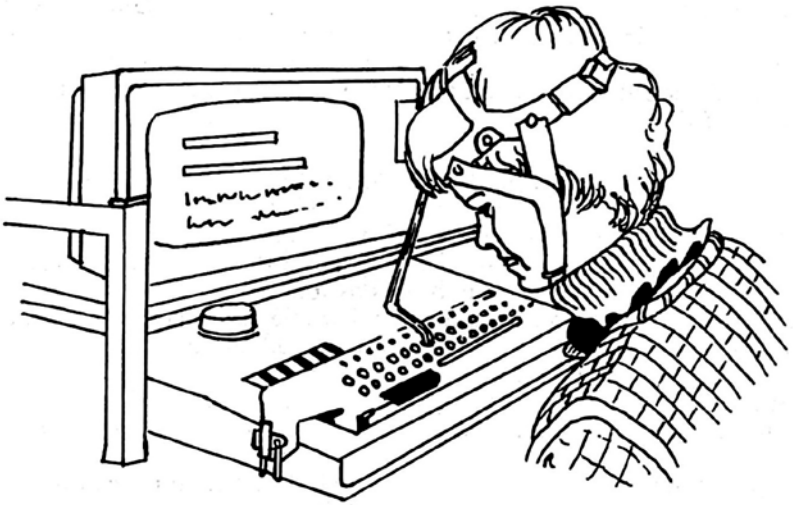
By scanning a small hand-held camera across the page the reader can see a bright magnified image of the text on the large Viewscan display screen. Handwriting, typing, numerals, different languages – Viewscan handles them all, allowing the partially sighted to read normal print at work, at school or at home.

From: Wormald International Sensory Aids Ltd., 7 Musters Road, West Bridgford, Nottingham NG2 7PP

(Their address in Australia is shown in Chapter 12.)

A microcomputer for the blind or partially sighted is available, consisting of a lightweight, compact and portable, battery operated keyboard with full line tactile Braille display. The unit also incorporates voice output.

Micro-Brailler (MB 2400)
Supplier: Erleybridge Communications, 2-4 Old Street, London ECIV 9AA



An aid to communication.

Vincent Workstation

A synthetic speech system to assist the learning of Braille. It will speak out letters as they are typed on the Perkins Brailler or the computer keyboard. It can also read back words and sentences. Reading Braille is practised using the Concept Keyboard.

Developer: Dr T Vincent, Open University, 70 Manchester Road, Chorlton-cum-Hardy, M21 1PQ

Aids for the blind and partially sighted from:
John Bradburn (Micro Systems) Ltd.

Information Thru Speech (ITS) – A speech output microcomputer system capable of running local application software and connecting to remote computers.
Total Talk & Total Talk II – Talking Computer Terminals.

Cranmer Modified Brailler – A portable Braille system enabling users to interact with computers, produce hard copy Braille documents and tactile maps and graphs.

The CMPB is a microprocessor based unit, a modification of the standard and well known Perkins Brailler, which enables users to interact with computers ranging from the smallest micro to large computer systems – anyone who can type on a standard computer keyboard can produce Braille automatically without the normal delays and special skills required.

A number of programs are currently available to allow automatic translation from text to Grade II Braille and The Research Centre for the Education of the Visually Handicapped at Birmingham University is at present producing such a programme particularly for use with the BBC Micro.

John Bradburn (Micro Systems) Ltd, St James Mill Road, Northampton NN5 5JW

Speech recognition Aids

Information supplied by the Department of Trade and Industry:

Speech recognition by computer is a subject that is stretching teams of experts. For some years it has been possible to recognise single words carefully enunciated, but to understand whole sentences is much more difficult. How would you tell a machine to differentiate between *"The fishes..."* and *"the fish is..."*, for example?

But the battle is being won – even before the advent of the so-called "fifth generation" computers whose awesome power will allow artificial intelligence.

A particularly valuable application of IT (Information Technology) is for those with special needs and the DTI has sponsored a number of initiatives in this area. "The Concerned Technology Travelling Exhibition" contains most of the IT aids currently available.

Further information from:
The Concerned Technology Travelling Exhibition, c/o Expoman Ltd, PO Box 114, London SW15 1AS
or
Voice Input Ltd, 7 The Quay, St Ives, Cambridgeshire.

Further thoughts on Speech Synthesizers

There are two different ways in which speech synthesizers store and reproduce speech. The most lifelike way is one in which a vocabulary of whole words is recorded digitally in a memory chip and played back as required. The memory stores actual recordings of the words so when it is reproduced, the speech is very lifelike. The problem with this method is that to have any kind of useful vocabulary takes up an awful lot of memory.

The other method of speech synthesis uses noises known as *allophones.* These are small parts of words which can be strung together to make up complete words. The allophones are recorded on a memory chip in the same way as the words of the first method but there are less of them

required for a decent vocabulary. It is rather similar to the way in which there are only 26 different letters on this page but all these words can be made from them.

Aids to Communication

Mention has been made elsewhere (and follows in this Chapter) of various systems which aid communication.

The following brief account deals with an attempt to help people who have lost their speech entirely.

Fraser Duncan (49 Dial Hill Road, Clevedon, Bristol BS21 7EW) has set up a company, called Western Information Technological Services Ltd, to develop a range of communication aids for those who have lost their power of speech.

One of these aids enables a message typed on a keyboard to be spoken, either once or repeatedly as required. The words and phrases are pre-recorded and are produced by means of two keys at a time on the keyboard ie they are the spoken response to two-letter abbreviations.

The project is funded by the Department of Industry, Bristol City Council and Bristol University.

Further details from Duncan Fraser at the address above.

Other Speech Systems

A brief description of the VOTRAX Personal Speech System
Cyber Robotics Ltd state:

"The Votrax Personal Speech System – a completely self-contained text-to-speech synthesizer. This computer peripheral will produce unlimited speech output via literal English.

In addition to producing unlimited speech output, the Votrax Personal Speech System provides comprehensive sound effects and music. Sound effects and three voice, eight octave music synthesis are generated independently of speech which allows the possibility of mixing for special effects.

The Personal Speech System is a true peripheral which enables your computer to talk and generate sound effects with minimal use of valuable computer memory.

The generation of speech by computers for disabled people is clearly a significant advantage, but obviously for this purpose the ability to say anything and everything is required.

When connected to a computer the Votrax Type 'n Talk and Personal Speech System units behave just like printers, but instead of a visual record an aural record is produced, and, like a printer and text these units will speak any data that is sent to them.

This ability to speak anything and everything is achieved by incorporating within the unit its own microcomputer, an English language algorithm and a model of the human vocal tract.

Speech synthesizers take a little time to get used to. Just as dialects take a listener time to get accustomed to, so the Votrax voice is a type of

dialect. It copes with English pronunciation such as butter, where the 't' is English (in the US they say "budder"), but "hot" is pronounced "hut" as in America. Accuracy of speech of 95% in either accent is claimed.

Finally, Cyber Robotics feel it is important to mention context. People are sometimes disappointed that they cannot initially understand random speech, this is because the importance of context (expectation) and other factors such as facial expression, have been overlooked. Our experience is that with a little practice (and a few tricks eg. double spacing between words or even repetition of sentences) Votrax units widen the horizon of many disabled people dramatically.

The current business applications under investigation include speech at supermarket checkouts, recorded information given over the telephone and "point of sale" speech.

VOTRAX Type-'n-Talk

Type-'n-Talk is a completely self-contained text-to-speech synthesizer.

The unit is as easy to program as typing data or programs into a computer.

The user's computer is free to perform other tasks while speech is in process – with no effect on the throughput of the user's computer.

The vocabulary spoken by Type-'n-Talk is unlimited and user defined.

The text-to-speech synthesizer creates speech from electronic phonemes using a set of rules that describes English pronunciations."

Further details from Cyber Robotics Ltd 61 Ditton Walk, Cambridge CB5 8QD

Another Speech Synthesizer

D E TALKER has an unlimited vocabulary. Speech commands are given as whole words or word elements in plain English. Over 350 word elements are held in D E TALKER's memory. It is preprogrammed with number and letter names as well as letter sounds and computer jargon such as Escape, Return, Delete and Copy. For example:

```
10 *S"PR+ESS ESCAPE TO RE+ST+AR+T"
or
10 *S"Y+OR SC+ORE IS TWO HUNDRED"
```

D E TALKER allows control of timing by punctuation marks or pause commands.

It is available from D E Systems, 44 Cross Street, Widnes, Cheshire WA8 6LT

ROBIN Speech Unit

A phoneme based system which can be used with or without a pen.

Speech Programs include:

Speech Maker: "create your own words and speech (pen not required)."

Obtainable from Educational Software Company, 108 Parthenon Drive, Liverpool L11 7AD.

Equipment/Software available in most SEMERC's (of particular interest to Speech Therapists)

VOCAID – synthetic voice (by Texas Instruments) obtainable from QED, 1 Prince Alfred Street, Gosport, PO12 1QH.

CANON COMMUNICATOR – "ticker tape" printer (The address will be found in Chapter 12).

MICROWRITER – portable word processor/one handed typewriter (details are given in Chapter 3.)

*DISCWORDS – (single switch communication, games, educational material) available for BBC and Commodore PET micros.

AUTOTYPE – single switch printer, on BBC micro.

BLISSAPPLE – or multi-switch communication, on APPLE micro.

MACAPPLE – single or multi-switch communication, on APPLE micro.

BLISSPRINT – prints Bliss characters out (RML 380Z micro).

LARGE OVERLAY KEYBOARD – doubles as expanded QWERTY keyboard (BBC micro).

Expanded QWERTY keyboard for BBC micro – obtainable from Special Technology.

KEYMASTER – single switch control over all BBC micro functions and software.

V.S.F. INDICATOR – shows voiced, "fff", and "sss" sounds. A speech frication indicator with a very comprehensive guide to clinical use.

*Q.E.D. VOICE OPERATED SWITCH – (R.S. Components) Blow Switch with battery, toys or Toy Control Interface – details of which appear below – (BBC and Sinclair Spectrum micros.)

*MICROMIKE – voice-volume controlled games (BBC micro).

SIMON game – practising listening skills (BBC micro).

NASAL Program – instant feedback on nasality (developed by Richard Caley).

Speech Therapists may be interested in a device developed by Richard Caley. Plugged into a BBC micro, it uses two acoustically separated microphones to compare nasal and oral sound output from the client.

The measure of nasality in the voice is given by a line graph, accompanied by growth or shrinkage of the nose on a cartoon face on the screen. Richard Caley is Senior Physicist at Pinderfields General Hospital, Aberford Road, Wakefield WF1 4DG.

*(Details in Chapter 7).

Equipment and software of interest to Occupational and Physiotherapists

The following aids may be inspected in your local SEMERC.

Switch and Toy System – especially blow switch, rubber bulb, burglar pad pedal switch, mercury switch (which senses body position).

*Toy Control Interface – "TOY REP", "TOYHOLD" programs make demands on use of switches.

*"COMPACT" – one and two switch programs.

"GRAFDISC" with Beebstick Plus – computer aided art and design (as mentioned in Chapter 6).

*"DART" – Turtle graphics with floor turtle.

BBC Buggy – experience of movement, distance, orientation.

(*see Chapter 7)

A general note: by using a keyguard or special input to a micro (eg by an expanded keyboard, Toucan Communicator, or Keymaster) a disabled person can gain access to a range of software.

Therapists will not be put off by the title of the company "Toys for the Handicapped". Their catalogue includes a simple touch-sensitive screen device to suit the Sinclair Spectrum and BBC model B, with software for assessing and aiding perceptual skills.

Simple matching software is also available for the switch system.

Toys for the Handicapped: 76 Barrack Road, Sandy Lane Industrial Estate, Stourport on Severn, Worcs.

A keyguard (a perforated plate to aid use of keyboard by a physically handicapped user) which also makes the keyboard extremely robust in use).

From: Hallam Industries, 272 Attercliffe Common, Sheffield S9 2BR

Micromike (this gives simple voice-volume control over a suite of games and activities).

Micromike Plus (For a severely handicapped user.)

From: John Tabberer, 51 Guernsey Road, Widnes, Cheshire.

Toy Control Interface (Particularly for profoundly mentally handicapped and physically handicapped people.)

From: Micrex, 54 Linley Road, Alsager, Stoke-on-Trent.

Photonic Wand – a headworn light-pen serves as communication aid allowing selection of options from screen at a distance by slight head movement.

From: Photonic Wand Co, 12 Orchard Croft, Guilden Sutton, Chester.

Pyramid Light Pen, Pyramid Micros, 25 Cairo Street, Warrington, Cheshire.

Possum-controlled computer systems for disabled people: the keys are spaced apart and recessed in a robust keyboard enabling anyone with gross movement or tremor to operate the computer. A delay device is incorporated for people with severe tremors. (BBC Model 'B', Apple II and ZX Spectrum.)

From: Possum Controls Limited, Middlegreen Road, Langley, Berks SL3 6DF.

"Computer Aids"

for young children and those with special needs.

Computer Aids is a company which provides equipment for young children and those with special needs. Furthermore, support and advice regarding micro technology is offered (free of charge) to interested persons who have children with special needs.

The Cheshire Expanded Keyboard measures 63 cm long by 30 cm high and 4 cm deep, has 44 key positions (11 x 4) which can be defined and these are covered by a heavy sheet of plastic, on which is placed overlay sheets (size 58 cm x 27 cm) relevant for a particular program using the keyboard. The Cheshire Expanded Keyboard also caters very specifically for those mentally and/or physically handicapped pupils of all ages.

From: G R Derby, The Fox Covert, Fox Covert Lane, Picton Gorse, Chester CH2 4HB. Tel: (0244) 300363.

An Eye-Controlled Switch

obtainable from Queenswood Scientific, 1 The Paddock, Stubbington, Hampshire PO14 3NS

With this aid a severely disabled person can control electronic devices by merely blinking or moving his eyeball sideways.

Another useful aid is:

"Communication and Environmental Aid for the Disabled" (CEAD)

available from: CEAD Supplies Ltd, 100 Southend Road, Gateshead, Tyne & Wear. Tel: (0632) 823305.

It can enable a severely physically disabled person without speech or sight to hold a conversation, type, use a telephone, raise an alarm, operate domestic electrical equipment, etc. CEAD can be operated through whatever facility the person has left such as a blink of an eye, tongue or chin movements, minute limb or finger movements.

There is also:

C.O.R.E.

details from: Christopher Arnold, Valance School, Westerham, Kent TN16 1QT. Tel: (0959) 62156.

C.O.R.E. is described as "a flexible communication system for those with tremors, visual problems or those who need to use head pointers."

Further examples may be found in:
"The Concerned Technology", published by
Handicapped Persons Research Unit
Newcastle-upon-Tyne Polytechnic
No 1 Coach Lane
Coach Lane Campus
Newcastle-upon-Tyne
NE7 7TW

In that book will be found many more examples of the excellent research taking place at that Unit.

Communication Aids Centres

Julia Le Patourel, Communication Aids Centre, Charing Cross Hospital, Fulham Palace Road, London W6. Tel: 01 748 2040.

Helen Wynne, Communication Aids Centre, Rookwood Hospital, Fairwater Road, Llandaff, Cardiff. Tel: (0222) 566281 ext 65.

Liz Panton/Philip Lowe, Communication Aids Centre, Queen Victoria Road, Newcastle-upon-Tyne. Tel: (0632) 325131 ext 455.

Fay Thomson/Nicol Jollef, Communication Aids Centre, The Wolfson Centre, Mecklenburgh Square, London WC1N 2AP. Tel: 01 837 7618 & 01 278 4902.

Jayne Easton/Jane Bennett, Communication Aids Centre, Frenchay Hospital, Bristol BS16 1LE. Tel: (0272) 565656 ext 204.

Kathryn Robinson/Clive Thursfield, Communication Aids Centre, Boulton Road, West Bromwich, Birmingham. Tel: (021) 553 0908.

Useful publications

"Occupational Therapy Micronews"
Editor: Janet Brown, Education Department, College of Occupational Therapists, 20 Rede Place, Off Chepstow Place, London W2 4TU.

and

"So you're paralysed."
"Able to work."
"People with Spinal Injuries: treatment and care."
(all obtainable from
The Spinal Injuries Association
Yeoman House
76 St James's Lane
Muswell Hill
LONDON N10 3DS)

Furniture

ORANGE AIDS are a range of furniture and fittings for those with special needs.

The Twickenham Table is designed as a general purpose variable height unit for all domestic, school and institutional requirements.

Each table is equipped to have the Orange Aids Standard Clamp fitted on the front and on the back. With other table edge adaptors available for use anywhere, the many Orange Aids can be employed as required.

The Mobile Table 'A' with upper shelf and storage units, fits over most single beds, adjustable, with non-slip castors and brakes.

There is also a Computer Monitor Stand – for use with most computer monitors.

EP20 Typewriter Mounting Bracket – on a pole for mounting on wheelchairs, beds, tables, etc.

Details from:
Hugh Steeper (Roehampton) Limited
237/239 Roehampton Lane, London SW15 4LB

Information on all aspects of provision for the disabled may be obtained from:
Handicapped Persons Research Unit
Newcastle Polytechnic
1 Coach Lane Campus
Newcastle-upon-Tyne NE7 7TW

A leaflet titled "IT and the Disabled" is available from:
John McCann
Information Technology Awareness Programme
Department of Industry
29 Bressenden Place
London SW1E 5DT

Disabled users of the ACORN BBC micro may obtain information about both hardware and software from:
Sue Harris
ACORN Computers Limited
Cambridge Technopark
645 Newmarket Road
Cambridge CB5 8PD
(Requests for information should be addressed to the Disabled Customer Services Department.)

Although these aids have been classified rather arbitrarily as being of use for this or that kind of disability, therapists will be well aware that no one category is mutually exclusive.

Research goes on in establishments funded by the Department of Trade and Industry, by the Department of Education and Science, by DHSS and in most teaching hospitals, as well as in the voluntary sector.

There are also valuable reviews of equipment and programs in journals like "Handicapped Living", Stanley House, 9 West Street, Epsom, Surrey KT18 7RL.

(More addresses will be found in Chapter 12: "Manufacturers and suppliers".)

Chapter Six

JOBS FOR HOUSEBOUND PEOPLE

Working from home is more than likely to increase, bringing with it new approaches not only to work but to those who do the work.

In the USA there is a move towards "telecommuting": clerical workers staying at home while they work at computers and only "meeting" their colleagues when they hold a "teleconference". Ugly words perhaps, but they do offer employment prospects for housebound and disabled people; once the idea catches on that some tasks can be done just as efficiently at home there must surely be a new approach to work and workers by employers.

Government help in the UK

The Department of Trade and Industry has, among other schemes, one for Information Technology and Work Preparation. This is a part of its "umbrella" Support for Innovation scheme, which also encourages "Information Technology and the Disabled Student".

The Department is currently funding a project (to the tune of £10,000 worth of equipment for six disabled people) on the use of micros by disabled users.

Although the project has not yet been evaluated, there is evidence (reported in an article in *"Learning to Cope"*, 1983) that "People working in home units are as productive, if not more so, as any abled-bodied employee".

To make employers aware of the benefits to them of employing disabled and handicapped people the Manpower Services Commission has published a leaflet:

Disablement Advisory Service
A new service for employers

This service complements the service available from the Disablement Resettlement Officers and other staff at the jobcentres. Some employers are not aware of, for example, the possibility of getting a cash grant towards the conversion of their premises or equipment or of the Fit for Work Scheme, details of which are given in this Chapter.

The Disablement Resettlement Officer

At every employment office/jobcentre a Disablement Resettlement Officer (DRO) is available to advise disabled men and women and to help them to get suitable employment. The DRO will also be pleased to advise

employers if they enquire at their nearest employment office/jobcentre about the best means of making full use of the services of disabled workers.

The Manpower Services Commission has also established Employment Rehabilitation Centres which run courses combining work assessment and rehabilitation.

The following extracts from an MSC leaflet may be of interest. The information is intended for medical workers, hence the use of the term "patient".

Employment Rehabilitation

"Employment Rehabilitation Centres (ERCs) are intended mainly to help people who, because of injury, disability or illness, have or may have difficulty in finding or keeping a job.

The courses combine work assessment and rehabilitation and are designed to help people by –

assessing physical and mental fitness for different types of work and advising on the most suitable occupation

developing the self confidence necessary to secure and retain employment

improving work capacity within the limits of any residual disabilities

recommending courses of vocational training, special employment schemes, or other aids to employment in appropriate cases, to improve employment prospects

recommending appropriate work placement.

Apart from specific skills, attention is given to improving self confidence and social skills. These are important in relating to both employers and workmates and also in facilitating independent community life while at work.

The initiative for identifying patients needing employment rehabilitation rests with the doctor caring for the patient, whether at primary or secondary care level. However, if the doctor has doubts about whether a patient has reached the stage to benefit from employment rehabilitation, the advice of the Centre EMA can always be obtained and the patient seen by the EMA if necessary."

(A list of Employment Rehabilitation Centres may be obtained from your DRO).

The Fit for Work Award Scheme

(Manpower Services Commission, Fit for Work Central Awards Unit, Moorfoot, Sheffield S1 4PQ)

What follows is an extract from another MSC leaflet.

"Employers who have won the Manpower Services Commission's Fit for Work Award can testify from experience that disabled workers are hard working, reliable and loyal members of their workforce.

Disabled people do not seek or want preferential treatment from employers. All they want is to be given the chance to compete for jobs on equal terms. Help them to help you.

The Manpower Services Commission provides a wide range of services to help you employ disabled people. Help is available through your local jobcentre.

The DRO can advise about the operation of the quota scheme, under which employers of 20 or more staff have a duty to employ a percentage (currently three per cent) of registered disabled people.

The Fit for Work Award Scheme was introduced in 1979 by the Manpower Services Commission with the aim of encouraging employers to look afresh at ways of providing equal opportunities for disabled people.

The scheme has the full support of the Government, the Confederation of British Industry, the Trades Union Congress and has the personal patronage of eminent employers and trades unionists in British industry and commerce."

Reduced costs for employers

Employers quickly learn that their overheads (which can be quite high for most clerical work) are reduced considerably when people work from home.

The kinds of activities which disabled micro-users do, and are paid for, are:

wordprocessing
database management
editing viewdata
computer programming.

Governments and employers are realizing that work at home releases carers and relatives from the hassle of helping a disabled person to get ready for the journey to work and to receive him when he returns from work.

And for the disabled person, who knows all too well when he is unable to keep going, working at home allows him to choose his hours – and if he feels like a 2 am start, good luck to him! Each of the six people mentioned above are paid a full salary by their employers, with a consequent saving to public funds.

There are some jobs which some able-bodied people find tedious, simply because they are confined to one work station and, indeed, to one seat.

An example is dealing with requests for reservations in a large hotel group. Someone has to be at the end of a telephone, or, more likely, a computer, (a) to note the requirements (b) search the database for suitable accommodation and diet and (c) print out a confirmatory letter. But this kind of work increases at holiday time, just when able-bodied people want to be away from telephones and computer terminals. So why not use someone who is confined to home anyway? If this sounds like exploitation then maybe it's a two-way process. There is a move afoot in

the USA, and perhaps elsewhere, for the keystrokes of a computer user to be automatically counted by that very computer (not a difficult task) and also for the times when the computer is switched on and switched off to be recorded. Many micros present you with the time and date when you switch on; it's easy enough to record this. If you, like many disabled people, are an insomniac, think what consternation your 2 am work sessions will cause at Head Office!

Working from home.

Working for yourself

Reference has already been made to the work of the Manpower Services Commission and to their Disablement Resettlement Service.

Most local authorities in the UK also offer advice and financial inducements to people who want to start in business and who seem likely to offer employment to others.

At local level there are several Regional Management Centres (a letter to the Librarian of your local Polytechnic will bring you further information) which offer courses on many aspects of running your own business or managing someone else's.

Council for Small Industries in Rural Areas

CoSIRA is an agency of the Development Commission. Its objective is to revitalise country areas by helping small rural firms to become more prosperous.

If you run a small business in a market town or rural area of England or you are thinking of starting a rural business, then CoSIRA is likely to have something to offer you. Some businesses are too large to qualify for CoSIRA assistance but none too small.

CoSIRA is Government financed, but the staff in each rural county of England are backed up by a voluntary Committee of local people.

Queries to put to CoSIRA

How do I start up a business on my own?

Where can I find a larger workshop or a small factory at a reasonable rent?

Do I need to get planning permission?

What help can I get from Government or the County Council?

How do I set about borrowing money to expand my business?

How much money will I need?

Where do I sell my product?

How do I take on my first worker?

Other services offered by CoSIRA

Business Management Advice – Accountancy, Marketing, Production Management.

Technical Advice – Building, Mechanical Engineering, Electrical Engineering, Industrial Safety.

Finance – CoSIRA Management Accountants are available to assist with the preparation of a case to support an application for a loan.

Grants – In priority areas only, grants are available towards the cost of converting buildings of all descriptions into workshops, including the cost of installing or upgrading mains services.

(*Priority Areas.* In certain remoter country districts CoSIRA has priority areas, known as Rural Development Areas.)

Training and courses

The CoSIRA Organiser can arrange either a visit from a technical officer or one of CoSIRA's intensive two- to five-day courses.

Microcomputers for the Small Firm

The course covers all the questions which should be asked before a decision is made to purchase and gives course members a chance to use a computer themselves.

Other services include: Village Shops and Tourism.

Charges: No charge is made for the help and information given by the CoSIRA Organiser. The fees for Technical and Business Management Officers and Training Courses are very modest.

CoSIRA County Office Addresses

NORTH

Darlington, Morton Road, Darlington, Co Durham DL1 4PT

York, The Lodge, 21 Front Street, Acomb, York YO2 3BW

Barnsley, Council Offices, York Street, Barnsley, South Yorkshire S70 1BD

Morpeth, Northumberland Business Centre, Southgate, Morpeth NE61 2EH

Howden, 14 Market Place, Howden, Goole, North Humberside DN14 7BT

Penrith, Ullswater Road, Penrith, Cumbria CA11 7EH

Preston, 15 Victoria Road, Fulwood, Preston PR2 4PS

EAST

Bingham, Chancel House, East Street, Bingham, Notts NG13 8DR

Northampton, Hunsbury Hill Farm, Hunsbury Hill Farm Road, Northampton NN4 9QX

Sleaford, Council Offices, Eastgate, Sleaford, Lincs

Cambridge, 24 Brooklands Avenue, Cambridge CB2 2BU

Norwich, Augustine Steward House, 14 Tombland, Norwich, Norfolk NR3 1HF

Ipswich, 28a High Street, Hadleigh, Ipswich, Suffolk IP7 5AP

SOUTH EAST

Wallingford, The Maltings, St John's Road, Wallingford, Oxon

Bedford, Agriculture House, 55 Goldington Road, Bedford MK40 3LU

Braintree, Bees Small Business Centre, Hay Lane, Braintree, Essex CM7 6ST

Maidstone, 8 Romney Place, Maidstone, Kent ME15 6LE

Guildford, 2 Jenner Road, Guildford, Surrey GU1 3PN

Lewes, Sussex House, 212 High Street, Lewes, Sussex BN7 2NH

Winchester, Northgate Place, Staple Gardens, Winchester, Hants SO23 8SR

Newport, 6–7 Town Lane, Newport, Isle of Wight

SOUTH WEST

Exeter, Matford Lane, Exeter, Devon EX2 4PS

Taunton, 1 The Crescent, Taunton, Somerset TA1 4EA

Truro, 2nd Floor, Highshore House, New Bridge Street, Truro, Cornwall TR1 1AA

Bristol, 209 Redland Road, Bristol, Avon BS6 6XU

Dorchester, Room 12/13 Wing D, Government Buildings, Prince of Wales Road, Dorchester, Dorset

Salisbury, 141 Castle Street, Salisbury, Wilts SP1 3TP

WEST

Telford, Strickland House, The Lawns, Park Street, Wellington, Telford, Shropshire TF1 3BX

Wirksworth, Agricola House, Church Street, Wirksworth, Derby DE4 4EY

Malvern, 24 Belle Vue Terrace, Malvern, Worcs WR14 4PZ

Warwick, The Abbotsford, 10 Market Place, Warwick CV34 4SL

Small Firms Service

This is another service run by the Department of Trade and Industry in the UK.

The Small Firms Service is an information and counselling service to help owners and managers of small businesses with their plans and problems. It also acts as an advisory service to those thinking of starting their own business.

Through the Small Firms Service you can get information on any business problem: from finance, diversification and industrial training to exporting, planning, technological advances, industrial relations and marketing.

If the enquiry you have is beyond straightforward sources of information, it can be discussed with a Small Firms Counsellor, an experienced businessman who may well have faced a similar situation. He will help by offering advice and guidance, impartially and in strict confidence.

Simply contact your local Small Firms Centre – dial 100 and ask the operator for Free-fone 2444.

The information service is free. For counselling, the first three counselling sessions are free and, after that a modest charge is made for each session.

Apart from the 12 Small Firms Centres, counselling is available at 80 Area Counselling Offices around the country. Phone the nearest Small Firms Centre to book an appointment.

Your Small Firms Centre is backed by the full resources of the Department of Trade and Industry, the Scottish Office and the Welsh Office. Its aim is to help you find the right answers to your questions quickly.

The Small Firms Service in *Scotland* is operated through the Scottish Development Agency. In *Wales* the information service is provided by the Welsh Office and the counselling service is operated by the Welsh Development Agency.

An information service is provided by the Department of Economic Development in *Northern Ireland*.

How will the micro help you at work?

As we have seen, you will need a suitable program; more important, the program must be compatible with your equipment.

Given those provisos, it is possible to use many programs as aids either to your own business or someone else's.

A word processing program is essential.

Some kind of database program is probably also necessary.

With those two programs as a basis for your work you will be able to write letters, reports, novels, poetry, plays – and invoices. You will also be able to record some Accounts to the satisfaction of the Inland Revenue and your employer.

Computer programming

"Today there are blind people in the rapidly expanding field of data-processing who do the same jobs as and work side by side with sighted colleagues. The Royal National Institute for the Blind has been involved in training computer programmers since 1966."

HRH The Duke of Kent, President of the British Computer Society (quoted in *"Working with Computers"*, RNIB, 1983).

You, too, may find your micro so absorbing that you decide to train yourself to write and market your own programs.

Protect your property

A thorny point about writing your own programs (software) is the danger of piracy; some people will copy your cassettes or disks or your written program without your permission and without paying you for it.

This is theft of your intellectual property but the law in the UK is a little vague about how you prove that it is your program.

Some manufacturers have incorporated a *"dongle"* (a kind of plug-in switch) and others use *cartridges* which contain programs, rather than sell their software on vulnerable tapes and disks.

You may find the following books useful:

Writers and Artists Yearbook
Published by Adam & Charles Black
and
"Copyright and Education"
published by the Council for Educational Technology.

The first book contains an article on Copyright as it affects authors of printed books. The second book looks at the question from the point of view of teachers who wish to use programs as an aid to learning; program writers may find it useful to see the other side of the coin.

Recent articles in the *Spinal Injuries Newsletter* (No 31 – May 1984) have been contributed by members who have either got jobs as writers of programs for an employer or are working on their own account. They are summarized and included here with the permission of the Director of the *Spinal Injuries Association*, Stephen Bradshaw.

Experiences of two members of the Spinal Injuries Association

1. (John Borthwick) "Computers: neither I, nor for that matter the DRO, really knew what computer programming involved, but to me, it sounded one of the more interesting of some pretty dull prospects. I was trying to get on to the Computer Programming course run by Queen Elizabeth College, Leatherhead, Surrey.

Work itself presented and continues to present few physical problems.

When I started it was as a Junior Programmer; over the years I have competed with others on equal terms and have been promoted several times. My current title is Senior Systems Analyst which I achieved about five years ago.

Computer programming is a job well within the capabilities of many disabled people, providing they have the right aptitude. It can be done either in an office or at home. The only physical requirement is to be able to communicate your thoughts either to paper or to a computer directly. Whether this is done by writing or via a typewriter/computer keyboard doesn't matter, both however would be preferable.

The guidelines I gradually accumulated before I eventually acquired the equipment (hardware):

The VDU (visual display unit – like a TV screen or in some cases can be a TV screen) and keyboards: some were attached and I couldn't reach the whole span either back to front or the width.

Those were eliminated and we concentrated on separate keyboards.

Also, keyboards can vary in size, layout and key spacing – making them easier or more difficult to use."

2. (Peter Chilcott) "In voluntary organisations, the competition for some tasks is almost non-existent and a slow learner is tolerated.

Remember that you do need the "permission" of the DHSS to work; you have to advise them of your intention to work. You can mention it is speculative, the initial capital costs, say you will keep them informed, let them know that you know the therapeutic earnings regulations, and that if profits accrue you will advise them immediately; say that it is your ambition to get off state benefits and become financially independent."

Programs which could help you

You may get some ideas from magazines like "Software Index", published by IPC Magazines Ltd, Westover House, West Quay Road, Poole, Dorset BH15 1JG, but whatever program you have in mind remember that you will need a version which runs on your micro (is compatible with your system).

A program to keep your records and accounts, called "MINI-OFFICE" and priced under £10, is available from: Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Here are some ideas:

Computer assisted design

Why not use your micro to help you design? Computer assisted design has been around for some time now and some firms are beginning to realize that design plays a large part in success or otherwise of their marketing. The DOI in the UK has plans for helping free-lance designers.

Some of the aids mentioned in Chapter 5 could be useful while you are investigating this application, for example:

GRAFPAD
obtainable from British Micro, Unit Q2, Penfold Works, Imperial Way, Watford, Herts WD2 4YY.
(This is compatible with the Acorn BBC micro, Sinclair Spectrum and Commodore 64.)

Writing letters in a foreign language

No, you don't have to be a linguist, though it helps. There are programs which consist of a pack of key paragraphs and sentences. Choose your phrases, give each one the code number in the program and, with a bit of practice, you have constructed a reasonable letter in French, German or Spanish.

Courses in Micro-computing

Computer "camps" have migrated from the USA to the UK; some addresses of holiday courses for children will be found in Chapter 8.

There are also courses available in Colleges of Further Education and even self-instructional courses available on cassette.

Such a course (at a technical college) is currently being taken by a mature lady who is recovering from a stroke; she is also studying for an Open University qualification. This lady points out the rehabilitative effects of using a micro:

> "It helps you to organize; it makes you work out things step by step. A few weeks ago I used to start dialling a telephone number and then forgot which digits I had dialled. Learning to use a micro has helped me over those first difficulties; most of all it has given me confidence."

Some Residential courses

Dartington Technical College, The Old Postern, Dartington, Totnes, Devon TQ9 6EA has residential courses in micro-computing.

Dr Lionel Wardle runs a scheme called "Computer Holidays". Details from him at 37 University Road, Southampton SO2 1TL (Please include a SAE).

Hereward College of Further Education has a support and information service for physically handicapped students entering further education.

Information, training, practical experience, staff courses, and even a limited loan service are provided.

Further details can be obtained from the College, Bramston Crescent, Tile Hill Lane, Coventry CV4 9SW.

The British Institute of Mental Handicap runs conferences, courses and workshops. Some of these deal with "Micro-computing and Mental Handicap"; not only is there the possibility of meeting people who know about micros at these courses but also of sharing your experiences with others who would like to learn more about them.

Their address is:
British Institute of Mental Handicap, Wolverhampton Road, Kidderminster, Worcs DY10 3PP

The Spastics Society also run courses, which include courses on topics like: "Technology and Disabled Children".
Their address is: Castle Priory College, Thames Street, Wallingford, Oxon OX10 0HE

Roger Jeffcoate runs courses on Technology and Micro-computing for Disabled People.
His address is:
Willowbrook, Swanbourne Road, Mursley, Milton Keynes, Bucks MK17 0JA (Stamped, addressed envelope, please).

Micros and voluntary work

One example of a way in which you could help a voluntary agency would be to offer to compile and retrieve their records.

There is one computer application which is very good at both storing and retrieving records: a *database.* Databases were briefly described in Chapter 3.

A database could form the basis of a LINK SCHEME as operated by some disability groups, where recently disabled people are put in touch with other disabled people who are able to offer advice based on their own experiences.

In these circumstances your database could match one person's age, interests, location/address, experiences and so on with those of another; ie it would assess compatibility.

It could also be used by schemes such as the Crossroads Care Attendant Scheme to match a carer with a "client".

The DIAL scheme would also welcome help in collating information on local services for disabled people. (DIAL = Disablement Information and Advice Line.)

Working as a free-lance

You might choose to advertise your services in, for example, looking up and recording people's ancestry.

Here is a more detailed account of how you might proceed, together with a mention of some of the pitfalls, which can waste a lot of time.

First you will need to talk to someone who already does the job manually, that is someone who visits record offices and churches – someone who already searches for the records of one particular family which we'll call "Smith".

Here are some introductory questions to pose to your "client".

1. Roughly how many records do you want to use?

This is so that your micro can set aside this amount of memory. Any overflow of records will be a disaster: the system will not accept extra

Figure 1

Survey of hostels available to disabled people in Last Town (19--)

Place	L/Term Avail	L/Term Occ	S/Term Avail	S/Term Occ	Emer Avail	Emer Occ	Staff F/Time	Staff P/Time	Volun-teer	Ages 0-16	Ages 16-19	Ages 20-30	Ages 30+	Ref From
First House	28	28	0	0	0	0	3	10	Yes	No	Yes	Yes	Yes	Soc Svcs
Fourth House	9	9	4	4	1	0	4	6	Yes	Yes	Yes	No	No	Schools
Second House	18	18	2	1	1	.5	2	5	Yes	No	Yes	Yes	Yes	Soc Svcs
Third House	24	24	.5	0	0	0	4	6	Yes	No	No	Yes	Yes	H/cap Team
Totals	79	79	6.5	5	2	.5	13	27						

Figure 2

Hostels with less than 10 part-time staff
and less than 10 available places (long term)
as at 1 January, 19--

Place	L/Term Avail	L/Term Occ	S/Term Avail	S/Term Occ	Emer Avail	Emer Occ	Staff F/Time	Staff P/Time	Volun-teer	Ages 0-16	Ages 16-19	Ages 20-30	Ages 30+	Ref From
Fourth House	9	9	4	4	1	0	4	6	Yes	Yes	Yes	No	No	Schools
Totals	9	9	4	4	1	0	4	6						

Figure 3

Hostels with emergency places available
as at 1 January, 19--

Place	L/Term Avail	L/Term Occ	S/Term Avail	S/Term Occ	Emer Avail	Emer Occ	Staff F/Time	Staff P/Time	Volun-teer	Ages 0-16	Ages 16-19	Ages 20-30	Ages 30+	Ref From
Fourth House	9	9	4	4	1	0	4	6	Yes	Yes	Yes	No	No	Schools
Second House	18	18	2	1	1	.5	2	5	Yes	No	Yes	Yes	Yes	Soc Svcs
Total	27	27	6	5	2	.5	6	11						

Figure 4

Smith family records from 1600 to 1984
Evidence from wills (note: RO = Record Office)

SEARCH AREA	SURNAME	FORENAME	TRADE	DOCS SEEN	AMT	REF NO.	DATE	NOTE
NOTTS	SMITH	JOHN	FARMER				1757	CLIFTON
NOTTS	SMITH	JOHN	FARMER				1771	CLIFTON
LOUGHB	SMITH	JOSEPH	CLOTHIER				1852	LEICESTER
ASHBY	SMITH	CHAS HENRY	BUTCHER			PP/014/ADMIN	1878	LEICESTER
ASHBY	SMITH	ELSIE W	FARM		£20	RR/015/PBB/212	1913	LEICES
M MOWBRAY	SMITH	FRED			£45	A/112/ADMIN	1918	LEICESTER
LEICESTER	SMITH	WILLIAM	BUTCHER				1899	LEICS
LEICS	SMITH	CHAS	LAB	RO	£41	PR/10/1448	1646	SUTTON CHEN
LEICS	SMITH	JOS	BUTCHER	RO		R/333/ADMIN	1827	KILBY
LOUGHB	SMITH	JOS HENRY	INNKEEPER	RO		R/023/ADMIN	1762	LEICS

Figure 5

Smith family records from 1600 to 1984
Evidence from wills seen in Leics

SEARCH AREA	SURNAME	FORENAME	TRADE	DOCS SEEN	AMT	REF NO.	DATE	NOTE
LEICS	SMITH	CHAS	LAB	RO	£41	PR/10/1448	1646	SUTTON CHEN
LEICS	SMITH	JOS	BUTCHER	RO		R/333/ADMIN	1827	KILBY

items and you will be left with a part of a database only – as much use as a part of an index to a book.

2. What do you want to use your records for?

3. Supposing I told you that I had come across a reference to a Smith in the eighteenth century. What would be your first question?

The answer to the second question would help both him and you to visualize your records and the use to be make of them. If he wanted to compare one thing with another then you could consider drawing up a set of records with those two items *("fields")* at the start of the record. This is because, in general, the nearer the field is to the start of the record, the more speedy the search.

The third answer would help you to designate the first field of your database (eg "Place of birth").

The difficulty you may meet is that people don't always know what they want or when they are likely to want it.

So be prepared to scrap your first attempt once your client has seen it and has changed his priorities.

His answer might be, "My first question is 'where did he live?'"

But what does this mean?

Is your first field to be

Birthplace

or Deathplace

or Marriage place

After this kind of trial and error you should be able to show him a specimen database record and then a specimen printout of several records, printed in a special order to show the relationship between one thing and another.

SPECIMEN DATABASE RECORDS

Figure 1

Figure 1 shows a (fictitious) table of figures and could form the basis of a discussion with your client.

Only a few lines are shown, for reason of space, but several thousand could be stored and printed out at will. The interpretation of the figures is the responsibility of the person who asked for them to be presented in this way.

You may expect questions about both the content and the format of the printout:

Why does the second house not appear in second place?

(The program was instructed to sort all items under "PLACE" so that this item could be accessed most easily. So the places are sorted and listed alphabetically.)

What does the last column mean?

(It stands for "referred from" – the curious term used by medical people and adopted by some Social Services people. The full heading isn't used here because of space. The same limitation applies to all the other headings.)

What does the first column mean?

(These are the "beds" available. See the comment above on curious jargon terms.)

Then how can half a bed be available in the third house and how can half a bed be occupied by an emergency "referral" in the second house?

(The database does what it can to express the terminological inexactitudes of officials. Although this is fictitious it is based on actual responses. These included, "God knows what we'd do in an emergency. We'd have to put someone up in a storeroom.")

If there are volunteers working in each establishment why bother to have a separate column?

(In a larger/longer printed list there could be some hostels without voluntary help. But see also the further comment below.)

Why not give the actual ages?

(This would, indeed, have been more informative. As it is, some assumptions can be made eg that First and Second Houses could each have residents aged from sixteen to seventy.)

Who adds up the figures?

(The program does. It would also have given averages if they had been requested. But it only totals figures; the last six columns contain words and they would not be totalled.)

Figures 2 and 3

These give two examples of selected records. Again it must be said that the same process could be used with several thousand records eg the emergency places in hostels in the entire United Kingdom could be selected and printed out.

If you intend to use this facility in your database work do be prepared for the micro to use its own methods. When you ask it for the information in Figure 2 you may be required to answer the program's prompts in arithmetical terms. So your request could look like this:

print out all records in which field 2 (the "long term available" figure) is less than 10 and in which field 9 is also less than 10.

Similarly your request for the information given in Figure 3 might be in these terms:

print out all records in which field 6 is greater than zero.

Notice that the micro does only what you tell it to do. Had you wanted the actual figures for "List only the hostels which have officially got room available" you would have had to add a further criterion:

List all records in which field 6 is greater than zero and in which field 7 is zero.

The important thing is to use the potential of your micro: let your micro do the searching.

When your client has asked questions about this brief printout (and received answers which satisfy him) you may wish to move to the topics which interest him.

FAMILY RECORDS

Evidence from Wills

1. Area Searched
2. Surname
3. Forenames
4. Trade
5. Will dated
6. Place where docs were seen
7. Ref No. (in record office)
8. Other

Of course, there are other ways of doing this, some more lengthy. It is assumed here that this is simply a record of Wills and that other records will be held on a second file for the time being.

Figures 4 and 5

Here is a specimen printout of the information.

Bearing in mind the questions asked about the earlier survey (Figures 1, 2 and 3) you should now be in a position to answer any further queries.

When your client has seen his records printed in this form he may wish to change the format of each record. So you'll have to start again; fortunately you limited your records to ten, so it won't be a daunting task.

What have you learned so far?

Presumably that you need to do a practice run so that your client has a chance to change the format.

Also, that when you have named the fields you should add at least one "other" (8. above), so that you can add last minute comments.

Finally, be prepared for several trial runs of your final printout. Your page width is limited and although your printer will do what it can to squeeze all the letters and figures into columns your main concern is that the information is not only accurate but easy to assimilate. This means spaces between the columns ie you must add 2 to each assessment of the width of a column for a space at either side.

If you simply can't fit everything on one sheet then you must go back to your figures. You may find that you really don't need some information or, alternatively, that it can be presented in an abbreviated form.

But whatever the problem do ensure that your micro does the hard work; it can only do that if you have given it the correct instructions.

Whether or not you now feel competent to advertise your services is up to you, but, even if you don't take the matter that far, I hope you will find organizing a database a satisfying and rewarding task.

Chapter Seven

DEVELOPING LANGUAGE SKILLS WITH THE MICROCOMPUTER

by R. G. Dyke, M.Ed., Manager of Manchester SEMERC

Used even at the most basic level, communication skills have a dramatic effect on our situation. Just vocalise loudly and others will look around. Make it a sad sound and they will think you've got a problem. Make it merry and they'll smile too. Succeed at that level and you will find yourself on the slippery slope of developing ability with language, where success breeds progress. Communication skills diversify to encompass the nuances of facial expression, the abstract scribble we call written language, the language of particular groups and subjects. Thinkers tell us that they use language as a tool for thinking with. Perhaps it will catch on.

And then there are devices called microcomputers. Leaving aside the question as to whether they will catch on, can it be possible that they have a part to play in developing language competence? First impressions make that an unlikely proposition. It is well known that computers are number crunchers. They calculate I.C.I.'s payroll, track satellites, lurk in Maths departments in schools.

However, equipped with colour, sound, and a multitude of sockets for external devices, some microcomputers appearing on the home and school market now are capable of being all things to all users. This Chapter takes a brief look at the micro in its versatile role of encouraging the development of communication skills.

The microcomputer is establishing itself as the basis for very flexible communication systems for severely physically disabled adults and children. A single tiny or poorly coordinated movement may be used to control a system whose complexity is paradoxically employed to make its use as simple as possible. The system may provide a printout of written comments or even synthetic speech. The microcomputer may be the sole outlet for an individual's expressive language, and thus the main channel for development through interaction with others. Specialised systems are appearing. DISCWORDS[1] offers single switch access to educational material easily typed in by the teacher, in addition to communication, design, and games facilities for the switch user. CEDRIC[2] is a communication system which offers telephone dialling, synthetic speech and control of a large number of features of the environment. KEYMASTER[3] gives single switch control of standard software on the home micro, allowing use of business programs, standard wordprocessor packages, and access to Prestel, as well as very simple and basic communication.

These systems assume a degree of skill with written language. However, teachers, therapists, and parents are exploring the benefits to be gained from using the microcomputer with individuals at much earlier stages of development.

Simple plug-in devices such as the Toy Control Interface[4] allow the micro to play a part in developing characteristics in the profoundly handicapped child as basic as self-awareness and awareness of the individual's power to influence the environment. Noisy and lively battery-powered toys or bright computer screen displays motivate movement by providing immediate, tireless, and consistent 'big' responses to weak or uncoordinated efforts. The power of the microcomputer lies particularly in providing the teacher with monitoring of performance and the ability to make tiny increments in the demands made on the child. Such systems may serve as training aids towards the eventual use of a computer based communication device. They may also be regarded as a means of leading the user towards the use of more complex input systems than the single switch. Software such as the MICRO-ACTIVE programs lead the user through a progression from single switch to two switches to overlay keyboard.

For the speech-impaired child at the two to three year old level, the MICROMIKE[5] system will encourage babbling and vocal play by building up a bright pattern in response to vocal sounds made into a microphone attached to the computer. More sophisticated users may use the system to practise vocal skills by using voice sounds to control quite demanding games on the screen. Far more elaborate systems such as VISISPEECH[6] provide a graphic display (and a printout if required) of speech patterns to help speech impaired and deaf pupils eliminate faulty intonation and pronunciation.

For some children with quite clear speech (particularly deaf pupils), weakness in use of syntax may be a barrier both to effective expression and to full understanding. Computer-based material produced at Hull University by the Educational Technology Group has been devised to strengthen syntactic awareness. Programs such as SQUARE AND CROSS[7] and HIDDEN SHAPES encourage the user to explore positional relationships using commands and questions keyed into the computer. The program highlights syntactical errors as they are made.

As the focal point of a group of pupils, the microcomputer may serve as a stimulus for the exercise and development of language skills in a very natural way. The COMPACT[8] suite of software presents a large number of activities on the microcomputing screen controlled by a single switch or touches on pictures on the paper sheet on an overlay keyboard. Events on the screen invite exploration, commentary, argument, and attempts at prediction, and overflow into practical activities imitating the events on the screen.

The overlay keyboard, a pad of invisible keys under a paper sheet, offers many possibilities for the development of communication skills. Picture and shape matching with items appearing on the micro screen are obvious activities, but as developers become more open minded about the functions of the microcomputer, many other possibilities emerge. A recent programming project by a university computer studies student has resulted

in a simulation of a Pelican road crossing on the computer screen and the overlay keyboard. The crossing button is pressed on the overlay picture, the green man appears on the traffic lights on the screen, and the cars stop. A finger walked across the crossing on the overlay takes a small figure over the crossing on the screen. Another simple program is available which allows a figure on the screen to be dressed by touching in correct order items of clothing drawn on the overlay keyboard. As the overlay is a sheet of paper, the teacher can modify the complexity of the child's access to the program easily. The child may be touching doll's clothes stuck on the overlay, or coloured pictures, line drawings, words, or even words in a foreign language. There is no suggestion that these are substitutes for real experience, but the potential for developing the language relating to thinking about and using the skills is obvious. At the time of writing, programs are being developed to present 'microworlds' on the overlay keyboard to be explored in relation to comments or directions provided by the computer. Early, unpublished, experiments in this field reveal that groups of children are provoked into very active verbal interchange of questions, solutions, estimates and ideas. The computer may present tasks for the pupils in terms of movement around a village layout, querying incorrect moves and prompting further activity, or the computer may respond to the pupils' activity on the village (or other) layout by printing out written and illustrated accounts of the pupil's activity. In this way, non-writers may produce their own reading material.

An aid to expression.

Adventure games provide a fertile source for group discussion, whether it be deciding which items from the magician's hoard will be of most use in traversing the haunted forest, or how to negotiate the half inch thick steel door bearing the legend "Insert your security pass in the slot". Since the majority of these games are entirely based on text, insightful analysis of

written material is at a premium, and seemingly innocent comments on the screen are probed for deeper meaning. "Yes, I know it says THERE IS NO LOCK THAT I CAN SEE, but what do you think it's telling us?". Many of the games sold for home use are extremely demanding intellectually. The educational value of this kind of activity has been recognised, and adventure games for school use such as GRANNY'S GARDEN and FLOWERS OF CRYSTAL[9] have appeared. The recent appearance of a prototype adventure game for mentally handicapped users, PUZZLE PALACE[10] is encouraging.

Open-ended programs such as TREE OF KNOWLEDGE[11] offer possibilities for language development at many levels of ability. The program in effect asks for the pupils' help in developing its "knowledge" of a particular topic. TREE OF KNOWLEDGE gathers and refines information on any topic of the user's choice. It may be found demanding increasingly precise definitions of minerals, chemicals, plants, pieces of music, characteristics of members of the group, or utensils in the cookery room. It will also accept very simple definitions of the funtions or appearance of everyday objects, animals, or people. Whatever the level of its use, there is a great deal of enjoyment and educational value in teaching that ignorant and painfully logical member of the group – the microcomputer. The program may be a focus for discussion and a builder of concepts and vocabulary in any subject in the curriculum. This must be a vital role, since a grasp of the working vocabulary of any subject is essential to confidence and success.

Perhaps the ultimate open-ended program, and a language in its own right is LOGO.[12] This is a programming language readily used by pupils, most often seen in the form of TURTLE GRAPHICS packages. These use LOGO language to drive a floor crawling turtle or a simulation of this on the T.V. screen, carrying a pen to produce patterns which grow in complexity with the development of the pupils' thinking. Commands such as "FORWARD 50 . . . LEFT 90" drive the turtle to draw patterns. As the user gains in confidence, commands are grouped to form 'procedures', which may be combined to form complex pictures and patterns. The computer may be taught to 'SQUARE', then to 'TRIANGLE', then told to combine these procedures in order to 'HOUSE'. The system presents itself as being very simple in the first place. Its strengths lie in its ability to grow in complexity with the ability of the user, in the fact that the user is learning by teaching the computer, and in the demands made on the user to organise and express ideas in logical order. Besides encouraging the ordering and logical expression of ideas within the LOGO framework, use of the system gives rise to purposeful (and usually animated) group discussion, involving a great deal of proposing and testing of hypotheses.

There is increasing interest in 'pre-LOGO' activities using educational toys such as BIGTRAK, as teachers discover that if an appropriate starting level can be found for the development of the language and thinking skills involved in LOGO, children thought to be of very low intellectual levels blossom through the imaginative use of the material. This process of working backwards to beginnings with less and less able and less motivated

children has led the Walsall LOGO Project[13] to the stage of developing 'pre-BIGTRAK' activities to precede the 'pre-LOGO' activities, and to finding as great a value in these activities in unsuspected fields such as social education as in the intended target areas of language and logic development.

The microcomputer may be found promoting written expression, often in the early stages freeing the young author from some of the physical chores in order to allow freer exercise of linguistic skills. A "first word processor" named PROMPT[14] combines a whole-word input from the Concept Keyboard with a very simple word-processing system on the normal QWERTY keyboard. A beginning reader can have the whole of his reading vocabulary written on the overlay keyboard sheet and entered into the computer's memory by the teacher. The pupil can then 'play' with the words that he knows, constructing phrases and sentences correctly spelt and neatly written, each word touched in from the overlay. As confidence and vocabulary develop, an increasing proportion of words are typed in by the pupil in the normal way from the QWERTY keyboard. Other word processing systems offer support in various ways to the struggling author.

WORD-STOPPER[15] developed at the MACE centre in Birmingham will comment "You have used that word before in the story. How about a different one?". More advanced word-processors such as EDWORD[16] or WORDWISE[17] offer an easy step from that level into systems which would answer the needs of professional authors, but which are capable of use by a writer taking the first steps in written communication. The facility to edit, revise, or re-call material previously written and to see much-altered work printed out faultlessly, is a great encouragement to self-expression at any level of ability.

A number of programs now available (such as STORY[18]) directly encourage written expression by providing narrative elements which may be selected or rejected by the user to form a unique story. Anita Straker's WORDPLAY[19] takes the process a stage further by inviting the user to enter collections of nouns, adjectives, verbs, and adverbs on a chosen topic, which the program then endlessly combines and recombines in "poetry" format at the touch of the spacebar on the keyboard. Sometimes hilarious, the results can be surprisingly good, leaving users impressed by their own choice of vocabulary. The group gathered around the T.V. screen judging each screenful of "machine generated poetry" is exercising linguistic skills at a high level.

TRAY[20] is a program which deliberately sets out to develop linguistic expertise, and which in the process guides the user through an apparently impossible task. It presents a piece of text on the screen with only the punctuation visible. No words or even letters can be seen. The user's task (usually a group task) is to "buy" letters, and then to guess other letters in the piece of text at as early a stage as possible. Clues from word length and context soon arise, and the problem-solver is involved quickly in the very kind of linguistic analysis which enables the skilful reader to cope with unfamiliar material.

Currently available programs for the microcomputer may then support the development of communication skills from the most basic level to those of quite subtle analysis of written material. It would clearly be most unfair to regard the microcomputer in future as a dealer in numbers, or as the native inhabitant of maths or science departments in schools. In promoting language development, both spoken and written, it is contributing towards success in all areas of the curriculum.

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Mancester M13 0JA.

Software References. *Examples given are for the BBC model B micro*

1. DISCWORDS. Communication/education. From Stuart Rees, Manchester Polytechnic, Hathersage Road, Manchester, M13 0JA. (At cost of media).

2. CEDRIC. Communication/environmental control. From Dave Allen, CEAD Supplies, 100 Southend Road, Gateshead, Tyne & Wear.

3. KEYMASTER. Switch control of standard software. From Lyndon Thomas, Newtech, Coach House, Kelsterton Road, Flint, Clwyd, CH6 5TH.

4. TOY CONTROL INTERFACE, MICRO-ACTIVE. From Micrex, 54, Linley Road, Alsager, Stoke on Trent.

5. MICROMIKE. Voice-volume games system. From John Tabberer, 51 Guernsey Close, Widnes, Cheshire.

6. VISISPEECH. Speech analysis. From Jessop Acoustics, Unit 5, 7 Long Street, London E2.

7. SQUARE & CROSS, HIDDEN SHAPES. Syntax correction. From Dr. A. A. Rostron, Dept. of Psychology, University of Hull, Hull HU6 7RX.

8. COMPACT. Single switch/overlay keyboard language development. From Dr. D. Harrison, 168, Shakespeare Crescent, Dronfield, Sheffield, S18 6ND. (80 programs at cost of media).

9. GRANNY'S GARDEN, FLOWERS OF CRYSTAL. Educational adventure games. From 4MAT Software, Linden Lea, Rock Park, Barnstaple, Devon, EX32 9AQ.

10. PUZZLE PALACE. Adventure game for mentally handicapped users. With other software, some for severely handicapped users with single switch. From Alan Nixon, 18, Kinnegar Road, Holywood, Co. Down, N. Ireland.

11. TREE OF KNOWLEDGE. Open-ended classification program. From Acorn dealers – an ACORNSOFT program.

12. LOGO, TURTLE GRAPHICS. Children's programming language. (Examples): DART, From Advisory Unit for Computer Based Education, Endymion Road, Hatfield, Herts.
or LOGO CHALLENGE. From Addison Wesley, 53 Bedford Square, London WC1B 3DZ.

13. WALSALL LOGO PROJECT. BIGTRAK curriculum support material, Turtle Graphics EPROM program. c/o Linda Spear, Curriculum Support Team, Busill Jones School, Ashley Road, Bloxwich, W. Midlands, WS3 2QF.

14. PROMPT. Simple word processor/whole word input. From BrainWare, 15 Oakford Close, North Molton, Devon, EX36 3HF.

15. WORD-STOPPER. Supportive word processor. From L.T.S., Haydon House, Alcester Road, Studley, Warwickshire, B80 7AP.

16. EDWORD. Educational word processor. (On ROM chip). From Clwyd Technics, Coach House, Kelsterton Road, Flint, Clwyd, CH6 5TH.

17. WORDWISE. Word processor. (On ROM chip). From Computer Concepts, 16 Wayside, Chipperfield, Herts. WD4 9JJ.

18. STORY. Story writing program. From DACO Software, 59 Mackenzie Road, Moseley, Birmingham, B11 4EP.

19. WORDPLAY. Computer generated poetry. To be published by Collins.

20. TRAY. Use of context clues. From Heather Govier, Davidson Centre, Davidson Road, Croydon, CR0 6DD.

SPECIAL SWITCHES, OVERLAY KEYBOARDS. Details may be obtained from your local SEMERC.

Chapter Eight

MICROS IN SPECIAL EDUCATION

Special Education in the UK takes many different forms. Throughout this book the form referred to is what has been called "ESN/S" ie the education of severely mentally handicapped children and adults. Within this group there are people with multiple handicaps; for example, a mentally handicapped person may not only be a slow learner but also need special equipment to enable him/her to carry out certain functions.

Before the establishment of the SEMERCS, and you will have read an article by a Manager of a SEMERC, Bob Dyke, in the last Chapter, there was no co-ordination of the work being done to write programs for these needs. Teachers were writing programs in isolation, parents were struggling (as you see in Chapter 9) and some research was going on in places like Universities and Polytechnics, as Tony West's article illustrates. In teaching hospitals there were programmers working on tasks which varied from monitoring heartbeats with the aid of a micro to helping a disabled patient to achieve some measure of independence. There was also ongoing research in specialist organizations (like the Hester Adrian Research Centre in Manchester and the voluntary agencies).

Now we have the Microelectronics Programme (MEP), which is administered by the Council for Educational Technology; things are on the move. Among their many other activities the CET look after the four SEMERCS.

This is what their leaflet says about them:

> The SEMERCS staff demonstrate relevant equipment and provide advice relevant to children with special needs. The MEP has encouraged materials for all ages and abilities to be researched by a variety of agencies. It has been responsible for creating training packs which accompany the equipment subsidised by the Department of Trade and Industry's schemes for schools.

It must be emphasized that the SEMERCS really exist to help teachers to identify and satisfy the needs of people in special education.

If there is any valid criticism to be offered it is that there are too few of them. At present a teacher from a Special School can ask for advice about any aspect of micro-computing and will get a helpful answer. Groups of teachers are given demonstrations at which they can touch the switches, blow into other devices, and actually do things with a micro – even if they have never used one before. The SEMERC staff make a note of their observations and are thus able to pass on ideas from one teacher to another.

Other government bodies are playing a part: the work of the DTI, for example, has been referred to throughout this book. Their leaflet, *"Information Technology and Special Education"* describes pilot work in some schools in Scotland and includes the following remark:

> The inherent flexibility of Information Technology means that the teacher or pupil should not be asking "What is available?" but "What do I need?"

When such questions are put by a teacher to the Staff of a SEMERC (most of whom have worked in Special Education) they can not only demonstrate existing programs and systems but, if they deem there is sufficient need, can actually write programs.

An example of this is a database for use by children in a Special School. Although it is not called a database (and expressions like "record" and "field" are not used) the program enables children to record items of information and retrieve them in different ways.

The messages on the screen are very friendly eg

"I need to know the first name as well", and "This is what you wanted to know", followed by a short list of items.

If the child cannot read, s/he hears the teacher reading out these prompts or solutions.

Concept Keyboards

Mention has earlier been made of this development. They are more properly called "overlay" keyboards.

The reason for using them is to by-pass the usual typewriter keyboard – called a QWERTY keyboard because these six letters are grouped on the top row of a conventional keyboard.

Why should anyone not be able to use a keyboard? There may be several reasons. The user may not be able to recognize the letters, digits and symbols. S/he might not be able to see them clearly. S/he may not be able to press individual keys (because of physical weakness).

It may still be possible for the keyboard to be used in some of the conditions mentioned above and a competent programmer should be able to adapt a program accordingly. For example, if it is possible that a user might keep his finger on a key or press it repeatedly – whether through physical weakness (eg tremor) or excitement, in the case of a mentally impaired user – the program can be made to allow for that.

This is an aspect of programming called, rather charmingly, "*Disabling* keys". You find the need for this when you accidently press the wrong key; in many cases, if that key has not been "disabled", the program comes to an abrupt stop, with perhaps only a winking light on the screen and the usual rubbishy message (like, "BREAK IN 4500" or "READY"), which you read about in Chapter 2.

It can be useful, if you are testing a program, to deliberately press individual keys like "ESCAPE" or "BREAK", or "STOP", "RETURN" or "ENTER". If the program stops, beware; *you* may remember not to touch those keys in future but somebody else who uses the program may

not. It can be infuriating to find that a program has stopped just when it's beginning to tell you something or test your capabilities. Another bit of jargon: when this has happened people say the program has *"crashed"*.

What does the overlay keyboard do?

It can be of any size but more usually it is A3 or A4 – large enough for over a hundred smallish squares to be drawn on it and also (perhaps unfortunately) for the user to lean on it. The principle is that when you touch, or lightly press, any designated part of the sheet of paper something happens on the screen. Instead of pressing a key on the keyboard you press part of a sheet of paper. Underneath that spot somebody has "programmed" the micro to show something on the screen or make a sound – but only when that particular spot is pressed.

Who would need to use it? Let's go back to our opening paragraph.

A mentally impaired person, or a slow learning child, may not recognize the symbols on typewriter keys. If a letter of the alphabet (lower case) or a digit is written on the sheet of paper he may find it easier to press the outline of the letter or digit. If so, he gets a reward by seeing something on the screen or hearing some appropriate sound.

For example, if a child touches a particular red square he hears a bleep and sees on the screen "RED" or "This square is red" or even, "THIS SQUARE IS RED, ANDREW".

There are many other applications which an imaginative teacher or therapist can develop, as Bob Dyke explains in Chapter 7. A jigsaw can be completed on the screen by the handicapped person touching a word on the paper (you see a picture of a man on the screen minus arms, legs and head; only when you press the appropriate symbol on the paper will an arm be added to the body, and so on).

Programmers are beginning to supply programs designed specifically for the overlay keyboard, as illustrated by Mike Doyle's submission to THE TIMES National Micro-computer Challenge.

One example of such a program is:

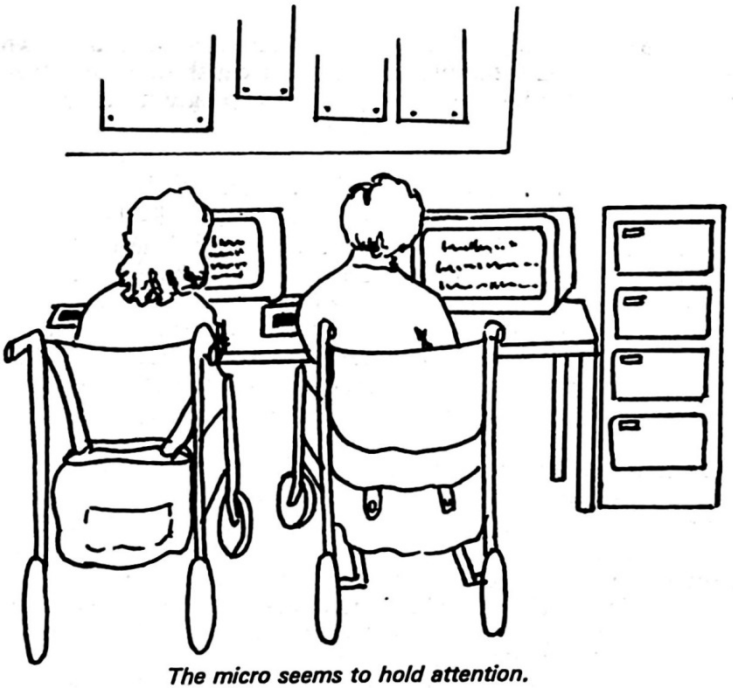
STARSET

Starset enables you to allocate words or symbols to up to 120 squares drawn on a sheet of paper which is placed on the board.

Here are some examples:

two rectangles in different colours are shown on the paper (overlay): when the correct one is pressed (on the paper) a moving colour fills the screen and sound (music) can also be added;

press the correct picture on the paper and see the word on the screen (or vice versa); a teacher might as a child, "Find the word CAT (on the overlay paper)". If the child presses that word, but not if he presses (for example) CAN, he sees a picture on the screen.



The micro seems to hold attention.

This kind of keyboard can be programmed by anyone. First, of course, the need of the pupil must be identified. If prepositions are confused in the child's mind, for example, the teacher would

1. See what input is required (eg UP/DOWN etc)
2. Allocate those words to the overlaid paper.

Here is an example:

A house is shown on the screen. On the overlay paper the child sees words and phrases like "above", "below", "on top of", "at the side of". When the child answers correctly (by pressing the correct part of the overlay) a car appears *"in front of"* the house, or a garage *"at the side"*; or a window appears in response to another correct answer.

The overlay keyboard could be used by speech impaired people recovering from a stroke (like the SPLINK board, details from P.O. Box 13, Godalming, Surrey.) with a different message on each of the 120 odd squares ("I'm thirsty", or "please open the window" etc).

There is, in fact, hardly a limit to the levels of ability or the degrees of handicap which can be taught through the concept keyboard. It is also being used to help hearing-impaired children to learn to talk. The micro, according to teachers of the deaf, seems to hold the attention of children whose powers of concentration had previously been considered to be very limited.

Easy programming

Computer people tend to stay loyal to the first computer language which they were taught. Nowadays, however, more and more experts are accepting that it is possible for a child to "talk" to a micro, rather than for him to be programmed by the micro. These are the ideas which led Seymour Papert and his team at the MIT (Massachusetts Institute of Technology) to develop a language called LOGO. LOGO is not a "children's computer language". It is a way of telling a micro what to do, which, incidentally, helps children to understand a subject like Mathematics in ways which might have pleased the educationist Piaget.

One micro application which is similar to LOGO is the "Turtle" program which forms part of the Open University pack for teachers – ("Awareness pack" described in Chapter 2).

Since it deals with mathematical concepts one can hardly expect mentally impaired children to learn to program but it does offer to a teacher ways of helping a child to understand some concepts.

For example: a figure appears in the centre of the screen; it looks nothing like a turtle and few children have seen a turtle anyway but it is called a "turtle" to keep the adults happy.

What is more important than the name is that you can type in an instruction like "forward 50" and the thing moves across the screen. Add "right 25" and it changes direction. If you understand ideas like "45 degrees" you can add that instruction and the thing moves into a different position.

It doesn't take many instructions to show a square or a triangle or a rectangle actually being drawn on the screen. Type *"repeat"* and you get several squares. When you have got this far, all you need to add a square to your design is to type "square", because you have already talked to the micro about squares and it now understands what you want. The micro has learnt something.

Even in 1980 when Papert's team was in an early stage of developing LOGO, they were able to teach the "turtle" things like: "TEST FRONT TOUCH". That told the thing to check whether it had run into something. "IF TRUE RIGHT 180" was added and the "turtle" would then (1) check whether or not it had run into something (2) do an about turn if it had.

From screen to floor

What LOGO can do with figures on micro screens it can do with an actual robot, for example at floor level.

What is a robot? The *British Robot Association,* BRA (!), says it is a re-programmable device which can manipulate and transport items by means of variable programmed motions. However you define it, it may be of interest to know that the estimated number in use in Japanese industry is 25,000. So somebody evidently takes them seriously.

Many teachers in Special Education now see possibilities of helping severely handicapped children to learn by helping them to program a robot. For a child who, so far in his life, has had to have everything done

for him, it must be deeply satisfying to see that when he puffs and sucks, or nods his head in a certain way a thing moves across a table or a floor exactly as he wants it to. And if a pen is attached to it the "turtle" will leave a diagram showing where it's been, rather like a snail. In other words, when the child has ordered the snail to move in a particular sequence of directions he can see a record on paper of what he has ordered and how his orders were carried out.

So when parents hear that children in a Special School have been "playing" with a robot they will know that, once again, the micro has come to the aid of the teachers and the child.

It needs only a little imagination to see how a child might be helped, by telling a robot what to do and what not to do, to learn the almost impossible task of crossing a road.

As for expense, a form of robot can be operated through the control of a very cheap, British micro, the *Sinclair ZX Spectrum.*

Here's what two manufacturers say:

> The Sinclair ZX Spectrum Microcomputer can be used as a control computer when it is interfaced to a turtle in a primary classroom.
>
> **Zeaker turtle** – A micro-turtle/robot which will be of interest to both primary and secondary school teachers. The Zeaker is battery-operated and is 140 × 130 × 50 mm in size. It has two separately driven wheels, and touch sensors to indicate if the turtle has collided with other objects. Underneath the Zeaker is a retractable pen unit which can be used to trace its path across a surface, when controlled by the appropriate software.
>
> **Griffin Robotic arm** – is a ready built, robotic arm, which is the ideal educational tool for teaching about robot control. It has five axes of rotation; base, shoulder, elbow, wrist and three-finger gripper. It is a continuous path machine, able to move several joints at once and to perform move-sequences under computer control.
>
> The robotic arm can be driven by most microcomputers, including machines such as the Sinclair ZX81 and Spectrum, BBC, PET, Apple and RML 380Z. The robot has a learning capacity so it is able to repeat a sequence that has been taught to it as many times as required.

Details from Griffin & George, Ealing Road, Alperton, Wembley, Middlesex HA0 1HJ

The Valiant Turtle

The makers say:

> Most children are now familiar with computers. They are in most schools and many homes. There is much talk about the "Micro-revolution", but in many schools computers merely regurgitate pages from text books, and in most homes they are used as video-game machines.
>
> Computer scientist and educationalist, Seymour Papert, proposed an alternative, "Rather than have the computer program the child, let the child program the computer."

During the 1970's and early 1980's BASIC was the only widely available programming language. With its difficult abstract syntax it is inaccessible to most children.

LOGO, an easy to learn language has been available for several years on mainframe computers. It was developed at the Massachusetts Institute of Technology by a team working with Seymour Papert. They designed LOGO to be accessible to young children.

New technology has moved LOGO from the mainframe to the micros. "Letting the child program the computer" is now a practical possibility.

Seymour Papert realised that children only understand abstract concepts of programming and mathematics if they are presented in a concrete form.

The cybernetic Turtle is that form.

The Turtle is the gateway into the world of LOGO. The turtle has been used to teach LOGO to four year olds.

It carries a pen which can be raised and lowered. It moves backwards and forwards, and turns right and left. By telling the Turtle where to go, and teaching it new words, the child learns to program the computer.

LOGO and the Turtle have created great interest amongst educationalists. LOGO is part of the curriculum in many primary schools.

Other applications of the Turtle are limited only by your imagination. It is an ideal introduction to Robotics, a revolutionary methods of teaching geometry and a precision drawing instrument. Children have choreographed several Turtles to perform a ballet.

An infra-red transmitter plugs into a port on the microcomputer and sends signals which are converted by the Turtle's logic control into moves, turns and pen action.

Further details from Valiant Designs Limited, Park House, 140 Battersea Park Road, London SW11 4NB.

Also of interest to teachers who wish to consider using "turtles":

DART is a computer language which enables turtle graphics to be displayed on the screen or to be reproduced by controlling a floor turtle.

Details from Jessup Acoustics, Unit 5, 7 Long Street, London E2.

The MEP/Economatics "BBC Buggy"

This robot vehicle, driven from the BBC micro's User and Analogue Ports, is unique in having a wide range of sensors built in. It is supplied as a kit of Fischer-Technik and electrical parts. Driven by a pair of stepper motors, it has sensitive left and right bumpers, and photo cells to allow line following, bar code reading, and seeking of light sources. The Buggy comes with a suite of a dozen programs including routines which show off the Buggy's skill at exploring its environment and gathering information.

Further details from Economatics, 4 Orgreave Crescent, Handsworth, Sheffield S13 9NQ.

Audiotext

Mike Doyle's submission for THE TIMES National Micro-computer Challenge has already been mentioned. He has also developed AUDIOTEXT. This is "a novel acoustic form of language".

Details from Mike Doyle, Ravenshead Centre, Bradford, W. Yorks. or: 37 Bright Street, Skipton BD23 1QQ.

Profoundly handicapped pupils

Aids for profoundly handicapped people will be found listed in Chapter 5, under the headings of *"Equipment of interest to therapists"* and *"Speech systems"*.

Some items of equipment listed elsewhere are, however, repeated here for the convenience of teachers and others.

Micromike (Particularly "CIRCLE", "BOO", "SHOOT2" programs). This enables a child to see the effect of his vocalizing. When the teacher says, for example, "Say (sound increases in volume or range of tone") the child sees a flood of colour moving across the screen.

Contact: J. Tabberer, 51 Guernsey Close, Widnes, Cheshire.

Switches and toys – Although not strictly speaking micros these are mentioned here because they encourage a wide range of activities (as described, for example, in the Queenswood literature (on the next page.) They also develop concepts of cause and effect ("I can see/hear that when I do this I see/hear that").

Software
developed by voluntary agencies

Mention is also made in Chapter 5 of equipment and software which is being developed by organizations like the Royal National Institute for the Blind, the Royal National Institute for the Deaf and other voluntary bodies.

It should be remembered that voluntary agencies also run schools and that equipment and software is developed there.

Two examples may illustrate this.

The following Schools run by *The Spastics Society* use micro-computers:

Craig-y-Parc School, Pentyrch, Cardiff CF4 8NB.
Ingfield Manor School, Five Oaks, Billingshurst, West Sussex RH14 9AX.
Meldreth Manor School, Fenny Lane, Meldreth, Royston, Herts. SG8 6LG.
Beaumont College, Slyne Road, Lancaster LA2 6AP.
Dene College, Shipbourne Road, Tonbridge, Kent TN11 9NT

Programs are being evaluated and others are being written at *Donaldson's School for the Deaf,* West Coates, Edinburgh EH12 5JJ.

Queenwood Scientific
The Sound Effect Board

The manufacturers offer the following information. Further details may be obtained from their address, which appears at the end of this section.

This device has been designed to provide a tempting array of knobs and buttons, all of which "do something". The Board will produce many sound and light effects. The objective of the Board is to motivate children with limb problems so that they wish to make controlled movements.

The design of the Sound Effect Board has been developed with care so that it is fitted with a selection of spatial and manipulative tasks of varying complexity. It is possible for the therapist to vary the degree of challenge presented to a child and also to vary the characteristics of the sound reward from day to day.

The Board is fitted with two large push-switches which can be operated by a child with athetoid problems. Two smaller finger push-switches provide a more challenging task. All these four push-switches operate bright coloured lights on the Board. Depending upon which side of the Board the child is placed so the task to operate these push-switches can be varied. Time requirements and the requirement to get lights of certain colours on together can be used to develop single switch activities.

The Board also produces many types of sound. The family characteristic of the sound is selected by the supervisor using a rotary switch. Four main types of sound can be selected. These are:

1. Musical notes on a special set of soft action button switches.
2. Wide range warble sounds an extreme of which is bird-song.
3. Steam train type sounds.
4. Broad range of vehicle noises.

Once the sound family has been selected the user can make significant variations on the selected theme by moving the various knobs and sliders on the board. In doing so the user is tempted to achieve many aspects of hand, arm and finger movement.

Sound and Light Reward Products for Motivating Movement.

A range of sound and light producing devices and switches which may be connected together in any combination to produce a variety of systems to attract attention and thereby to motivate movement.

Both the sound and the light source are touch-sensitive. This means that they can be operated by mere skin contact on a special touch pad. Either device can also be operated using the ordinary push-switch. The touch pads require a skin contact between two metalled areas. This can be from one hand, hand to hand, etc and can also be between more than one person. In the "Magic Nose" game one person holds each disc of the type 4 Touch Pads and if one touches the other's nose, the buzzer (or the lantern) will operate.

These products are a very versatile means to encourage the development of spatially co-ordinated movement. They can be used with seated children and also between foot and hand for children on the floor.

The Touch Buzzer requires one PP3 battery and the Touch Lantern, three HP2 batteries.

Infra red eyeball switch

This switch allows users to achieve control over computers and other devices including environmental devices such as lights, radios, television etc merely by movement of their eye.

The switch is operated either by looking to the side of the face or by closing the eye. The circuit is designed to ignore the effects of casual blinks.

The principle of the switch is that the amount of infra red light – invisible – which is reflected from the eye varies depending upon where the user is looking and on whether the eye is open or closed.

Gaze communication systems

We are able to supply two types of Gaze Communication System. Both are designed on the basis of using a tiny infra-red transmitter on the child's head as a means of controlling a remote light unit.

Designed for use as a first communications technique for severely disabled children, the vocabulary they require is initially very small and can be merely "yes, no, toilet" for example.

The system consists of a tiny infra-red transmitter unit which is worn attached to an elasticated head-band. It is powered from a small battery-operated transmitter control unit which has a pocket clip. This is used with a mains powered lighting system. Communication between the two parts of the system is just by the infra-red light from the transmitter. There are thus no wires to trail around the floor and to become tangled in chair wheels.

Available from Queenswood Scientific, 1 The Paddock, Stubbington, Fareham, Hampshire, PO14 3NS.

For more literate pupils

Word Stopper – Allows children to type in passages of text and generates similes for words which are over used, incorrectly used or mis-spelt. The teacher can specify which words are to be "stopped" in each case.

Say That Again – Presents a short passage and asks the child to retype it using different words but retaining the same meaning. The child is asked to rewrite the passage whenever three words from the original passage remain. Teachers can specify their own passages for the child to rewrite.

Concept keypad Junior Pack – Two programs:

Shape Finder – Shape recognition, matching and memory. Presented in a colourful and interesting style this program provides exercises at four levels to encourage necessary pre-reading skills.

Pairs – A variation on the Pelmanism theme, the "Cards" may carry either shapes or letters with the facility to specify words or groups of letters to put on the cards. Two modes of play; with another child or against the computer at one of three levels of difficulty.

Harlequin – A suite of programs which allow children to create pictures from basic shapes.

All available from Learning and Training Systems Ltd, Haydon House, Alcester Road, Studley, Warwickshire B80 7AP.

Also:

Standard pen and painting program with routines to use the light pen in your own programs.

Startwrite – a letter formation program that teaches children to correctly form lower case letters.

Letter match and Number match

Logic games – three puzzles which encourage logical thought.

And also:

Speech Maker: create your own words and speech (pen not required).

Sentence Maker: use the Robin to choose and say words produced with Speech Maker and make sentences.

The Talking Dictionary, supplied with 200 common words and the facilities to add and edit more. (Disk based; requires pen.)

Available from Educational Software Co Ltd, 108 Parthenon Drive, Liverpool L11 7AD.

Intelligent Microcomputer Keyboard

A microcomputer for use by the physically handicapped, which implements the full character set, (letters, punctuation marks, figures, and numbers) but only has eight keys. In this way large switch guides may be used, making typing easier for those with motor control problems.

Digitalker

This speech synthesis system converts the speech wave forms from a human speaker to digits and then later reconstructs the wave form through a digital-analogue converter. Male, female and children's voices can be synthesised.

From: Quest Youth Workshop, 40 Linenhall Street, Belfast BT2 8BG.

Chatterbox

Chatterbox is a portable speech synthesiser, fitted with an electronic typewriter-style keyboard, a built in amplifier unit and rechargeable batteries. This talking machine will speak every word that is typed into it phonetically and has a small 12 character luminous display which allows the user to check for typing errors before the speech key is pressed. Chatterbox has been programmed with 74 useful phrases which can be spoken by touching two consecutive keys. The device is designed for non-vocal persons with some hand control.

From: Quest Educational Designs Ltd, 1 Prince Alfred Street, Gosport, Hants PO12 1QH.

Possum Expanded Keyboard to BBC Microcomputer Interface

The interface allows the already DHSS prescribed Possum expanded keyboard to "print" pages on the BBC micro VDU.

Remote Control Overlay Keyboard

The overlay keyboard is in prototype form. A 12" x 12" sensitive area is divided into 16 discrete areas, but can be arranged through software to operate in 1, 2, 4 or 8 areas. The board is sensitive to fingertip, pointer stick or even model car rolled over the surface. The main advantage is that there are no wires between it and the computer, thus allowing for greater flexibility of use.

From: Nottingham Schools Development Centre, Birchover Road, Bilborough, Nottingham NG8 4BW.

Further sources of information

Programs for *Apple II* and *TRS80* micros have been developed by the following:

Peter Cutts, Queslett School, St Margaret's Hospital, Great Barr, Birmingham.

Speak and Spell coupled to *TRS80* (contact: Allan Fortune, 47 Northumberland Avenue, Nuneaton CV10 8ER.)

For *Apple II* (contact: Sheila Butcher, Larkfield, Mount Pleasant, Stoford, Nr Salisbury, Wilts.)

Fletcher Maths Program on *TRS80* (contact: Ian Staples, Jane Lane Special School, Churchill Road, Beatley, Walsall WS2 0JH.)

Goole Adult Training Centre – working with *Apple II* in producing material for use in education of the mentally handicapped.

Bob Hurst (Manager), Adult Training Centre, Rawcliffe, Goole, North Humberside.

Godfrey Thomson Unit – working with *Apple II* and *PLT* on communication systems for the severely handicapped.

Phil Odor, Godfrey Thomson Unit, Department of Education, 24 Buccleuch Place, University of Edinburgh, Edinburgh.

Research into potential uses of microcomputers in tackling the communications problem of aphasic children has been done by:

Dr Sheila Hollins, 8 The Farm, Princes' Way, Wimbledon, London WIN 2BA.

Programs and Projects

MACE (West Midlands Regional Centre, Four Dwellings School, Birmingham B32 1RJ) have produced a suite of programs for children with Special Education needs.

Details from the Head of Project, Michael Trott.

Dorset County Psychological Service have written a series of programs for the BBC Microcomputer for use in teaching Remedial Reading and Spelling.

Walsall Educational Development Centre have a Special Education Project. Software is being designed for children with moderate learning difficulties, those with physical handicaps and those with severe mental, or multiple handicaps.

Contact: Nick Dodds (Head of Centre), EDC, 36 Wolverhampton Road, Walsall, West Midlands.

The Lancasterian Project

Concerned with the development of a package of programs to help overcome the physical limitations on some children which prevent other means of work and communication. A package of programs is available for even the most severely handicapped pupils.

Contact: Stuart Rees, c/o The Head Teacher, Lancasterian School, Elizabeth Slinger Road, Manchester M20 8XA.

MAISE (Microcomputer Aids in Special Education)

MAISE has been set up with the purpose of alleviating some of the problems encountered by teachers using micros with children with special educational needs.

The group consists of special school teachers, county advisers, advisory teachers, peripatetic teachers, educational psychologists, sixth form students, parents and disabled people, all of whom are, or wish to be, involved in computer use in schools.

Contact: Mr Bernard Henderson, Secretary, MAISE, West Glamorgan Centre for Computer Education, Elmwood Road, Baglan, Port Talbot, West Glamorgan.

Furrowfield School and *Texas Instruments (Micro)*

Machine assisted learning, using *Texas Instruments*, provides practice and reinforcement loops, guarantees initial success, and helps with fundamental skills which are often absent or only partially grasped.

There is a book available for £1.30 from: Anthony Loughlin BEd, Furrowfield School, Whitehills Drive, Felling, Gateshead, Tyne and Wear NE10 9RZ.

ACE (Aids, Communication and Electronics)

Mental Handicap in Wales – Applied Research Unit, The White Houses, 44/46 Cowbridge Road East, Cardiff CF1 9DU.

Resources

"Directory of Who's doing What with Microelectronics in Special Education." Free from Mary Hope, *CET*, 3 Devonshire Street, London W1N 2BA.

"A Guide to Regional Information and Contacts" appears in "LEARNING TO COPE" an "Educational Computing" special. This is a guide to computers in Special Education and costs £2.00 (p+p inc) from EMAP Business & Computer Publications Ltd, Priory Court, 30–32 Farringdon Lane, London EC1R 3AU.

"Microcomputers in Special Education" *Schools Council Programme 4* by Freddie Green, Robert Hart, Colin McCall and Ian Staples, is available from Longman.

The Directory of Non-Medical Research Relating to Handicapped People 1982.
HPRU, Newcastle-upon-Tyne, 1 Coach Lane, Coach Lane Campus, Newcastle-upon-Tyne NE7 7TW.

National Council for Special Education, 1 Wood Street, Stratford on Avon (for advice on all aspects of Special Education.)

Journals

Learning to Cope.
Computers in Special Education.
Personal Computer World.
Practical Computing.
Practical Robotics.
The Micro User.

Useful addresses:

Dr Bernard Chapman
School of Education Research Unit
University of Bristol
Berkeley Square
Bristol BS8
(Developing Rebus system for accelerating language development in deaf and language disordered children.)

CIPHER
Brian Marsen, Mere Oaks School, Wigan.
(Samples of *Commodore Pet* software for special education are produced by this group.)

Communication Aids Centre, Frenchay Hospital, Frenchay, Bristol
(Jayne Easton, Speech Therapist, has a range of communication aids from mechanical to microelectronic.)

Fraser Duncan, University of Bristol, Senate House, Bristol BS8 1TH.
(Developing portable, battery operated synthetic speech communication boxes with individually designed code and keyboards to suit user: as described in Chapter 5 of this book.)

Phil Goulding, Medical Physics Department, Withington Hospital, Manchester.
(Speech synthesis on *Apple* micro.)

Hull University, Psychology Department, Hull HU6 7RX (Drs A B Rostron and D F Sewell.)
(Programs for ESN and deaf children for *TRS80, SWTP,* and *Apple* micros.)

LDA (Learning Development Aids), Duke Street, Wisbech, Cambs PE13 2AE.
Working in conjunction with Roger Newbury of Liverpool Polytechnic, the Kirkby Springfield School, Cawthorne Close, Kirkby, Merseyside L32 3XQ – Intelligent scanning keyboard for *Commodore Pet.*

MUSE (Microcomputer Users in Secondary Education), Information Officer, MUSE Information Office, c/o Westhill College, Wesley Park Road, Selly Oak, Birmingham B29 6LL.

MAPE (Micros and Primary Education), Secretary – B M Holmes, St Helens County Primary School, Bluntisham, Cambs.

Micro Electronics Project

Details of Micro Electronics Project for Special Education *(MEP)* can be obtained from:

Mrs Mary Hope
Council for Educational Technology
3 Devonshire Street
London W1N 2BA

and from the *MEP SEMERCS:*

Newcastle Polytechnic (Colin Richards)
Coach Lane Campus
Newcastle-upon-Tyne NE7 7XA

Redbridge SEMERC (Jean Tait)
Dane Centre
Melbourne Road
Ilford, Essex

Manchester College of Higher Education (Bob Dyke)
Hathersage Road
Manchester M13 0JA

Bristol SEMERC
Faculty of Education
Bristol Polytechnic
Redland Hill
Bristol BS6 6UZ

I am indebted to Information Sheets and Newsletters published by these organisations for much of the information given in this Chapter. Teachers in Special Education who write to the Council for Educational Technology or who visit (by appointment) their local SEMERC will find their enquiries are dealt with sympathetically and efficiently.

Further Education

The Department of Trade and Industry says, in its leaflet *"Information Technology and Work Preparation"*:

> "The transition from school to work can be traumatic for any young person. The protective atmosphere of the classroom is worlds apart from the bustle of the factory floor, or the mysteries of the office. School-leavers with learning difficulties may have particular problems in adjusting – not least because the special education sector provides such a high standard of care."

Fortunately the gulf which formerly existed between Special Education and Further Education is, in some parts of the UK, hardly discernible. Pupils from Special Schools attend "link courses" at the local College of Further Education, some FE Colleges have courses (both full-time and part-time) which are attended by mentally handicapped people and the colleges are, in the main, more aware of the needs of disabled people. One still hears the occasional cry from the die-hard "vocational" instructor, "What if there's a fire?" But especially in Departments which offer courses in micro-computing, there is more acceptance of disabled and handicapped students.

There is now a "National Study Group on Further and Higher Education for the Hearing-Impaired" sponsored by the *National Association for Teachers in Further and Higher Education.*

That Association's Journal published recently a series of articles on "What the typical college can offer less-able students". There was also a three-page article on "New Development at Hereward College" which described how funding from the Department of Trade and Industry had enabled staff to develop Information Technology in courses for severely disabled students.

(National Bureau for Handicapped Students. Address is in Chapter 12, page 156).

Higher Education

Perhaps the most hopeful advance in bridging gaps between the various sectors of education in the UK is in the field of teacher-training.

Courses at Polytechnics and Colleges of Higher Education now include an element of training which considers the needs of disabled and handicapped people.

Publicity for this kind of development is given by the more forward-looking journals and I am indebted to *"Learning to Cope – Computers in Special Education 1983"* for the following article by Tony West, a Senior Lecturer at Hull College.

(**"Learning to Cope"** and **"Educational Computing"** may be obtained from: EMAP Business and Computer Publications Limited, Priory Court, 30–32 Farringdon Lane, London EC1R 3AU.)

Special Lessons for Everyone

Tony West is a senior lecturer in the School of Engineering at Hull College. He describes the progress made in Derringham Special School ESN (M) after staff attended a course in BASIC programming at his college.

A little over 12 months ago, two members of the staff at the Derringham Special School ESN(M), attended a course in BASIC programming at the Hull College of Higher Education. When they finished the course, they realised they had the potential to develop computer-based learning programs but lacked the necessary hardware.

The solution to this problem turned out to be very simple. Until the school was in a position to provide its own hardware, the college would loan the school a Pet and the services of one of its staff to provide software support. Since then, the introduction of computer-assisted learning has created so much enthusiasm that the school has acquired, in a variety of ways, four microcomputers and, with a few exceptions, every child has access to the computer during the week.

During the earlier stages of software development, programs were demanded and developed with a speed which now seems quite frightening. It was soon appreciated that this was a mistake and that a more rational policy was essential. As a result, priority areas of the curricula were listed, programs were prepared according to agreed guidelines and supportive documentation was produced.

A great deal of the software which was, and is currently being, produced is orientated towards literacy and numeracy across as wide an age range as possible. In doing this, the staff responsible for software development have always involved the classroom teacher and his or her children. Whilst this has ensured that the program matches, as closely as possible, the teacher's style, it has also aroused great curiosity.

At first, only two members of staff could program. Now, if you cannot program, you are an exception. This has created two benefits. The original software team can now delegate software production. In addition, those staff who do not feel confident enough to produce programs say that they can cope much better with the computer when things go wrong. The enthusiasm which has been generated is reflected by the fact that the school entered a national competition and won a 380-Z micro.

In general, the computer is used in a tutorial mode, generating problems for the child to solve and makes full use of the graphics, sound and randomisation found on the Pet and 380-Z. Several approaches have been adopted in respect of the child's answer. In some cases, the child will be told that an error has occurred and a second chance not offered. On the other hand, there are programs which will not continue until a correct response is received so that the child always scores 100 per cent.

In a suite of programs covering a given area, the approach ranges through those two extremes. Appropriate rewards are a key feature in many programs. These range from graphic displays, showing a smiling face or a sad face, to sound emissions when a correct response is given.

One of the most important facts to emerge has been that the child wants to control what is happening. This allows them to proceed at their own pace and to be a part of the decision-making process. They do not like the machine to pressurise them into submitting an answer. Pressure can be introduced, as indeed it must at some stage if they are to face the realities of the outside world, in the form of competitive programs. There are several programs which require the presence of two children who compete against each other.

One of these programs generates horizontal addition problems. Each child, in turn, enters the answer to their problem and the computer determines who gave the quickest answer. At this point, the display becomes significant. On the screen, there are two racing cars and their movement across the screen is controlled by the speed of the child's response. When a car reaches the finish, a chequered flag is displayed. At the start of the program, the number range for the displayed problems can be selected.

To increase the effectiveness of the software, programs are now being developed to use external devices. An original program designed for word spelling has been modified accordingly. The program did display a word which was then spelt letter by letter. Later, the word would be removed and the child would attempt to spell the word. An earlier program would have allowed the child to first spell by copying. Now the child is shown a word and told the Language Master card number so that he or she can listen to the sound of the word before attempting the spelling.

This represents a device which stands independent of the computer. An alternative keyboard which plugs in to the user port is also used. The design of this device was given to us by Stephen Clamp of the Anthony Gell School, Derbyshire. Originally, it was designed to provide the user with a simplified keyboard having fewer but much bigger keys. It was used as a coin-box and allowed the user to make up given amounts of money.

At Derringham, the program is used in this way and, by renaming the keys with removable pads, alternative uses have been found. In one program, the child is presented with a graphic display whose movement, left/right/up/down, can be controlled from the simplified key pad and allows the child to explore his spatial awareness.

In a relatively short period of time, the computer has made its presence felt. But what has been its impact on the staff and children? Amongst the staff, there was an initial reservation because it was felt that the computer represented a substitute teacher. In fact, it was soon demonstrated that the computer is no more than a classroom aid and, in this respect, is no more potent than a television programme. It has certainly made the staff think about what they teach and how, and by examining performance outcomes which the computer lists, it has become possible to focus subsequent work patterns on more realistic areas of work.

Of the many virtues which the staff have felt the computer possesses, its endless patience has found a universal acceptance. The computer's ability to repeat endlessly, a question without the gradual human deterioration is a function which is often overlooked but it does represent an area where even the most dedicated teacher is at risk. Sooner or later, the teacher will often run into the situation where his supply of problems begins to dry up. With the computer, it has been possible to provide problems through the random number generated and in doing this, each child is presented with individual work loads. Even with word problems, this idea can still be applied.

One of the most important facts to emerge has been that the child wants to control what is happening. This allows them to proceed at their own pace and to be part of the decision-making process.

The majority of the children enjoy working on the computer. It is a highly personalised resource but, because it is a machine, children do not have the same fear of failure with it as they do with a teacher. One aspect that they quickly made known to the staff was the machine referring to them by their name and telling them their performance. They treat the machine with the utmost confidence and will happily load programs and generally manage the whole affair themselves.

Finally, a word of caution. Whilst the future of classroom computers is generally accepted, there are those who view the computer as an educational panacea. A key word, particularly in the context of curriculum development, has to be limitation. The computer does have a place in our curriculum but this must be identified properly.

An Educational Computing Special, 1983.

Chapter Nine

SELF-HELP FOR PARENTS

As readers of Ann Worthington's book, "Coming to Terms with Mental Handicap" (1982) will have seen, there are both social and educational problems for parents of severely mentally handicapped people.

They need to help their dependants to achieve the ordinary living skills which the rest of us take for granted, for example, how to cross the road safely.

With the advent of the micro, however, there are new possibilities of helping mentally handicapped people to achieve their potential (as the psychologists have it). For example, a games program can be slowed down to the extent that it can be played by someone whose aiming skills had been thought limited, or even non-existent. Even the Makaton sign-language can be taught with the aid of a suitable program.

Note: Mention in this book should not be taken to imply recommendation of either hardware or software.

A Down's child is taught by her parents

The following letter appeared in "Parents Voice", September 1983. It was written by Leslie Duffen.

> "I was interested to read the article by Michael Tombs about Sandy and the Computer (Parents Voice June 83) because I have long believed that microcomputers offer the only economically feasible way of providing that large amount of individual tuition which our children need. My daughter Sarah's education is continuing now very largely by the use of a BBC computer.
>
> There is in fact a good deal of software and hardware already available and there are four organizations called SEMERC in different parts of the country, set up specifically to disseminate information about the use of computers to educate physically and mentally handicapped children. My nearest SEMERC is at the Faculty of Education, Bristol Polytechnic, Redland Hill, Bristol, and I do suggest that interested readers get in touch with Jean Johnston at Bristol, or their nearest SEMERC (addresses available from MENCAP)."
>
> Leslie Duffen, WIMSTONE, Green Lane, Ilsington, Newton Abbot, Devon TQ13 9RB.

Leslie Duffen's success in teaching his daughter, Sarah, has been reported on BBC (Radio 4) and on television South West and is the subject of current research at Portsmouth Polytechnic (as reported in Chapter 11).

Mr. Duffen has also contributed to the Down's Children's Association Newsletters and has been successful in encouraging other parents to use microcomputers to educate their mentally handicapped children.

Here is his own account of a remarkable achievement.

"I am grateful for any opportunity to spread the gospel about the use of computers for helping handicapped people! While there are many specific needs which can only be met by the use of computers I think that a major reason for using them is simply the cost.

The distinguishing characteristic of many mentally handicapped children, including my daughter, is just that they are very slow learning. Society cannot, or will not, afford to pay for the enormous amount of individual tuition that these children need if they are to achieve their maximum potential.

The use of computers makes it possible for the State to afford to educate them, or what is more likely to happen, for parents who have no teaching skills or specialised knowledge to supervise the education of their children.

The basic reason why I opted for a BBC microcomputer was that I thought that there would be a lot of educational software available and I have not been disappointed in this.

I enclose a lesson time table that we use with my daughter. All those marked with a C are those where she uses a computer, and almost all of those are programs that are available at my school or neighbouring primary schools. Since we act as unofficial advisers to the neighbouring feeder primary schools we have access to all their software. The point though is that almost all of it is written only for the BBC, Spectrum or the RML.

I expect you will realise that this is typed on a word processor. The purchase of a Wordwise word processor was definitely a 'best buy'.

My daughter writes her diary on it, and all her correspondence. With very little editing, and a decreasing amount of it, she can produce work which will stand comparison with that produced by the most able child, and this is a considerable boost for self-esteem."

LESSONS
For Sarah Jane

Explanation

'Writing diary' refers to Sarah typing her daily diary on the word processor. She types whatever she wants, sometimes with suggestions from my wife or myself which she can ignore if she wishes to do so. It is then edited before being printed out. The editing is restricted to the minimum amount of corrections to grammar, spelling and sentence construction, not to meaning, and sometimes no editing at all is required.

'Reading diary' refers to Sarah reading the edited diary out loud.

'Reading book' refers to Sarah reading out loud her current book. At the present time it is "Swallows and Amazons" because she liked the programme on television.

'Reading words' refers to Sarah reading out loud words and definitions of words which were unfamiliar to Sarah when she came across them in her current reading.

'Tape recording' refers to Sarah making a tape recording of herself reading her diary entry and then playing it back.

These first five lessons are done every school day as a priority, with intervals of physical activities taken from the second section. The rest of the morning is taken up with Sarah's selection of lessons from the first section. The afternoons are devoted to building up Sarah's cooking business, as required by orders received, or as she and my wife decide. In the evenings Sarah does as she wishes, but she has a trampoline club on Monday evenings, often a Country and Western dance on Tuesday evenings, a swimming lesson on Wednesday evenings, a dancing lesson on Friday evenings and horse riding sometimes on Saturdays.

MICRO LESSONS

'C.SENTENS' refers to my modification of a commercially produced program. Words in individual sentences are jumbled up and Sarah has to put the words in order to make sense of them. I have modified the program so that the sentences are of particular interest to Sarah and I change them when Sarah has mastered a particular sentence.

'C.ORDER' is a similar program to 'C.SENTENS' but jumbles up a block of sentences rather than the words within an individual sentence. I often use the block of sentences to teach Sarah a specific lesson, such as how and when to fill up a car with petrol, as well as the language involved.

'C.BIGGER' is a program to teach which of two numbers is the bigger.

'C.ADDS' is a program to practise adding.

'C.TAKES' is a program to practise subtraction.

'C.DIVIDES' is a program to practise division.

'C.TABLES' is a program to practise tables.

'C.ANIMAL' is a program which Sarah is using to build up a large number of definitions of animals by deciding for herself what the difference is, for example, between a zebra and a horse.

'C.M.CWORDS' is a program to practise changing from words to figures and vice versa.

'C.TRAINS' is a program to practise addition.

'C.WATCHP' is a logical thinking game.

'C.ANAG' is a program for guessing anagrams.

'C.BRICKUP' is a program for teaching word definitions and spellings.

'C.SHPING' is a program for practising shopping.

'C.SPIKE' is a program for practising place values.

LESSONS
For Sarah Jane Duffen

Sample Timetable

		APRIL															MAY						
		:S	:M	:T	:W	:T	:F	:S	:S	:M	:T	:W	:T	:F	:S	:S	:M	:T	:W	:T	F:	:S
		:15	:16	:17	:18	:19	:20	:21	:22	:23	:24	:25	:26	:27	:28	:29	:30	:01	:02	:03	:04	:05
Writing diary		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Reading diary		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Reading book		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Reading words		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Tape recording		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.SENTENS	7/5	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.ORDER	3	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.BIGGER	3	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.ADDS	3	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.TAKES	36	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.DIVIDES	3	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.TABLES	47	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.ANIMAL	48	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.M.CWORDS	18	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.TRAINS	29	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.WATCHP	30	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.BRICKUP	30	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.ANAG	31	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.SHPING	32	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
C.SPIKE	31	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Sentence		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
French		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Geography		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Spelling		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Money maths.		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Swimming		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Gymnastics		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Roller sk.		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Ice sk.		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Cycling		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Dancing		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Keep Fit		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Walking		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Sewing		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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Skipping		:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:

(Leslie Duffen)

This timetable illustrates the integration of a micro into a curriculum.

Those readers interested in the research project at Portsmouth Polytechnic, which includes work done with microcomputers, should get in touch with:

Mrs Sue Buckley
Senior Lecturer in Psychology
(Down's Syndrome Research Project)
Portsmouth Polytechnic
Psychology Department
King Charles Street
Portsmouth P01 2ER

An account of the research work of Sue Buckley and Liz Wood is given in:

"Reading & Language Development"
in "Children with Down's Syndrome"
obtainable from the above address.

Further details will be found in:
"Further Approaches to Down's Syndrome". Stratford. B. & Lane. D. (Eds.) published by Holt-Saunders 1985 in a Chapter written by Mrs. Buckley entitled "Attaining Basic Education Skills."

I include here an article which I wrote for the Journal "APEX" (now "MENTAL HANDICAP") in 1980; the Journal is published by the British Institute of Mental Handicap, Wolverhampton Road, Kidderminster, DY10 3PP.

The use of microcomputers in the teaching of the mentally handicapped

PETER SAUNDERS M.Ed., B.A.
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Summary:
This article is written by a layman with the intention of persuading other laymen to consider using microcomputers for teaching mentally handicapped children and adults.

It surveys some of the work being done to help disabled people and proposes that similar effort should be co-ordinated in the interests of the mentally handicapped and of those who care for them.

An example

Let us start with a hypothetical case. Helen is aged thirteen and attends an ESN(S) school where her teachers work as a competent and dedicated team. Let us suppose that her class teacher wishes to assess her ability to discriminate numbers between 1 and 13 and also to help her to learn to recognise those numbers with which she has difficulty. With a microcomputer, and with a program prepared by Westhill College of Education, Birmingham, this is how both objectives could be achieved (Cutts *et al.*, 1979*).

*The programs were written by students of Westhill College, Birmingham; the author wishes to acknowledge a very helpful letter from their tutor, Mrs. E. M. Moody.

The program asks (the teacher, nurse or parent) one or two questions. For example, it asks what range of numbers is to be presented (in this case 1 to 13); how many attempts should be allowed before a wrong answer is ignored; and at what intervals a funny face should appear on the screen (as a reward and encouragement).

Then Helen sits in front of the microcomputer ready to touch or press a key when requested by either the human or the computer – once she gets the hang of it she will need only to look at the screen and then touch two keys, one at a time.

This particular microcomputer has two keyboards: one for letters and symbols and the other for numbers, similar to a pocket calculator keypad. In addition, there is a large, red key marked "Return".

To start Helen's lesson the teacher types RUN and the screen displays a number, randomly chosen between 1 and 13. The teacher reads the number to Helen, or asks her to say it. That done, Helen touches the appropriate key on the number-pad and then touches the red key. If she has found the right number, another number pops up. If not, the same number pops up for a pre-determined (by the teacher) number of times. Now and again, at intervals as predetermined by the teacher, a funny face pops up and a message, which includes Helen's name, also appears.

A moment's thought will demonstrate the need for the adult (teacher, nurse or parent) to be involved in the preparation of this learning aid. Some mentally-handicapped people would tire after a few attempts, some would need reinforcement more frequently than others, and all would benefit from repetitive teaching (Spencer, 1980). What is being described here is an individual learning aid, one with which the learner can be left alone. If, in addition, a printer is attached to the microcomputer the adult can see, at the end of each session, a permanent record of which numbers were displayed, which were correctly identified, which gave difficulty and so on.

There is always a temptation to sit with the learner but this, in my view, defeats the object of using a microcomputer because, even if the adult remains mute (as he thinks), his feelings as he watches the successes and failures are often transmitted to the learner. Left alone with the machine the learner gets encouragement from the program itself and, even if he becomes frustrated at not identifying a number over and over again, there is neither reproach nor exasperation shown on the screen. Of course, the machine cannot replace a human but the point is that an appropriate program may not only help a person to learn but may also demonstrate to the teacher that something has been learned. (For example, a child who "never gets seven right" may be found to have mastered it; a teenager whose span of attention was considered to be short may persevere for longer than was expected.)

This example of learning through the use of a microcomputer is intended to demonstrate one of the possibilities only, but one which could be useful to children and adults alike. Similar programs have been developed at Westhill College for helping the mentally handicapped to recognise letters of the alphabet. Further possibilities will be given at the end of this article.

Seeking advice

Now let us consider (1) the cost and (2) how the best advice can be obtained.

First, the cost: a microcomputer costs less than a video tape recorder and a bit more than a large, colour television set. These items are given for comparison because they are often chosen as the targets for benefactions to schools and centres. It is hoped that some readers who are offered such donations will instead consider the purchase of a microcomputer, after seeking advice from experts in their locality.

Who are the experts to be consulted? The best advice will probably come from people who teach computing at the local secondary school (Wells, 1980) or technical college (some primary schools also teach computing (Nuffield Foundation, 1972)). For some readers it will be more convenient to consult an expert on the staff of their own, or a nearby, hospital – computers are already used in most teaching hospitals and there are also users of microcomputers in other hospitals (Mason, 1980). Written advice can also be obtained from the Council for Educational Technology, 3 Devonshire Place, London W1.

In my experience, teachers and users of microcomputers are delighted to be consulted about buying and using a microcomputer. This is a fairly new field of education and medicine, and one in which experts are always looking for new applications (Sweeten, 1980).

A computer has been called "a solution in search of a problem". *What the expert needs to know is a clear definition of the would-be user's problem.* This requirement is not easy to fulfil. However, simply thinking of the kind of topic we want to teach is a useful start, for example: how to cross a busy road (Taylor and Robinson, 1979); safety precautions in the kitchen; recognising public notices.

It is important to realise that the microcomputer is really one application of a microprocessor, so that it will do much more than merely compute. The interested reader, therefore, is advised to ask questions, however outlandish they may seem at the time, based on the kind of learning which is required. Some examples might be:

> Can it respond to a human voice?
> Can it utter sounds? words? figures? music?
> Can a different sized or kind of keyboard be added?
> Can words be displayed, on the screen and in print, in upper case and in lower case?
> Can a word be displayed so as to fill the whole screen?
> Can coloured lights be used to give signals?
> Can the machine cope with several wrong keys being pressed at once?
> and so on . . .

Each of these questions would be answered. "Yes", possibly with a qualification, ". . . if you are prepared either to spend money or to learn how to program the machine".

Using the machine

If he is fortunate enough to be given a microcomputer, how does a layman use it?

Let us assume that, as a novice, he simply wants to use the microcomputer as it stands. He chooses a program from a commercial catalogue – this takes the form of an audio-cassette and a leaflet telling him what the program does. (For example, at the time of writing he could buy, for £5, a program which helps a child to spell.) He "plays" the cassette and finds that instructions appear on the screen of the microcomputer; from now on he simply follows these instructions.

It is the program-writer's task to ensure that all instructions, illustrations and comments appear when they are wanted. He must also provide for all eventualities. Thus, a program might include this question at the end:

"Do you want any more?" (Type YES or NO)

Parents as participants.

The microcomputer will respond appropriately to any of the following responses:

YES – NO – OK –, or even to – RUBBISH!

Now it is very probable that a teacher of the mentally-handicapped, having tried a program, will want modifications. For example:

some of the items should be deleted;
others should be substituted;
letters or symbols should be displayed in larger format;
more encouragement should be given;
there should be a delay in any animated picture.

It is at this point that he will appreciate the advice of the expert whom he consulted before buying the micro-computer. That advice (unless the expert has time on his hands to write or modify a program) is likely to be that he should enrol for a course in program-writing at the local technical college. As part of the course he would learn to identify a problem, to draw a flowchart showing how that problem could be tackled and to express each move in one of the computer languages.

Enrolling for a course may be a big decision to take but it is one which should enhance career prospects. If the mentally handicapped are to benefit from this new technology, the time has surely arrived when every school, centre and hospital should employ its own trained expert.

The current situation

Nationally, at the moment, there is unco-ordinated effort; programmers are looking for customers to tell them what they want; potential customers are unable to understand the jargon and are, therefore, unaware of the benefits.

Perhaps we can learn from those who teach the disabled, for there are encouraging signs in that quarter. Disabled people are being trained as programmers on a recently developed TOPS course at Queen Elizabeth's Training College at Leatherhead. (Details are available from Manpower Services Commission, Training Services Division, Kingston, Sub-Office, 19-21 Fife Road, Kingston on Thames).

Computer programs to promote communication for the disabled have been available for some time and they are still being developed. Examples of work in progress, taken from the "hobbyist" press, are:

> *Micros for medicine,* by P. Chambers and four 5th form pupils. **In** *School Technology,* June 1980. (Describes a submission for the BBC's Young Scientist of the Year Competition).
>
> *Easier communication for the disabled, by A. R. Berry.* **In** *Personal Computer World (UK),* April 1980. (Describes systems which help severely disabled persons to use keyboards in order to display language on a screen).
>
> *Disabled and administration share the rewards, by M. Hayman.* **In** *Practical Computing (UK),* June 1980. (Includes a reference to a computer program written for mentally-handicapped teenagers at an ATC in the London Borough of Hillingdon).

Microcomputer communication for the handicapped, by Tim Scully. In *People's Computers (USA),* March/April 1978. (Describes how a wheelchair-bound person can select a word displayed on a screen by moving a knee-switch).

Peter can now read, by John Pollard. In *Recreational Computing (USA),* May/June 1979. (This article is reprinted from an Australian journal called *COM-3.* It relates how a dyslexic boy was helped by his father; he developed a program which caused an audio-cassette recorder to present a spoken word after the boy had uttered the same word which had appeared on the screen).

The British Computer Society has a Specialist Group for the Disabled, which reported to the 1980 meeting of the Computer Education Group. It stressed the desirability of using computers to encourage the *abilities* of the disabled, rather than to remind them of their disabilities. Perhaps a similar attitude might produce programs which would encourage the mentally handicapped to find a measure of independence.

Much of the work done for disabled people might, with some modification, be of use to mentally handicapped people. Routine training of skills could be presented as behaviour modification through the use of a microcomputer; because distractions are necessarily kept to a minimum it might be found that an individual's level of concentration is greater than was supposed when traditional methods were used.

Recent work being developed in Australia (Macleod and Overheu, 1977) includes a facility for a mentally handicapped pupil to touch part of a picture projected from a slide to show that he has understood a tape-recorded description of it (for example, he might be asked to touch the largest of several objects). The microcomputer can recognise which part of the panel has been touched and can simultaneously display another slide and play another part of the recording.

The same organisation is developing a program which teaches sight recognition of basic safety words, such as DANGER. The pupil reads a word, written on a panel, and presses it; if he does not say the word in a given time, the computer sounds that word. An alternative exercise is for the computer to light up a certain word written on a panel, wait for the pupil to say it and, if he does not, the computer sounds it.

Still on the topic of language learning, the Ohio State University Graphics Research Group (USA) is developing video-cassettes which work together with a microcomputer to produce animated images (Withrow, 1979). For example, a message appears on a screen and, as each phrase is spoken, the message is enlarged; this associates the printed word with speech.

It will be seen that some countries take very seriously what may have seemed to some administrators to be merely a gimmick. The University of Illinois, for example, employs over 3,000 authors of computer programs who contribute to its PLATO project; at present it has produced more than 16,000 hours of lesson material, covering 150 subject areas. Of course, few of these are devoted to the teaching of mentally handicapped people but one wonders how many could be modified (a) to run on a microcomputer and (b) for the use of the mentally handicapped (Bitzer, 1979).

Looking to the future

Some of the prejudice against the use of computers may be due in part to the mystique which attaches to the technology and which is manifested in so much of the unhelpful jargon. The interested reader is urged to persevere in disentangling the abbreviations which too often duplicate one another: CBE, CAL and CAI, for example, (Computer based education; Computer assisted learning; Computer aided instruction).

It is unfortunate, too, that many of the programs which could benefit mentally handicapped people are designated as "games" – unfortunate because they may be overlooked when teachers are seeking devices for improving for example, co-ordination of eye and hand, or for recognition of symbols, or for estimating distance and speed (as in a possible program for teaching how to cross the road).

Nevertheless, enlightenment can be discerned in some of the professional journals and books, not only in the acceptance of computers in administration (Slack, 1979) but also as an aid to diagnosis (Shortliffe, 1976) and treatment (Scholes, 1979).

Finally, the current exhibition, *Challenge of the Chip,* at the Science Museum, South Kensington, must surely tempt even the most sceptical administrator to try his hand with one or other of the computers, some of which are already programmed in educational "games". Perhaps, too, at the end of a hard day in the school or centre, when the learning and the fun is over, an instructor will be seen surreptitiously slipping a cassette into the micro before settling down to lose a game of chess.

References

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Bundy, A. *Artificial Intelligence.* Edinburgh: University of Edinburgh Press, 1978.

Cutts, P. *et al.* Computers in the special school – some practical considerations. *Computer Education,* November 1979; **33**: 6.

Macleod, I., Overheu, D. Computer aided assessment and development of basic skills. *The Exceptional Child,* 1977; **24**: 18-35.

Mason, J. Neurosurgical intensive care. *Computer Age,* July 1980; **8**: 63-65.

Nuffield Foundation: maths teaching project. *Computers and young children.* Edinburgh: Chambers, 1972.

Scholes, M. Nursing and the Computer. *J. Royal Soc. of Health,* 1979; **99**: 8-9.

Shortliffe, E. H. *Computer-based medical consultations.* New York: Elsevier Computer Science Library, 1976.

Slack, P. Changing to computers. *Nursing Times* 20/27 December, 1979; 2189.

Spencer, K. A. Audio-visual instruction for the mentally-handicapped. *Apex, J. Brit. Inst. Ment. Hand.,* 1980; **8**: 1, 10-12.

Sweeten, C. MUSE program standards. *Educational Computing,* July 1980; **1**: 55. (MUSE = Microcomputer users in secondary education).

Taylor, P. D., Robinson, P. *Crossing the road – a guide to teaching the mentally handicapped.* Kidderminster: British Institute of Mental Handicap, 1979.

Wells, C. Educating the micro for classroom use. *Computer Age,* May, 1980; **6:** 27-28.

Withrow, M. Illustrating language through computer generated animation. *Am. Annals of the Deaf.* September 1979; **123:** 549-552.

Bibliography:

1. A glossary of computing terms can be obtained from the British Computer Society, 13 Mansfield Street, London (50p + postage).
2. An alphabetical list and brief description of computer languages (for example, ALGOL, BASIC) is published in: *Communications of the Association for Computing Machinery (USA),* Vol. 19, No. 12 Dec. 1976.

Since that article was written there have been developments both in Special Education and in microelectronics.

One of the most important has been the establishment of the Council for Educational Technology. The SEMERCS, to which reference is made elsewhere in this book, were set up under the aegis of the CET.

The Council for Educational Technology (CET) publishes excellent guides for teachers in the form of:

Information Sheets

e.g. Microelectronics and Children
with Special Educational Needs

Obtainable from:
The Council for Educational Technology
3 Devonshire Street
London W1N 2BA

These include:

Information Sheet 2
Digest of New Projects

Information Sheet 4
Some software for children with special educational needs (BBC Micro)

Information Sheet 5
A review of some software for children with moderate learning difficulties (BBC Micro)

Parents might usefully consult these guides; in Information Sheet 6, for example, they will see the meticulous manner in which teachers are trained to assess both the needs of a learner and the value of a program.

INFORMATION SHEET 6 **April 1984**

(Council for Educational Technology)

MICROELECTRONICS AND CHILDREN WITH SPECIAL EDUCATIONAL NEEDS

Software Evaluation & Review

There are many ways of evaluating computer programs, from simple qualitative judgements, such as 'good', 'fair' and 'awful', to in-depth research into their long-term educational value. This note seeks to address the practical questions teachers need to ask when they are shopping around the steadily increasing volume of available software.

It deals mainly with programs suitable for children with moderate or severe learning difficulties. The questions that arise where children have other special needs tend to relate more to supplementary hardware – input/output devices designed to enable those children to communicate. However, much of it applies right across the educational spectrum.

What, then, are the questions that need to be asked?

Educational Objectives

1. What are the educational aims and objectives of the program and are they clearly stated?

This is an obvious opening question in almost any evaluation. But we need to ask the second part because it is possible to miss the whole point of a program if the objectives are not clearly explained. Even so, in Special Education we quite often find that a program designed for one purpose turns out to be more useful for something else. So we then need to ask –

2. For what other teaching objectives might this program be useful?

This is not always easy to answer – indeed it is not always applicable. But, to give an example, Longman's "Sheepdog" is a program in which sheep have to be driven through an opening in a field by a controllable dog. It is said to be designed to teach concepts of space, direction, estimation, number and angle, with an option to introduce compass points. A teacher who evaluated this program with primary age children with moderate learning difficulties found that, for his class, language development was the most important feature. Non-communicating children were stimulated to talk excitedly to their peers about what was happening on the screen.

3. For what age ranges is the program most suitable?

Apart from the obvious need to know the age ranges, programs which can be used with children of widely differing ages are particularly useful in teaching children with special educational needs. There is so often a gap between the developmental ages of the children and their interest ages. For 14 year-old slow learners, pictures of spaceships are probably more suitable for teaching simple arithmetic than cuddly animals or snowflakes.

4. Are the identified objectives relevant and worthwhile for the children we are seeking to teach?

If the answer to this question is "no", then we can obviously stop here.

5. Could those objectives be attained just as well without the computer, using traditional techniques and materials?

Normally the use of sophisticated electronics cannot be justified if it has no advantages over cheaper methods. Some programs give the impression that they were written simply "because the computer was there". But in Special Education we are always looking for new ways of presenting the same old things. We need almost endless repetition. So there may be value in a computer program even if it does little more than repeat something in a slightly different form. The computer itself, of course, can often act as a motivator.

6. How is attainment of the objectives to be assessed?

In traditional classroom work, a teacher has many ways of assessing a child's progress, but these do not always apply when the pupil is using self-instructional programs on a computer. The program should clearly indicate what the teacher needs to do. In most cases the program should keep a record of the child's responses for the teacher to examine later (provision for a print-out can be useful here). For diagnostic purposes the child's *errors* are often more important than successes, though few existing programs provide for this. Too often the program simply records a 'score', as though it was a competitive game.

Teaching Methods

7. Is the teaching method primarily instructional (involving drill and practice routines or conveying structured information) or is it investigatory (proceeding by discovery, with the child uncovering patterns, principles and problem-solving strategies)?

It is fashionable to deride drill and practice routines – possibly because much of the earliest software consisted of rather dull exercises in simple arithmetic. But even if it is not very exciting, drill and practice will probably continue to occupy an important niche in Special Education, where 'over-learning' is so important. One of the advantages of the computer is that it never gets bored by repetition.

Having said that, there is no doubt that the educational opportunities opened up by the computer can best be exploited by the development of really imaginative discovery-type programs.

8. Is the program best used for class, group or individual work? And how frequently is teacher intervention required?

Although some programs can be used with the whole class as an aid to presentation (the 'moving blackboard'), most are at their best with small groups or with individual children. Indeed, it is arguable that small groups in which children take turns at the keyboard, while the other members of the group discuss and advise, is an ideal teaching mode. On the other hand,

the smaller the group, the less frequently will the teacher wish to be called upon if the rest of the class is not to be neglected. This may mean that what the program needs is an automatic re-run option because the instructions are too difficult for children who can otherwise benefit from it.

Program Design

9. Is the program accompanied by adequate documentation?

The documentation accompanying a program should describe the educational objectives, state simply and clearly the tasks to be performed by the pupil and explain how these are to be accomplished. It should suggest (and preferably provide) complementary materials such as workcards and propose a variety of associated activities. It should also indicate what prior attainment levels are required. The computer should normally be regarded as just another teaching aid which needs to be integrated into the whole teaching strategy, and it should rarely be used in isolation.

10. How flexible is the program? Does it offer a range of options to cater for a wide range of age and ability levels?

All programs should (but frequently do not) give the teacher full control over the difficulty levels and the time given to pupils to look at each display and to perform any task required of them. Success is an important motivator in all education, but critically so in Special Education where the children's attention span is usually so limited.

Ideally, there should be a simple provision to adapt the program to suit the particular needs of a child or group. In the language area of the curriculum, in particular, there is a need for framework-type programs in which the teacher can enter whatever text he or she chooses. This enables the program to be fitted to the particular reading scheme in use and to the abilities and background experiences of the children. Urban, multi-racial groups of children have often never heard of the nursery rhymes, proverbs and rural themes that are used in some language programs.

11. Will the program carry the children forward at the right pace, pushing them along, but without stress?

This is not merely a matter of timing and difficulty levels (which should be under teacher control). The program should proceed in logical steps of the right size for the children, neither 'losing' nor boring them.

Pupil-machine Interaction

12. Is the program stimulating and exciting, and does it adequately reward success?

Stimuli are obviously important, but so is moderation. Many programmers allow themselves to be carried away with animated pictures, pretty tunes, and flashing or inverse text in coloured boxes. After a time these can become boring (and even annoying). Also, remember the rest of the class. There should be a provision to turn off the sound if required.

Rewards should be mainly for success, not failure. A weakness of some programs is that they make it much more fun to fail. The computer's responses to the pupil should also be appropriate. A musical response to an error should be a sour one, not another pretty tune.

13. Are all messages in short, simple sentences, using everyday words that are likely to be familiar to the children?

In reviewing some programs teachers have commented that, if the child could understand the instructions, he would not need the lesson.

14. Are the required pupil responses simple?

Unless the program is designed to encourage writing, the responses required from the pupil should be as simple as possible ('Y' for yes, 'N' for no, 'press the space bar to continue', etc.) If words have to be entered, alternative answers and answers in either upper or lower case should be allowed (e.g. CAR, motor, Motor Car, AUTO and even AUTOmobile should all be permitted answers to one question).

15. Is the program easy to control?

It should be easy to move through the program, forwards or backwards, in small controllable steps. It is not sufficient that ESCAPE will return to the beginning of the program, since this often then requires the pupil to sit through rather long-winded introductory graphics.

16. Is the program robust and fool-proof?

While being flexible and affording the teacher full control, the program should be as crash-proof as it can be made. All keys that are not needed to use the program should be disabled, as should the repeat facility if it is not required. The BREAK key should be redefined to avoid loss of program and ESCAPE should return the user to Menu or some other convenient starting point in the program. If there is provision for storing records of pupils' responses (as there should be) those records should be protected as far as possible against inadvertent wipe-out by a pupil.

17. Does the program have a properly thought-out correction and re-trial procedure?

Although not applicable to every program, a good correction and retrial procedure is essential in all instructional programs carrying questions. The child's errors should never appear on the screen unless they are part of such a procedure, since it tends to reinforce them.

18. Does the program provide for the use of a concept keyboard, light pen or other simplified input device?

Children with fine motor co-ordination problems can find operating the standard keyboard difficult, even if the required responses have been kept very simple. A simpler input device can be very useful, if not essential, in these circumstances.

Screen Display

19. Is the display clear and easy to read?

For slow learners, minimal text with clear layout and enlarged characters is most desirable. If colours are used, they should have been well chosen. A surprising number of programs have combinations of foreground and background colour such that even the graphics can be difficult to decypher. Programmers seem to forget, too, that many schools are still using TV screens or monitors without colour.

Shopping for software

The CET Information Sheet No. 5 includes the following list of Software Publishers, reproduced here for the guidance of readers. It should be made clear that the materials are intended mainly for the BBC Microcomputer (although an enquiry to one of these firms might produce information helpful to users of other systems) and also that the CET list does not imply the CET "seal of approval").

Software Publishers

Acornsoft Ltd.
4a Market Hill, Cambridge, CB2 3NJ

Chalksoft Ltd.
Lowmoor Cottage, Tonedale, Wellington, Somerset, TA21 0AL

ESM
Duke Street, Wisbech, Cambs., PE13 2AE

Golem Ltd
77 Qualitas, Bracknell, Berks. RG12 4QG

L.C.L.
26 Avondale Avenue, Staines, Middlesex

Logical Educational Software
12 Rowditch Avenue, Derby, DE3 3LD

Longman Group Ltd
Resources Unit, Tanner Row, York, YO1 1JP

EGA BEVA
18 Luccomb Hill, Redland, Bristol

Tecmedia Ltd
5 Granby Street, Loughborough, Leics LE11 3DU

There are programs listed as "educational" in the Software Index published by

I.P.C. Magazines Ltd
King's Reach Tower, Stamford Street, London, SE1 9LS

It must be said that buying programs by mail-order can be a risky business, not so much because of dishonesty but because you may not realize from an advertisement that a program is not compatible with your system.

However, to give some idea of what is available, I include here extracts from the catalogues of two firms which specialize in providing software for the use of slow learners.

This is what they say of their products.

(1)

New Horizon
Unit 8 Enterprise Plymouth
Somerset Place, Stoke
Plymouth, PL3 4BB

LETTER-SHOOT – A large sized letter drifts slowly across the sky. If it is different to a fixed letter on the ground the student should press a key on the computer. A rocket destroys the letter in the sky and a helicopter rises to show progress.

The large size letters can be capitals, small, numbers, or a mixture; you can choose your own.

At the end of the programme the student's performance can be analysed if required.

PELICAN – Created to simulate a Pelican crossing and how to use one before using the real thing.

Extensive use of graphics and sound displaying the important parts and the correct procedure for using the crossing. Requires the use of the space bar and assistance and explanation from an experienced person.

PRETTY PATTERNS – Colourful patterns and sounds occur when the student touches the computer, an ideal first introduction to computers for most students.

WHICH WAY – Created to help a person learn what is sometimes a difficult concept of up, down, back, front, left and right, by using cartoon style displays.

An analysis of the student's performance can be shown at the end of the programme.

FUN SHAPES – The student has to match shapes and colours.

The left-hand part of the screen has one group of symbols, the right-hand side has three and the student presses a key on the computer to indicate a match.

In version 1 there is one symbol in each group, chosen from three possibilities of shape and/or colour.

In version 4 there are three symbols in each group, chosen from many shapes and colours.

For every correct response, the rescuer gets nearer to the stranded girl.

MAKATON – Designed as an aid to a teacher of the Makaton sign language, especially for those students who are mentally handicapped.

The computer creates a picture or symbol on the screen together with the word in either small letters/capitals/both or neither. The teacher then instructs the pupil how to do the signs.

When they have been taught the signs, the computer creates pictures at random for the pupil to practise, the teacher combines with the display to indicate if the signs are right or wrong.

There are two programmes currently available, 1 deals with 'Eating Food etc' and 2 is called 'Around the House'.

CASSETTE VERSIONS – All the programmes are for use on the BBC.B, Electron and in most cases. the Speetrum. Please enquire for other machines.

DISK VERSIONS – These are available for the BBC.B and any available information on PAGE, disk density, tracks, autobooting would be appreciated but is not essential.

Disk programmes are not protected and we ask for an undertaking that backup copies, which we encourage, are only used on the machine for which purchased. The right to use on several machines is negotiable.

GAMES – Games are in the process of being designed that will have themes similar to those currently available for normal users, but will take into account the restrictions of the user.

(2)
ESM
Duke Street
Wisbech
Cambs PE13 2AE

(The following notes on a selection of programs devised for early education suggest that they could be suitable for people with special educational needs. A fuller catalogue is available from the suppliers.)

COUNTING

Three infant maths programs counting up to 20 and identifying numbers 0 to 100.

(BBC micro and Commodore PET micro)

EARLY READING

Four sequencing programs to practise visual sequential memory and recall of objects and letters. Two programs provide association exercises to reconstruct a word or sentence from an arrangement of letters or words.

(BBC micro)

WORD SEQUENCING

Proverbs, Nursery Rhymes and Sentences are three word sequencing programs designed by Ann and Russel Wills to encourage children to practise reading and syntax. The child is presented with a jumbled sentence on screen which he must use a simple edit procedure to rearrange in the correct order. Instructions enable you to insert your own sentences. Results of up to 20 pupils can be stored and recalled.

(BBC micro and Commodore PET micro)

Finally, here are some thoughts on how the family of a handicapped child might benefit from using a micro. They are contributed by the Deputy Head of a Special School.

THE FAMILY WAY

The educational revolution associated with the microcomputer is significantly different in one important aspect. Unlike other educational landmarks, which have been somewhat professionally confined to the school, it can be viewed as having much broader possibilities. The educational applications of the microcomputer have as much potential in the living room as in the classroom.

Many people do have misgivings about their own ability to understand and use microcomputers. It should be comforting to parents to appreciate that these misgivings are as prevalent amongst the staff of schools as they are in many other walks of life. The small hurdles which have to be overcome to eliminate these misgivings are effectively the same for all. Gradually, school staff are learning to live with, and profitably use microcomputers, as indeed are many parents. However, what we should perhaps be addressing ourselves to are the ways in which more parents of children with special needs can become realistically involved with the education and development of their children via the microcomputer.

It is worth stating some of the recognised advantages of using a microcomputer as an educational tool:

(i) The microcomputer does not tire or become frustrated.
(ii) Educational programs can be tailored to suit the child's ability level.
(iii) The speed of operation can be adjusted to suit the child.
(iv) The microcomputer maintains a consistency of approach.

There are other benefits, although these can depend upon the microcomputer used and the application.

The selection of microcomputer can be influenced by the applications, although it is fair to say that microcomputers are able to perform the initially required task and more besides. Its versatility also offers possibilities well beyond educational applications. Whether a member of the family wishes to indulge in computer programming, a functional application, or enjoy one of the many computer games available, the microcomputer can be viewed as something more than an investment for one of the family. This latter point is the dimension which is so inviting a prospect: an item of equipment which can be useful for individual members of the family as well as being a medium for bringing them together in an educational or leisure pursuit.

What do you need to start? Well, first check if your child's school already uses a microcomputer, and whether your child is involved. It may be that the school has a microcomputer, but that your child is not involved. Don't be disappointed for there can be valid reasons for non-involvement. Unsuitable educational programs for your child, the microcomputer may be new to the school, or, as is often the case, no available computer time. However, do not be afraid to pursue the matter with the educational services. Many authorities have staff who should be able to provide some initial help and advice.

The question of available finance does influence selection of a microcomputer, so that you may have been able to determine some suitable software (programs), and the microcomputer suited to your needs, but cost may be prohibitive. An obliging authority can save you V.A.T. on your purchase if they are prepared to let you purchase your needs through the school. In any case the market is very competitive, so do shop around for the best deal.

What is the best package? Well, the microcomputer should select itself, although the optimum has to be one which permits the connection of special switching devices, if your child's needs dictate; a printer (when required), a colour monitor, and a disk drive. The justifications for these are as follows:

Special switching devices – The child may not be able to operate the conventional keyboard satisfactorily. Commercially available, or easily made switching arrangements can facilitate these control problems, and can be of several configurations. The controlling body part can literally be any appendage the child can control voluntarily. Touch, movement, or sound are all established control mediums.

Colour monitor – Although most microcomputers can use normal televisions as visual display units, the design of such units is such that the visual image is not as clear and sharp as it is with a monitor.

However, the cost of a monitor can be prohibitive for the single function of being used with microcomputer. It is now possible to buy colour televisions/monitors, which provide the facilities of a television, yet monitor picture quality at the flick of a switch.

Whilst considering the selection of monitor do bear in mind the size of screen. Small screens can often be a poor investment when considering the nature of some educational applications.

Disk Drives – These use floppy disks for program storage. Their greatest advantages are the speed of transfer from the disk to the computer, literally a few seconds, and the fact that they are controlled by the computer. The alternative of using the much cheaper cassette recorder system presents the problem of a much slower rate of program transfer, minutes rather than seconds, and a less reliable transfer. Perhaps an even more significant problem is that the cassette recorder requires some operation of controls, which may present the physically disabled person with unnecessary problems.

Printers – Whilst not essential in the first instance, a developing use may justify the need, especially if the computer is to be used as a means of communication.

What must be remembered is that the whole scene of microcomputers is a developing field. Today's technological breakthrough is literally tomorrow's dated design. However, the needs of our children are fairly simple initially and the available technology can more than satisfy the needs. A good educational foundation is valid regardless of the technology. The technology is merely a tool for this and not a panacea. Nevertheless, the future does hold some promise. Control systems, computer mail via telephone lines, and access to vast stores of

information are currently becoming available. What these will offer to ourselves and our children is somewhat speculative. We can only find out by becoming involved.

The microcomputer system initially purchased as an educational tool could well grow into a leisure centre, communication point, financial control system, and domestic caretaker.

The implications of the microcomputer age for the family of a special needs child are potentially boundless.

The fact remains fiction until you become part of the fact.

John Procter
Deputy Head
Holly Bank School
Huddersfield

Chapter Ten

INDEPENDENT LIVING

Electronic mail as a link

"Approximately 2 years ago I became aware that hearing-impaired people could use the telephone in conjunction with a home-computer for communication. As a consequence of this I acquired a BBC Micro-computer Model 'B'.

During the period October 1982 to January 1984 I was involved in the "Visicom Project" together with 70 other people (deaf, deaf and blind, and hearing) who experimented with Electronic mailbox (Telecom Gold), Prestel and Dircoms (back-to-back), using various types of equipment e.g. Teledek (Prestel Keyboard), Home-computer, Diablo-Printer, CPM machines etc.

Over the last few months I have been busy setting up a communication network (Dircoms) in Leeds and have successfully linked up with three deaf families in Leeds and one in Bradford. We 'chat' to each other regularly using this medium and frequently "swop" programs by "down-loading" via the telephone.

I had many misgivings prior to setting-up the network as there appeared to be no deaf people in the area who had any experience in this field. My impression was that there was much hardware available but few people with experience in the use of the equipment for communication.

Consequently, I spent a lot of time and incurred much expense in helping out the newcomers, giving demonstrations together with carrying out experiments. I have given demonstrations in clubs etc. to make people aware of the new technology which is available but not taken seriously. I also give individual tuition on the equipment as and when necessary.

After purchasing this expensive equipment in order to use the telephone, I am unable to afford the sophisticated light system which indicates when the telephone rings, therefore to date I rely on my husband and son to inform me when the telephone rings.

It will be appreciated that the telephone bills are very high and of course there is no grant etc available and these bills have to be paid out of the family budget.

Having seen the transformation in hearing-impaired people on being able to use the telephone via the micro I have also seen the degree of equality and independence this has produced.

But I feel that financial consideration should be given by the government to encourage hearing-impaired people to use this aid.

The running costs are much higher than for a hearing person and the total number of contacts may be as few as three other persons. The hardware

must include (1) a micro (2) a *modem* and (3) a visual indicator that the phone is ringing.

There is additionally a usage charge, a standing rental and extras for the visual indicators.

Typing speed of most people is rather slow and it would appear from tests done that the ratio of typed text to voiced conversation is approx 7 to 1.

Those of us involved in the Network use the following equipment for telecommunication:

1. (a) BBC 'B' Microcomputer fitted with "Commstar" Rom.
   (b) Pace Modem (300 baud and 1200/75 baud)
2. (a) BBC 'B' fitted with "Commstar" Rom.
   (b) "Minor Miracle" Modem (300 baud and 1200/75 baud).
3. (a) Spectrum 48K micro.
   (b) Maplin Modem (300 baud).

The "Commstar" Rom is a terminal program in Rom form which is plugged into the BBC Micro. I cannot speak too highly of the "Commstar" Rom, which is also manufactured by Pace of Bradford, (92 New Cross Street, Bradford, BD5 8BS, W. Yorks).

Having tried various terminal programs I have found this to be the easiest to use, specially for the deaf who are new to this form of technology.

The Pace modem is a hardwired modem which operates at 300/300, TX1200/RX75, RX1200/TX75.

The "Minor Miracle" is also hardwired and operates in a similar way to that as above.

Current trends seem to suggest that parents/in-laws of the families will be joining the network.

To conclude perhaps I should mention that I was born deaf of deaf parents. I am married with a son aged 12 years; both my son and husband are hearing. I work full time as an Information Clerk, prior to that I worked as a Research Laboratory Analyst."
(Doreen Naylor, Leeds)

Mrs. Naylor has contributed this letter in response to my request to know how she feels about using a micro as an aid to independence.

It illustrates the Independent Living Philosophy which was mentioned in the May, 1984 Newsletter of the Spinal Injuries Association:

> "The philosophy on Independent Living recognizes the need for every disabled person to make his/her own life-decisions and to participate on equal terms with others in the determination of events surrounding them."

It shows also the relative ease with which a newcomer to micro-using can become familiar with the technology. And, most important, it shows how one person's enthusiasm infects others, in this case parents in law. This sharing of experiences (and also sharing the jargon!) is mentioned frequently by newcomers to microcomputing, as, for example in the letters to "Choice" magazine quoted later in this Chapter.

Microcomputing need not be a solitary affair.

User Clubs

If there is the right kind of transport available there is surely no need for a micro-user to stay at home, pecking away at the keys in solitude.

When you look at your favourite micro-users' magazine you will see lists of micro-users' clubs. There is one in nearly every town and they meet usually once a week or once a month. Sometimes the meeting will be in a public library – which should mean that access for wheelchairs is easier than, for example, a pub, although, as you know, it doesn't follow. But the main thing is to get there somehow. Once you are there you will be accepted on your own terms: as a beginner or as a real programmer, depending on how much experience you have. This is an example of "participating on equal terms" which was mentioned above.

Club membership can open doors for you. For example, you may learn about markets for your own programs, or you may be asked to give a talk in a local school or technical college, or you may be asked to test programs which other people have written, to see if they are "bug-free". (This can be either a tedious or a fascinating task, depending to a large extent on your own personality; but it's an essential job if a program is to be successfully used and marketed.)

Rehabilitation

Another jargon word, but this time not from the realms of computing. It is mentioned here to illustrate the many ways in which computers and microcomputers are helping people to independence.

Here are some examples taken at random from newspaper cuttings; a professional like an Occupational Therapist or a Physiotherapist could offer many more examples.

Accident victims are being helped to recovery by the use of computer "games". Researchers at Bristol have found that computer games help to restore the memory, concentration, and decision-making skills of these patients.

The Head Injury Recovery Trust has now been set up at Bristol to provide micros and support staff for accident victims.

Children are being helped by microcomputers to learn, as was seen in Chapter 8, and children for whom there was, up to now, no real hope of independent living are being given opportunities.

A 13-year old boy, without speech and physically handicapped is now able to write and to calculate with the aid of his own micro. His headmaster is quoted as saying, *"This is his first real communication with the outside world"*.

Injuries to nerves and muscles can now be assessed through the aid of micros and the efficacy of the treatments can also be assessed. This is being done at the Functional Assessment Clinic in Dallas, USA. For example: hand/eye co-ordination can be assessed when a patient tries to keep a spot on a screen steady while the outline is moved about rapidly and erratically. There are also "touch-sensitive" plates which can measure the extent of spinal-cord injury. A patient stands on a platform, with or without support, for a few seconds: a micro measures the degree of sway, left/right, forwards

and backwards. The patient sits and tries to tap or press a plate, using each foot in turn; this too is measured and recorded by the micro. Some of the medical conditions involved in these tests include Parkinson's disease, adult palsy, multiple scelerosis and other neuromuscular diseases.

Also in the USA, this time in a Brain Injury Rehabilitation Unit in California, video and micro "games" are being used to help patients recover their skills.

In the UK the work being done at Stoke Mandeville and at Pinderfields hospitals, to name only two, is well known.

Princess Anne has been a frequent visitor to centres where handicapped children have demonstrated robots and computer-controlled Braille printers.

The Royal National Institute for the Blind runs courses, which include preparation for independent living, at its Rehabilitation centre. The address is:

RNIB Rehabilitation Centre
Manor House
Middle Lincombe Road
Torquay, Devon TQ1 2NG

So does the Royal National Institute for the Deaf. The address of their Social & Vocational Training Centre is:

Court Grange
Abbotskerswell
Nr. Newton Abbot, Devon TQ12 5NH

The Chest, Heart & Stroke Association run a Volunteer Stroke Scheme. At its tenth anniversary meeting the Minister for Health referred to the 125,000 people who suffer from long-term strokes each year and to the need for their rehabilitation both physically and socially.

The next Chapter gives further examples of the kind of research being carried out in various parts of the world.

None of these developments need surprise the micro-enthusiast; it takes little imagination to see how some programs might be extended or modified to offer help to people with a disability. For example, the cheapest micro will run a program which tests reaction times: when you see the spot on the screen or hear the buzzer you must press a key or a joystick or something. The micro assesses your reaction and records it. This is the kind of thing which computers do well.

Keeping in touch by Electronic Mail

One other thing that computers ought to do well is talk to one another; I say "ought to" because the technology is there. The snag sometimes is incompatibility: even if a network of computers is programmed in the same computer language there may be problems. You will remember Mrs Naylor's experiences, given at the start of this Chapter: there were several systems at work and they all worked smoothly – they were supervised by a national telephone network.

A computer can only understand the difference between "ON" and "OFF": it stores all information as either 0 (zero), meaning OFF or 1 (one), meaning ON. There are many possible combinations of zero and one (as used in bar-codes) and so the computer experts thought this kind of code would be useful as the basis of a computer language.

Fine. The computer uses digits to convey information, either zeros or ones.

However, (yes, you thought there might be a snag!) a telephone network uses voice patterns, in what is known as a "modulated" form. Someone was given the job of "demodulating" and the problem was solved. But a piece of jargon was needed: so we have *"modem"*, standing for "modulate/demodulate".

This is how you keep in touch. You already have your micro. Now you buy a modem and a few other bits – but not until you have checked that they are all compatible with your system.

Then you register with an electronic mail organization (and pay the fee).

Now all you have to do is use your telephone, preferably during an off-peak period so that it doesn't cost you the earth, and join the network.

Provided the system is approved by the telephone authority you are allotted a "mailbox". When this is called up on a microcomputer it displays messages.

So you inspect the messages in your mailbox. Now you either press a key, which displays the full message, or press another key to see the next message. You can then send a message, using plain English.

You can communicate with a friend, buy and sell goods and services, inspect prices, see the latest news and get through to a local micro club in order to exchange a micro program or even get a program free of charge – provided you know the password.

Add to this the possibility of linking to a viewdata system and you can imagine the possibilities.

The cost of all this, even for a call to a person overseas, may be less than the cost of a Telex and certainly less than a telephone call. The highest cost is the charge for a telephone call to your local Electronic mail office in your country; if the "mailbox" is used during off-peak time the total costs can be very low.

Not surprisingly there are commercial bodies who will offer this system in the hope that you will buy their goods or services. You can make contact with a bank and a building society and see immediately how much you owe; you can transfer money to and from them. You can transfer your money to a shop and order goods.

There are also organizations like Social Services in the UK who have supervised the setting up of an electronic mail service to help elderly and disabled people to keep in touch. When you think of it, it's not always convenient for a pensioner to ask someone else to pay out or collect money for them; it is hardly an example of independent living. This service started in Gateshead and it is now extended. The Department of Industry have funded a project in Birmingham which connects about 1000 users who each pay £4 a month to shop for 10,000 items in a local hypermarket.

Some (from the comfort of a Conference Centre bar) might say that this development is anti-social. It exists; you may wish to use it.

Shopping for information

Apart from social uses, you can now use electronic mail to gain access to information. It is now quite possible, and relatively cheap, to exchange information with someone in, for example, North America or Australasia simply by dialling a local telephone number (see Chapter 12).

For example, for the price of two newspapers you can be connected for a minute to an information bank (in the USA – where else?) containing 14 million articles, books, computer programs and technical reports.

The cost is kept low because of an arrangement made with the telephone authority which ensures that you are charged only for a local call.

One micro magazine ("Personal Computer World") regularly publishes details of what's on in the various networks, how much it would cost to make contact with them and how to do it.

An answering service

Mention has been made earlier of the advantages of systems which are capable of speech recognition and speech synthesis. One such system is "Big Ears", manufactured by William Stuart Systems (Quarley Down House, Cholderton, nr Salisbury, Wilts). It will recognize voices: it stores "voice prints" and later recognizes them. So it seems that it would also recognize sounds which are not "speech", the sort of sound, for instance, vocalized by a disabled person who had little or no speech.

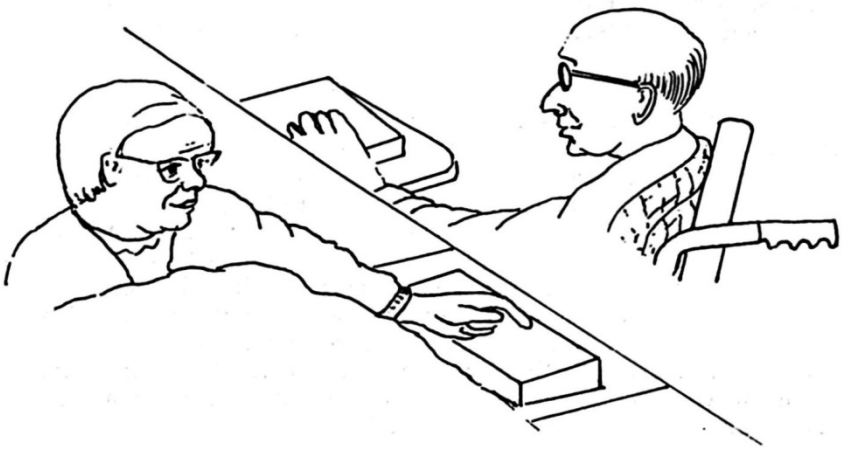
Linked with a telephone, as most micro systems will shortly be linked, such a system could act as a super-efficient answering service. It could not only accept a call from a dysphasic person but also select an appropriate reply.

As for synthetic speech, a micro can be taught in two ways. You can either repeat your message several times, and "tell" your micro to do the same; or you can program the most frequent sounds of your language ("allophones", of which there are 64 in English) and give your micro instructions for combining these sounds to make words and sentences.

The second method gives your micro an unlimited vocabulary but unfortunately, at present, it is not easy to get it to say these sounds with the correct inflexion. Hence the odd and uncolloquial nature of what the micro regards as "speech".

For some purposes this matters little: if all you want is a read-out of single digits, this can be done in an intelligible fashion. However, consider the difference in tone and inflexion between "thirteen" and "thirty" and you will understand some of the difficulties. But they are not insuperable.

Micro Command (distributed by Orion Data, 3 Cavendish Street, Brighton, BN2 1RN) gives an instant response on the screen to a limited number of commands spoken into a microphone. It recognizes the sounds you make, after listening to them several times, and responds to them – but only if you have incorporated this feature into your program.



Keeping in touch by Electronic Mail.

RETIREMENT CHOICE

It is not only disabled people who have found that micros open up new ways to independence. Many retired people have reason to bless the coming of the micro. Here are the views of two such people who recently wrote to "Choice", the magazine for leisure and retirement planning.

"I had never been on a weekend course by myself, but as I am interested in home computers and own a Commodore 64 I thought it would be helpful and interesting to go on a course which I saw advertised in a User-Magazine.

I knew nothing at all about the possible ages of the people who might attend. There were 15 of us, some couples; some men alone, some women alone, some women friends, and all between the ages of about mid-twenties to mid-fifties. I think I was the only pensioner.

After dinner on Friday we went to our first teaching session. We were paired, two to a computer, and remained in the same pairs throughout the teaching sessions. The majority of us had no, or very little, experience of using computers.

It did not take long for the enthusiasm of our lecturer to transmit itself to us, and three hours went by in no time at all. We started study again on Saturday morning at about 9.30, and except for a meal and tea or coffee breaks, and a 2-hour break on Saturday afternoon, we worked through until after 11 p.m. It was the same on Sunday.

I thoroughly enjoyed the course and came away feeling I had made progress.

I find a home computer ideal for mental stimulation and am glad to share in a small way the experience and use of computer jargon with my 10-year old grandson." (Mrs. F. C. B., Newbury, Berks).

Another letter was published in the next month's issue:

> "I was more than pleased to read Mrs. F.C.B.'s letter. Indeed I was absolutely chuffed.
>
> There I was at 55, thinking I was some sort of freak playing with my Commodore 64 micro, when it seems there are many more of us around.
>
> I can thoroughly recommend computing to others in my situation who have no overwhelming hobbies. It is a tremendous mental stimulant and has virtually replaced crosswords and other mundane pastimes for me." (Mr. L.C., Retford)

Pre-Retirement Magazine, Bedford Chambers, Covent Garden, London WC2E 8HA.

Simulations and robots

It is possible to simulate some activities by means of a micro, activities which would be dangerous or even impossible to perform in any other way.

It has been known for a government department to withhold permission for a disabled person to drive a motorised wheelchair on the grounds that s/he has had no experience of steering or using the controls. How can they get the experience? Up to now, they were prevented by this "catch 22" – no permission until they had experience of the controls: no experience until permission was granted.

Now it has become possible to simulate the steering of an invalid car by means of a microcomputer program.

One way of getting your micro to obey your wishes is by using a robot as used by school children – see Chapter 8. This is not as fanciful as it may sound. Businessmen have already latched on to the possibilities: it is possible to hire a robot to attend a trade show, for example. As the crowds mill around someone else's stall you send your robot in. To and fro it goes, waddling among the crowd while it says what you want them to hear and even gives out leaflets on its way. Compared with a TV personality or a show business name, the robot seems to lead people along in a kind of "Pied Piper" fashion – well, that's what they say.

As with micros, there are experts sitting around and asking one another, "But what else can we get a robot to do?" As with micros there are solutions waiting for the right problems.

Now, let's offer some problems to the experts.

Here we have a robot, capable of responding to various commands, able to sense the things that a human can sense, able, that is, to hear, to speak, to see, to smell, to touch. If it senses an obstacle in its path it can avoid it. Given the right program, it can grasp it, lift it, move it. If it senses the approach of darkness it can switch on lights and power. If it senses the approach of a human it can respond accordingly. And so on.

But the manufacturers are not too sure of their market. Businessmen and women, to be sure, seem to want various jobs done. Housewives, (since we're dealing in stereotypes) seem to want various jobs done.

So the experts preoccupy themselves with questions like, "Can it look like a human? Can it have two eyes, two ears, two arms, two legs – and can it look like the endearing object which will make money?"

Now let's consider the human being. Perhaps he's confined to a bed, or to a wheelchair. The experts say they can control the environment. Let's give them these problems, *problems which they have been waiting for.*

Forget the quaint toy which serves drinks and turns the TV on and off. Let's see the robot which opens doors and windows, signals the time, measures out the medication and warns of all possible dangers. Whether or not it looks human is immaterial.

All this is possible. "Ah!", says the manufacturer, "but is there a demand?"

Well, is there?

Demand, according to the Economics textbooks, means "willingness to buy backed up by the ability to buy". So until you have the money you are not regarded as a customer. However, if the state or a voluntary agency intervenes perhaps we shall see robots put to one of their proper uses, namely helping handicapped people.

The manufacturers, in the meantime, may well be considering their own redundancy. Professor John Rose, of Salford University, expects a second generation of seeing, feeling and touching robots within a few years.

> "We have a story about a production line," he says, "where the only living beings are a man and his dog.
>
> The man is there to feed the dog and the dog is there to stop the man from touching anything."

Finding out more

Chapter 11 gives a brief glance at some current research into, among other topics, rehabilitation. Chapter 12 gives a rather fuller list of helpful people and organizations.

Other sources of information are: radio and TV series; specialist magazines; travelling exhibitions.

There are continuing series of programmes on most TV channels and on radio. The BBC TV series, *"Technology and the Handicapped"*, for example, has one programme on "Retraining the senses – assistance for accident victims". Another programme deals with the topic with which this Chapter started, "The outside word – electronic mail".

Further details are available from:

INSIGHT
BBC Continuing Education
BBC, London W1A 1AA

The magazine "Handicapped Living" publishes up-to-date information on aids to rehabilitation.

Details from the Editor:

"Handicapped Living"
Stanley House
9 West Street
Epsom, Surrey KT18 7RL

Of the many micro magazines, "Practical Computing", "Practical Robotics", "Personal Computer World" and "The Micro User" occasionally contain articles on programs which may help disabled users.

Details from:

Practical Computing
Quadrant House, The Quadrant
Sutton
Surrey SM2 5AS

Practical Robotics
ECC Publications
196-200 Balls Pond Road
Islington
London N1 4BR

Personal Computer World
62 Oxford Street
London W1A 2HG

The Micro User
Database Publications Ltd
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY

"The Concerned Technology" (referred to in Chapter 5) is sponsored by the Department of Trade & Industry in the UK. It is a travelling exhibition dealing with information technology aids for those with special needs. As the organizers make clear: "All the equipment is there to be used" and "hands-on" experience is encouraged. The exhibition travels not only to places in the UK but also to venues in Europe.

The Spastics Society has a Visiting Aids Centre, usually staffed by Occupational Therapists. This, too, visits various centres in the UK and it is possible to view various pieces of equipment.

There is no doubt that local authorities are encouraging more and more organizations to put on exhibitions. Fairly typical of the trend is *The Greater Manchester Regional Centre for Disabled Living.*

It is permanently established at the Headquarters of The Cripples' Help Society. The Centre displays over seven hundred different types of aids covering a whole range of disability and takes the form of a comprehensive standing exhibition where aids of all kinds can be seen, examined and demonstrated. It is one of several centres in the North West of the UK. It is the only centre in the United Kingdom belonging to an organisation which provides other vital services for disabled people such as Handicraft Training and Welfare Counselling in the Home – a complete service in fact for disabled people.

Further information from the Principal Occupational Therapist, The Cripples' Help Society, 26 Blackfriars Street, Manchester M3 5BE (Tel: 061-832 3678/9).

Users' Groups

Not every micro has its Users' Group, nor may it have its specialist magazine. However, here is a list of groups; you may find the organizer or secretary has changed because these posts are usually honorary and they involve a lot of work.

British Apple Systems User Group
PO Box 174, Watford, WD2 6NF

Beebug (BBC micro)
Dept 13, 374 Wandsworth Road, London SW8 4TE

Laserbug
Dept A, 10 Dawley Ride, Colnbrook, Slough, Berks

EZUG (Educational ZX Users' Group)
Organiser: Eric Deeson, Highgate School
Balsall Heath Road, Birmingham B12 9DS

National TRS 80 Users Group
Brian Pain (Secretary)
40A High Street, Stoney Stratford, Milton Keynes

ACC (Amateur Computer Club)
Rupert Steel (Membership Secretary)
St. John's College, Oxford, OX1 3JP

ICPUG
Independent Commodore Products Users Group
Jack Cohen (Membership Secretary)
30 Brancaster Road, Newbury Park, Ilford, Essex IG2 7EP

NUMINE
Network of users of microcomputers in Nurse Education
This is an informal user group for those interested in using the computer as an aid to teaching and learning
Contact: Sue Norman 01-928 9292 Extension 2599
or Ian Townsend (Education and Training Adviser), NHS Learning Resources Unit (Sheffield Polytechnic) 55 Broomgrove Road, Sheffield S10 2NA).

Fred Harvey

To end this Chapter on independent living here is a contribution written for this book by Fred Harvey.

It seems to me to be a suitable encouragement to anyone, of any age, who would like to use a micro.

Brief biography of a Disabled Computer Addict

"Born in 1908, Fred Harvey was educated by scholarship at an old type grammar school to London Matriculation standard, and on leaving in 1924 entered the service of a London public authority on their administrative staff. All went well until in 1936 he developed tuberculosis and his wife was

advised that the outlook was grim. Treatment in a sanatorium for a year made it possible for him to resume duty with his employers on an outdoor job.

During the war he had two homes in London wrecked by bombing and in 1947 the old chest trouble came to life again. This time some minor surgery with bedrest for two years was followed with the loss of employment announced in 1949.

During this spell a visiting occupational therapist had initiated him into several crafts and he reached a standard sufficient to enable him to sell some of his products. In 1951 he persuaded his doctor to allow him to take the tenancy of a very small shop which it was proposed to use to sell his work and also to supply other workers with materials. His wife was interested and skilled in several crafts and the venture proved a modest success.

Regular medical checks were continuing and in 1954 the hospital reported ominous signs on the X-rays of further chest trouble. Fortunately streptomycin had then become generally available and a course of injections was prescribed. This enabled them to continue with the shop subject to set rest periods for Fred. Two hundred injections were given over 40 weeks with very uncomfortable side-effects on the patient but the shop continued to operate. At the end of the course Fred was pronounced free from the disease with little likelihood of recurrence. And so it proved but Fred was left with a legacy of bronchitis as soon as a cold germ struck.

In 1969 the doctor suggested that retirement to a cleaner and softer climate was advisable and a move was made to Selsey. Unfortunately in little more than a year Fred's wife fell ill and died from liver cancer within six weeks.

Fred was high and dry in a new area without any friends other than those he had made in the local photographic society which he had helped to form. He pursued this interest furiously to overcome the shock of the loss and founded a national photographic society, The Colour Reversal Club, devoted to the taking and processing of colour slides. This prospered and reached a membership of over 1500 spread throughout the UK and with sections overseas.

Fred moved to a small seafront flat and when relatives called to inspect the new address they kindly offered to take him on holiday with them to the Isle of Wight. All went well for the first week but on the ninth day they were coming back from a day's outing along the coast road when an American driving another car came round a bend on the wrong side of the road causing a head-on collision and the destruction of both cars. The occupants of both cars were transferred to hospital and as the front seat passenger of one car Fred suffered head injuries, facial cuts, several broken ribs, a fractured hip and other minor injuries. After a spell in hospital Fred was returned to Selsey but activity became very limited and in spite of attempts to drive a modified car he had, eventually, to take to a wheelchair to get around.

He secured accommodation in a sheltered housing unit where he has his own flat which he manages and cares for himself with the assurance of available help from a warden if needed.

The next problem was concerned with mental occupation and television and radio helped for a while supplemented by tapestry work. The flat walls soon became covered by tapestry pictures and something more mind-stretching seemed desirable.

Last year Fred's son suggested a computer – a suggestion greeted by Fred with derision as he had no interest in arcade games and could see no real use for the instrument otherwise. Eventually he agreed to give it a try and a Commodore 64 and tape recorder were purchased for him. He also received the Introduction to Basic Part I and games of Chess and Snooker.

With the arrival of last winter Fred got busy on the instruction course and used the two games. The idea caught on and although the programming procedures were none too easy for a 75 year old to pick up he was making progress and found that by typing in programs published in various magazines with the consequent typing errors gave him a great fulfilment in tracing errors and thereby learning something of the theory side of computer programming. The long winter days flew and he was so involved that he would often not break off for a meal if he felt the solution of a problem to be imminent.

> To a disabled person unable to follow a normal life it is so easy to settle down in a chair, put on the television, and go to sleep – not from tiredness but from boredom. Computer work will stop this gradual decline to senility and will prove a real cause for looking forward to tomorrow's work or exercise.

In his experience there is only one shortcoming and that lies in operating in isolation. One often feels the need for another mind to examine a problem in this work and Computer Clubs could perform a valuable service if they had members who were ready and willing to call in on a housebound enthusiast to chat over the hobby and associated problems.

Fred will be very happy to see or correspond with anyone interested in this work and can be reached as follows:

Fred Harvey, 32 The Rookery, Beach Road, Selsey,
Chichester PO20 0LL
Telephone (0243) 603228"

Chapter Eleven

CURRENT RESEARCH

This is not a list of academic research papers relating to any one disability. It will hardly be of use to anyone studying for a higher qualification.

I include these papers simply in order to remind you that progress is being made in the development of approaches to disability and to aids to independence.

A glance at the list of research papers and organizations will show that there are people all over the world who have an interest in improving matters. There are dentists puzzling over the likely effects of using a mouthstick; there are social workers wondering how telephone networks can help disabled people; there are electrical engineers staring at sinusoidal waves on a screen.

Some of the work may seem rather ancient. I have included it here firstly to reassure you that experts have been thinking about your problems for some time and secondly because it is on these early foundations that current research is built.

If you would like to investigate further you will find these people helpful.

BARD *(British Database on Research into Aids for the Disabled)*
Handicapped Persons Research Unit
Newcastle-upon-Tyne Polytechnic
No 1 Coach Lane
Coach Lane Campus
Newcastle-upon-Tyne NE7 7TW

The Computer as an Aid for those with Special Needs
(Conference organized by: ACTIVE.)
Conference Papers from: Judy Denziloe, National Development Officer, Seabrook House, Wylloyotts Manor, Darkes Lane, Potters Bar, Herts EN6 2HL.

The Development of a Microcomputer-Based Teaching System for Severely Mentally Handicapped Individuals by Alastair Ager, Mental Handicap in Wales – Applied Research Unit, 44/46 Cowbridge Road East, Cardiff CF1 9DU.

Using Microcomputers with Less Able Pupils: Computers in the Classroom, John Woollard, Broom Field School, Leigh Park, Havant.

Reading, Writing and Dyslexia: A Cognitive Analysis – Andrew W Ellis (University of Lancaster).

Employment opportunities for physically disabled people in computing in Britain – June Stevenson. Brief research report – Int J Rehab Research, 1983, 6 (4), 483–485.
Author: Dr M J Stevenson, Faculty of Economic and Social Sciences, University of Manchester, Manchester M13 9PL.

Gliedman J (1979) The Wheelchair Rebellion, Psychology Today.

Lewis M J (1969) Libraries for the Handicapped (The Library Association).

National Innovations Centre (1974) Disabled Students in Higher Education (National Innovations Centre, London).

Tudor G (1974) Study problems of disabled students at the Open University, Teaching at a Distance, 9.

Weinberg W (1978) The unique learning needs of physically handicapped social work students, Journal of Education for Social Work, 1, pp 110–117.

Helping Students with a Disability Achieve their Academic Aims – David McConnell, Educational Services and Teaching Resources Unit, Murdoch University, Murdoch, Western Australia.
Studies in Higher Education Vol 6, No 1, 1981.

Australian Vice-Chancellors Committee (1979) Students with Handicaps (Canberra, Australia).

Biomet Sci Instrum 1983; 19:109–10.
Speech recognition for wheelchair control.

J Prosthen Dent 1983 Nov; 50(5): 681–4
Analysis of stress produced by a maxillary mouthstick prosthesis.

Live wires (Telephone networks for the disabled); Gibbons J in Social Work Today Feb 1984; 15(24):14–15.

First Internat Meeting on Leisure, Recreation and Sports for the Disabled (RESPO) (Apr 1984).
Contact: Yutaka Nakamura, RILRS Committee Chairman, c/o Japan Sun Industries, Kamegawa, Beppu OITA 847–01 Japan).
(Papers on uses of micros.)

Roehl, Janet, ed Proceedings of Discovery '83: Computers for the Disabled.
Conference co-sponsored by the Office of Continuing Education and Vocational Rehabilitation Institute, University of Wisconsin-Stout, and Closing the Gap, Sept 12-24 1983.

Vanderheiden, Gregg V. The Practical Use of Microcomputers in Rehabilitation. Rehab Lit Mar/Apr 1983 44:3–4:66–70.

Myers, Ware. Personal Computers Aid the Handicapped. IEEE Micro Feb 1982 26–39.

Nelson, Peter J, ed Computers and the Handicapped: Workshop Proceedings. Ottawa, Ontario: National Research Council of Canada, 1982.

Advances in Rehabilitation Through Technology: Computers and Electronic Aids for the Physically Disabled Person – Instructional Courses. Co-sponsored by the Rehab. Institute of Chicago and the Rehab. Engineering Program, Northwestern Univ., Chicago, Ill., Nov 11–12, 1982.

Micros in Special Education. Sponsored by the Council for Exceptional Children, Hartford, Conn., Mar 10–12, 1983.

Summary of Workshop on Computer Technology for the Disabled. Bul. Science & Technology for Handicapped. Apr, 1983. 3:2:1-3.

Proceedings of the IEEE Computer Society Workshop on Computing to Aid the Handicapped, Nov 4–5, 1982. Charlotte, Va.: IEEE Computer Society Press, 1983.

Selection and Application of Microcomputers for Physically Handicapped Individuals – An Instructional Course. Rehab. Engineering Society of North America, June 16–17, 1984, Ottawa, Ontario, Canada.

Hagen, Dolores Y. Microcomputer Resource Book for Special Education. Reston, Va.: Reston Publishing Co (USA).

Apple Computer, Inc Personal Computers for the Physically Disabled (brochure). Cupertino, Calif.: Apple Computer, (no date.)

Power to the Disabled: Microcomputers Help the Handicapped Help Themselves. Time Magazine. Dec 13, 1982. 76–78.

Special Issue: Microcomputers for the Visually Impaired. Link-and-Go. Nov, 1982. 5.
Special Issue: Views of Kids with Disability and Personal Computers. Link-and-Go. Mar, 1983. 6.

Experts have been thinking about your problems . . .

Computer Technology for the Handicapped. Workshop sponsored by the American Association for Advancement of Science and the Trace Research and Development Center, July 8–9, 1982, Univ. of Wisconsin, Madison, Wis.

Selections from Research into the uses of micros by deaf and hearing-impaired people.

Nickerson, R S and Stevens, K N Teaching speech to the deaf: can a computer help? IEEE Transactions on Audio and Electronics, 1973, 21, 445–455.

Boothroyd, A. et al. Use of a computer-based system of speech analysis and display in a remedial speech program for deaf children. VOLTA Review, 1975, 77, 178–193.

Nickerson, R S Computer aided speech training for the deaf. Journal of Speech and Hearing Disorders, 1976, 41, 120–132.

Dugdale, S and Vogel, P Computer-based instruction for hearing-impaired children in the classroom. American Annals of the Deaf, 1978, 123, 730–743.

Galbraith, G An interactive computer system for teaching language skills to deaf children. American Annals of the Deaf, 1978, 123, 706–711.

Arcanin, J Computer-Assisted Instruction at the California School for the Deaf – past, present and future: an administrator's view. American Annals of the Deaf, 1979, 124, 573–577.

Sewell, D F et al. Mini-computers as aids for assisting the linguistic development of deaf children. Teacher of the Deaf, 1979, 3, 36–41.

Sims, D et al. A pilot experiment in computer assisted speech-reading instruction utilizing the Data Analysis Video Interactive Device (DAVID). American Annals of the Deaf, 1979, 124, 616–623.

The 1982 Symposium (American Annals of the Deaf, Vol 127, No 5, Sept 1982) was specifically on Microcomputers in Education of the Hearing Impaired.

Withrow, M Illustrating language through computer generated animation. American Annals of the Deaf, 1979, 124, 549–552.

Arcanin, J and Zawolkow, G Microcomputers in the service of students and teachers: Computer Assisted Instruction at the California School for the Deaf: an update. American Annals of the Deaf, 1980, 125, 807–813.

Dolman, D English remediation and the older deaf student: the computer as a tool. American Annals of the Deaf, 1980, 125, 655–661.

Hoffmeyer, D Computer-Aided Instruction at the Florida School for the Deaf and the Blind. American Annals of the Deaf, 1980, 125, 834–840.

Levitt, H Computer applications in audiology and rehabilitation of the hearing impaired. Journal of Communication Disorders, 1980, 13, 471–481 (UK).

Parkhurst, B G and MacEachron, M P Computer-assisted analysis of written language: assessing the written language of deaf children. II. Journal of Communication Disorders, 1980, 13, 493–504.

Levitt, H and Newcomb, W Computer-assisted analysis of written language: assessing the written language of deaf children. Journal of Communication Disorders, 1978, 11, 257–277.

Craig, C H and Siegenthaler, N M Preliminary hearing aid selection by computer. Hearing Aid Journal, 1981, 34 (4), 8–9, 20.

Casey, K B Computer applications for the deaf and deaf-blind. Directions, 1981, 2(1), 69–71.

Bodanis, D The video voice game. Guardian, 1981, 4 June, 15. (Describes computer games for teaching deaf children to speak developed by IBM France in association with the Institut National de Jeunes Sourds, Paris.)

Brooks, S et al. Teaching vowel articulation with the Computer Vowel Trainer: methodology and results. British Journal of Audiology, 1981, 15, 151–163.

Osberger, M J et al. Computer-assisted speech training aid for the hearing impaired. Journal of the Academy of Rehabilitative Audiology, 1981, 14, 145–158.

McLeod, R Toward development of a computer programming ability in deaf pre-high-school students: a pilot study. American Annals of the Deaf, 1981, 126, 1010–1016.

Association for Computing Machinery. Special Interest Group on Computers and the Physically Handicapped. Proceedings of the National Conference on Computing Careers for Deaf People . . . 1975. New York: Association for Computing Machinery, 1976.

Gulian, E Computer-based aids, motor control and speech acquisition by the deaf. In Tobias, J V and Schubert, J D (eds) Hearing research and theory. Vol 1. New York: Academic Press, 1981. pp 143–164.

Mothner H and Shawn J Microcomputers are 'macrocontributors' to special education programs. American Annals of the Deaf, 1982, 127, 449–451.

Nickerson R S et al. Computers and speech aids. In Hochberg, I et al. (eds) Speech of the hearing impaired: research, training and personnel preparation.

Baltimore: University Park Press, 1983. pp 313–324. Conference collection.

Clarcq JR Technology: a tool to facilitate the career development and employment of hearing impaired individuals. Journal of Rehabilitation, 1983, 49(3), 31–34.

Computer based aids: mainly for improving the temporal and pitch phenomena of their utterences and thereby their general speech proficiency – Report by Corrine Adams in The Australian Teacher of the Deaf (Vol 23, 1982).

Jack R Clarcq: Technology: a tool to facilitate the career development and employment of hearing impaired individuals. Journals of Rehabilitation July/August/September 1983.

American Annals of the Deaf. September 1983. Symposium on Research and Utilization of Educational Media for teaching the Deaf.

The 31 articles dealing with micros range from

How to stop worrying and start loving the computer by Doin Hicks

to

A computer-assisted diagnostic and prescriptive tool for use in teaching speech to the deaf by Richard G Stoker.

Adams C A computer based aid for the teaching of prosodic features to the hearing impaired. Australian Teacher of the Deaf, 1982, 23, 61–62.

Conference for Heads of Schools and Services for Hearing-Impaired Children, Manchester, 1981. Report of proceedings. Manchester: Department of Audiology and Education of the Deaf, University of Manchester (1983). Some of the articles:

Hearing aid data retrieval from computers and its educational significance by G Holsgrove pp 65–69.

Computer studies at Thorn Park School with a group of profoundly hearing-impaired girls by J Stell. pp 70–74.

Our first year with a PET microcomputer using a microcomputer as a language teaching aid by J C Holdsworth, pp 75–83.

Ward, R and Arnold, P Computer assisted learning and deaf children's language. Teacher of the Deaf, 1982, 6, 172–174.

Fletcher, S G Seeing speech in real time: the deaf can now view tongue, jaw and other vocal-tract movements on a CRT display. IEEE Spectrum, 1982, 19, 46–49

Sargent, D C Rhythmic cues aid lipreaders. IEEE Spectrum, 1982, 19, 46–49.

Rose, S et al. Measuring creativity through computer graphics for hearing-impaired children. Perceptual and Motor Skills, 1983, 57, 943–950.

Cerf, D The electronic mailbox: a new communication tool for the hearing impaired. American Annals of the Deaf, 1978, 123, 768–772.

Watson, P The utilization of the computer with the hearing impaired and handicapped. American Annals of the Deaf, 1979.

A microcomputer communication game for hearing impaired students.

Arch Phys Med Rehabil 1984 Feb; 65(2): 89–91 Microcomputer based communication systems for two non-speaking, physically handicapped persons with severe visual impairment.

Research is also carried out at:

Donaldson's School for the Deaf, Research Unit, West Coates, Edinburgh EH12 5JJ.

The Open University (Disabled Students Area) has also produced research reports. The Director is Derek Child, himself visually impaired; he has contributed articles on disabled students to Teaching at a Distance, an Open University research publication.

eg. *Information Technology and the disabled student* in No. 24.

Bramer, M A (1980) Using computers in distance education: the first ten years of the Open University. CAL Research Group Technical Report No 1, Open University internal paper.

Vincent, T (1982) Computer-assisted support for blind students, Computers and Education, 6, pp 55–60.

Smith, S and Vincent, T (1983) A talking brailler, Insight, 4 (2), pp 35–37.

Other research

Flanagan, J L, Coker, C H, Rabiner, L R, Schafer, R W and Umeda, N (1970) Synthetic voices for computers, IEEE Spectrum, 7 (10), pp 22–45.

Physically disabled people living at home: a study of numbers and needs.
(Department of Health & Social Security Report on Health and Social Subjects 13 (1978)).

New South Wales Council for the Mentally Handicapped:
Proceedings of the Conference – the Intellectually Handicapped: Citizens or Non-Citizens? 1978.
A New Deal for People with an Intellectual Handicap 1983.

Helping Mentally Handicapped People with Special Problems.
Report of a DHSS Study Team. Department of Health and Social Security (1984).

The rehabilitation of the disabled: a challenge for the 80's. Exceptional Child. (Queensland) 1984 March; 31(1): 5–18.

Simple devices for the physically disabled. (Harrison. E & Vise G T Jnr). Paraplegia 1984 June; 22(3): 182–93.

Shworles T R The person with disability and the benefits of the microcomputer revolution: to have or to have not. Rehabil Lit 1983 Nov–Dec; 44 (11–12): 322–30.

Computer Technology for the handicapped in special education and rehabilitation: a resource guide. Nave.G. et al. International Council for Computers in Education, University of Oregon 1983.

Microcomputers in Occupational Therapy Departments of hospitals and day centers by P B Edidd & Eliz Grove. Brit Jnl of Occ Therapy Aug 1983.46:8:222.

Sign teacher: a microcomputer application for the teaching of sign language, by Kate E Grosman, James A Siders and Hugh P Garraway. American Annals of the Deaf. Sep 1983. 128:5:577–584.

DEAFNET – The word's getting around: Local implementation of telecommunications networks for deaf users. American Ann of the Deaf. Sep 1983. 128:5:613–618.

Employment of disabled persons: manual on selective placement. International Labour Office, London.

The handicapped and their employment: a statistical study of the situation in member states of the EEC. Luxembourg EEC (1983).

Computers in a day centre: Special Education/Forward Trends: Brit Jnl of Sp Educ. June 1983.10:2:10. (Advice on choosing and using micros.) Article by Tom Vincent. (Open University).

Research into the teaching of Mentally Handicapped people: some sources.

Manchester University Computer Science Department (Trevor Hawkins) PO Box 88, Sackville St, Manchester M60 1QD.
(Development work with BBC graphics, speech input and output and touch sensitive screens.)

Manpower Services Commission, Information Office, Selkirk House, High Holborn, London, WC1

Winston McClean, New University of Ulster, Coleraine, Co. Londonderry, BT52 1SA.
(Wideband speech output and light pen on BBC micro.)

Current approaches to Down's syndrome. Stratford B. & Lane D. (Eds) Holt-Saunders 1985.
(See the Chapter by Ms S Buckley entitled, Attaining basic education skills.)

Useful addresses
for further information

Department of Health & Social Security, Alexander Fleming House, Elephant & Castle, London SE1 6BY.

Director: Education, Training & Employment Services Dept, Royal Society for Mentally Handicapped Children & Adults, 123 Golden Lane, London EC1Y ORT.

British Institute for Mental Handicap, Wolverhampton Road, Kidderminster, Worcs DY10 3PP.

College of Speech Therapists, Harold Poster House, 6 Lechmere Road, London NW2.

Scottish Down's Children Association, 48 Govan Road, Glasgow.

Thomas Coram Foundation, 40 Brunswick Square, London WC1N 1AZ.

Family Service Units, 207 Old Marylebone Road, London NW1 5QP.

Health Education Council, 78 New Oxford Street, London WC1A 1AH.

Hester Adrian Centre, University of Manchester, Oxford Road, Manchester.

King's Fund Centre, 126 Albert Street, London NW1 7NF.

Assoc of Chartered Physiotherapists in Research
Hon Sec
Miss Catherine Van de Ven
Limb Fitting Centre
Roehampton Lane
London SW15

Research Dept
Health Services Research Unit
The University
Canterbury
Kent

Yes, I Can
Foundation for Exceptional Children
1920 Association Drive
Reston, Virginia
22091

R.N.I.B. Reference Library
Braille House
338–346 Goswell Road
London EC1V 7JE

(has an extensive collection of ink-print materials on all aspects of visual impairment [except for the purely medical]).

National Association for the Welfare of Children in Hospital,
7 Exton Street, London SE1 8UE.

National Council for Special Education,
1 Wood Street, Stratford on Avon, Warks, CV37 6JE.

National Society for Brain Damaged Children,
35 Larchmere Drive, Birmingham, B28 8JB.

National Association for Mental Health (MIND),
22 Harley Street, London W1N 2ED.

Welsh Office:
7 St Mary Street, Cardiff.

Northern Office;
4 Park Lane, Gateshead, Tyne & Wear, NE8 3LZ.

Yorkshire Office:
157 Woodhouse Lane, Leeds LS2 3EF.

Newcastle Aids Centre:
MEA House, Ellison Place, Newcastle-upon-Tyne NE1 8ST.

Work in progress

Mental Handicap in Wales – Applied Research Unit, The White Houses, 44/46 Cowbridge Road East, Cardiff CF1 9DU.

Research into potential uses of microcomputers in tackling the communications problem of aphasic children has been done by:
Dr Sheila Hollins, 8 The Farm, Princes' Way, Wimbledon, London W1N 2BA.

Goole Adult Training Centre – working with Apple II in producing material for use in education of the mentally handicapped.
Bob Hurst (Manager), Adult Training Centre, Rawcliffe, Goole, North Humberside.

Walsall Educational Development Centre have a Special Education Project. Software is being designed for children with moderate learning difficulties, those with physical handicaps and those with severe mental, or multiple handicaps.
Contact: Nick Dodds (Head of Centre), EDC, 36 Wolverhampton Road, Walsall, West Midlands.

(and see Chapter 8 for details of work being done at the Garth School, Spalding.)

Chapter Twelve

HELPFUL PEOPLE

Spinal Injuries Association
Yeoman House
76 St James's Lane
Muswell Hill
London N10 3DS

The Advocacy Alliance
115 Golden Lane
London EC1Y 0TJ

The Association of Residential Communities of the Retarded
PO Box 4
Lydney
Glos GL15 6ST

The Association of Parents of Vaccine Damaged Children
2 Church Street
Shipton-on-Stour
Warks CV36 4AP

The Association for all Speech Impaired Children
347 Central Markets
Smithfield
London EC1A 9NH

The Association for Spina Bifida & Hydrocephalus
Tavistock House North
Tavistock Square
London WC1H

Dr Barnardo's
Tanners Lane
Barkingside
Ilford
Essex IG6 1QG

Birmingham Multi-Handicap Group
(Parent and Relief Service)
Mrs McCorry
Stanhope Hall
Emily Street
Highgate
Birmingham

Mobility Allowance Department
DHSS
Norcross
Blackpool
Lancs

The Secretary
Breakthrough Trust (for Hard of Hearing)
103 Ridgeway Drive
Bromley
Kent BR1 5DB

The Secretary
British Association of the Hard of Hearing
7–11 Armstrong Road
London W3 7JL

The Secretary
Leonard Cheshire Foundation
7 Market Mews
London W1Y 8HP

The Secretary
Parkinson's Disease Society of the UK Ltd
81 Queens Road
London SW19 8NR

The Secretary
Partially Sighted Society
40 Wordsworth Street
Hove
East Sussex BN3 5BH

The Secretary
Psychiatric Rehabilitation Association
21a Kingsland High Street
Dalston
London E8

The Secretary
Royal Association in Aid of the Deaf and Dumb
7–11 Armstrong Road
London

The Secretary
Royal Commonwealth Society for the Blind
Heath Road
Haywards Heath
Sussex RH16 3AZ

The Secretary
St Dunstan's for Men and Women Blinded on War Service
PO Box 58
191 Old Marylebone Road
London NW1 5QN

The Secretary
British Rheumatism and Arthritis Association
6 Grosvenor Crescent
London SW1X 7ER

The Secretary
Camphill Village Trust Ltd
Delrow House
Aldenham
Watford
Herts WD2 8DJ

The Secretary
National Council of Social Service
26 Bedford Square
London WC1B 3HU

The Secretary
National Deaf-Blind Helpers' League
18 Rainbow Court
Paston Ridings
Peterborough PE4 6UP

The Secretary
Nuffield Foundation
Nuffield Lodge
Regent's Park
London NW1 4RS

The Secretary
Sue Ryder Foundation
Cavendish
Suffolk CO10 8AY

The Secretary
REACH
Victoria House
Southampton Row
London WC1B 4DH
(REACH offers unpaid jobs in charitable organisations to retired executives.)

The Secretary
Mental After Care Association
Eagle House
110 Jermyn Street
London SW1Y 6HB

Castle Priory College (The Spastics Society)
Thames Street
Wallingford
Oxon OX10 0HE

Head of Industrial Units
The Spastics Society
16 Fitzroy Square
London W1P 5HQ

Regions Development Advisor
The Spastics Society
12 Park Crescent
Regent's Park
London W1N 4EQ

Useful addresses in LONDON

Public Relations Department
Lloyds Bank PLC
71 Lombard Street
London EC3P 3BS
(Offers services for the visually handicapped)

Manpower Services Commission
Information Office
Selkirk House
High Holborn
London W1

GLAD
1 Thorpe Close
London W10 5XL

ARCH
33 St Johns Way
London N19

Association of Disabled Professionals
14 Birch Way
Warlingham
Surrey
(also)
Association of Disabled Professionals
The Stables
73 Pound Road
Banstead
Surrey SM7 2HW

Action for Disability
Kensington and Chelsea
67 Old Church Street
London SW3

Lambeth Council Personnel Officer
(Disablement)
18 Briton Hill
London SW2

Senior Research Officer
L B Southwark
Social Services
Castle House
2 Walworth Road
Camberwell
London SE1 6SS

Principal Officer
Research and Information
Social Services Department
L B Lewisham
Eros House
Brownhill Road
Catford
London SE6 2EG

Centre Manager
Aylesbury Day Centre
L B Southwark
Social Services
Castle House
2 Walworth Road
Camberwell
London SE1 6SS

Training Administrative Assistant
Training Section R817
Social Services Dept
City Hall
Victoria Street
City of Westminster SW1E 6QP

Inspector for Computer Education
London Borough of Bromley Education Dept
Civic Centre
Rochester Avenue
Bromley
London BR1 3UH

Departmental Disabled Persons Officer
Property Services Agency
Department of the Environment
Room 528, Lambeth Bridge House
Albert Embankment
London SE1

Opportunities for the Disabled
1 Bank Buildings
Princes Street
London EC2R 8EV

Director
Queen Elizabeth Training College
Leatherhead Court
Leatherhead
Surrey

RADAR
25 Mortimer Street
London W1N 8DB

Director
RNIB Training College
5 Penbridge Place
Notting Hill Gate
London W2

Royal Association in Aid of the Deaf and Dumb
27 Old Oak Street
London W3
10 New Fletter Lane
London EC4A 1AD

Inter Action
15 Willan Street
Kentish Town
London NW5

Mr John Grooms
Association for the Disabled
10 Gloucester Drive
Finsbury Park
London N4

Disability Information Service
Westminster
10 Warwick Road
London SW1

Headmistress
Grove Park School
Grove Park
Kingsbury
London NW9

Manager
Robson Avenue Centre
Robson Avenue
London NW10

Vocational Research Officer
Royal National Institute for the Blind
224 Great Portland Street
London W1N 6AA

Head Occupational Therapist
Central Middlesex Hospital
Acton Lane
London NW10 7NS

Senior Occupational Therapist
Haringey Soc Services Training Section
40 Cumberland Road
Wood Green
London N22 4SG

Occupational Therapist
London Hospital (Mile End)
Rancroft Road
Mile End
London E1

Head Occupational Therapist
Royal Borough of Kensington & Chelsea
Town Hall
Horton Street
London W8

Occupational Therapist
DHSS
Room 1116 Hannibal House
Elephant and Castle
London SE1 6TE

Occupational Therapist (Neurology)
Occupational Therapy Dept
Maida Vale Hospital
London W9 1TL

Head Occupational Therapist
Victoria Health Authority
40 Adler Street
London E1 1EE

Occupational Therapist
Islington Social Services
345 Holloway Road
Holloway
London N7

Head Occupational Therapist
The Royal Star and Garter Home
Richmond Hill
Richmond
Surrey TW10 6RR

International Spinal Research Trust
Strand House
London

Assistant Research Officer
Social Services Dept
Ednam house
1 St James Street
London

S N O, Psych/Ment Handicap
St Annes Hospital
St Annes Road
Haringey
London N15 3TH

London Group of Workers with the Deaf
Esher Social Services
42/46 High Street
Esher
Surrey

UNITY 70
Winchmore Pavilion
Highfield Road
N21 3HD

Area Office
L B Hillingdon
Social Services
126/130 High Street
Ruislip
Middlesex HA4 8LP

Senior Programmer
British Telecommunications
Training Centre
181a High Holborn
London WC1V 7AP

The Secretary
Disabled in Camden
7 Crowndale Road
London NW1 1TV

John McCann
IT/Disabled
Department of Industry
29 Bressendon Place
London SW1

J F Northcott
Director, Microprocessor Applications
Policy Studies Institute
2 Castle Lane
Victoria
London SW1E 6DR

Help and Advice.

Useful organizations

The Secretary
Age Concern
60 Pitcairn Road
Mitcham
Surrey CR4 3LL

The Secretary
British Deaf Association
38 Victoria Place
Carlisle
Cumbria CA1 1HU

The Secretary
British Polio Fellowship
Bell Close
West End Road
Ruislip
Middlesex HA4 6LP

The Secretary
Lady Hoare Trust for Physically Disabled Children
7 North Street
Midhurst
West Sussex GU29 9DJ

The Secretary
Lingfield Hospital School
St Piers Lane
Lingfield
Surrey

The Secretary
Multiple Sclerosis Society of Gt Britain and N Ireland
4 Tachbrook Street
London SW1V 1SJ

The Secretary
Muscular Dystrophy Group of Gt Britain
Nattrass House
35 Macaulay Road
London SW4 0QP

The Secretary
King's Fund Centre
126 Albert Street
London NW1 7NF

National Fund for Research into Crippling Diseases
Vincent House
North Parade
Horsham
Surrey RH12 2DA

Play Matters
Seabrook House
Wyllyotts Manor
Darkes Lane
Potters Bar
Herts EN6 2HL

Royal National Institute for the Blind
224 Great Portland Street
London W1N 6AA

Royal National Institute for the Deaf
105 Gower Street
London WC1E 6AH

Royal Society for Mentally Handicapped Children & Adults
123 Golden Lane
London EC1Y 0RT

The Spastics Society
12 Park Crescent
London W1N 4EQ

DIAL UK HQ
Victoria Buildings
117 High Street
Clay Cross
Derbyshire

Down's Children's Association
4 Oxford Street
London W1

In Touch
Mrs A P Worthington
10 Norman Road
Sale
Cheshire M33 3DF

MIND (National Assn for Mental Health)
22 Harley Street
London W1N 2ED

National Assn for Deaf-Blind and Rubella Handicapped
311 Gray's Inn Road
London WC1X

National Bureau for Handicapped Students
40 Brunswick Square
London WC1N 1AZ

National Children's Bureau
8 Wakeley Street
London EC1N 7QE

National Deaf Children's Society
45 Hereford Road
London W2 5AH

National Society for Autistic Children
1a Golders Green Road
London NW11 8EA

National Federation of Gateway Clubs
MENCAP Centre
123 Golden Lane
London EC1Y 0RT

British Sports Association for the Disabled
Ludwig Guttmann Sports Centre
Harvey Road
Aylesbury
Bucks

Campaign for Mentally Handicapped People
16 Fitroy Square
London W1P 5HQ

Centre on Environment for the Handicapped
126 Albert Street
London NW1 7NF

Contact a Family
16 Strutton Ground
Victoria
London SW1P 2HP

British Epilepsy Association
Crowthorne House
New Wokingham Road
Wokingham
Berks RG11 3AY

British Institute of Mental Handicap
Wolverhampton Road
Kidderminster
Worcs DY10 3PP

Department of Health & Social Security
Alexander Fleming House
Elephant and Castle
London SE1 6BY

Disabled Living Foundation
346 Kensington High Street
London W14 8NS

Disability Alliance
25 Denmark Street
London WC2H 8NJ

Information Services in the UK

Scottish Region:

DIAL, Dumfries and Galloway, Loreburn Hall, Newall Terrace, Dumfries.
Tel: (0387) 65599.

DIAL, Preston Centre, Glenrothes, Fife.
Tel: (0592) 753891.

DIAL, Braid House, Morriss Square, Almondvale, Livingstone, West Lothian.
Tel: (0589) 414472.

Northern:

Rehabilitation Information Service, The Information Centre, Middlesbrough General Hospital, Middlesbrough TS5 5AZ.
Tel: (0642) 813133 ext 133.

DIAL, Mea House, Ellison Place, Newcastle NE1 8XS.
Tel: (0632) 32617.

DIAL, 241 Southwick Road, Sunderland.
Tel: (0783) 492844.

Yorkshire:

DIAL, 103 Dockfield Road, Shipley, West Yorkshire BD17 7AR.
Tel: (0274) 594173.

Hull Disability Rights Advisory Service, Crown Chambers, Land of Green Ginger, Hull HU1 2EN.
Tel: (0482) 226234.

DIAL, Central Library, Walker Place, Rotherham.
Tel: (0709) 73658.

DIAL, Park Grange, 100 Park Grange Road, Sheffield S2 3RA.
Tel: (0742) 27996.

North West:

DIAL, 372 High Street, Bangor, Gwynedd.
Tel: (0248) 52197.

DIAL, Mill Hill Day Centre, Mill Hill, Blackburn, Lancs.
Tel: (0254) 64004.

DIAL, Whitegate Day Centre, Whitegate Drive, Blackpool FY3 9JL.
Tel: (0253) 692030.

Disabled Advisory Service, 12 St George's Court, Unsworth, Bury.
Tel: 061-796 7077.

Children's Communication Aids Centre, Park Dean School, Oldham.

Midlands:

Handicapped Children's Information Service, 260 Broad Street, Birmingham B1 2HF.
Tel: 021-643 6267.

DIAL, Cressy Fields, Cressy Road, Alfreton, Derbyshire.
Tel: (0773) 833220.

DIAL, Medical Aid Department, 76 Clarendon Park Road, Leicester LE2 3AD.
Tel: (0533) 700666.

Nuneaton & Bedworth Council for the Disabled, 17 Newton Road, Weddington, Nuneaton, Warwicks.
Tel: (0682) 349954.

Home Counties:

DIAL, 90 Broomfield Road, Chelmsford, Essex CM1 1SS.
Tel: 87177.

DIAL, Aneurin Bevan Centre, Garden Terrace Road, Harlow, Essex.
Tel: (0279) 412020.

Greater London and the South:

Advice & Rights Centre for the Handicapped, St John's Day Centre, 113 St John's Way, London N19 3RS.
Tel: 01-263 8622.

Disablement Advice Service, Atheldene Centre, 305 Garrett Lane, London SW18.
Tel: 01-870 7437.

DIAL, 7 Victoria Road, Canterbury, Kent.
Tel: 50001.

Portsmouth DIAL, Disabled Living Centre, Prince Albert Road, Southsea PO4 9HR.
Tel: (0705) 824853 & 829329.

Help for Health, South Academic Block, Southampton General Hospital, Southampton SO9 4XY.
Tel: (0703) 777222 ext 3753.

South West:

Disabled Advice Centre, 127 Pembroke Road, Clifton, Bristol 8.
Tel: (0272) 733282.

The Disabled Persons Information Centre, 45 Park Place, Cardiff CS1 3BB.
Tel: (0222) 398058.

DIAL, 8 Albermarle Road, Taunton, Somerset.
Tel: (0823) 78067.

Useful people and organizations (each of these organizations would appreciate a stamped, addressed envelope)

Roger Jefcoate, Willowbrook, Swanbourne Road, Mursley, Milton Keynes, Bucks MK17 0JA.
(Gives advice and help on the practical applications of electronic technology; runs a loan service of microelectronic aids, publishes a regular information sheet and organises conferences and courses.)

Information on Disablement Electronic Aids, Reference Service (DEARS) from:
Miss H M Townley, 117 Wickham Chase, West Wickham, Kent BR4 0BQ.

Disabled Living Foundation, 346 Kensington High Street, London W14 8NS.

Active:
(Organisation which aims to produce easy to make and inexpensive toys and aids, by bringing together the skills of disabled people, parents of handicapped children, designers and other professionals.)

Seabrook House, Wyllotts Manor, Darkes Lane, Potters Bar, Herts EN6 2HL.

Schools Computer Development Centre (SCDC):
Birchover Road, Bilborough, Nottingham.

ACE (Aids, Communication and Electronics):
The Secretary, Group for Technology and Disability, Neath Hill Professional Workshop, 1 Fletchers Mews, Neath Hill, Milton Keynes, Bucks.
(Publishes a quarterly newsletter and acts as a clearing house for information on the design and effectiveness of aids.)

Help and advice is offered by:

British Computer Society

The British Computer Society's Committee for the Disabled was formed, initially as a specialist group, on the initiative of a group of disabled programmers, drawn mainly from the Oakwood Centre for Spastics at Kelvedon, near Colchester. They felt that computing provided excellent opportunities for the employment of the severely disabled, but that employers and potential disabled employees needed to be informed of the opportunities and encouraged to make use of them.

Contact: BCS Information Officer, 13 Mansfield Street, London W1M 0BP.

Open University

The Open University offers distance study learning packs for the RML and BBC machines. For details of OU courses and/or materials, write to:

Associate Student Central Office, The Open University, Walton Hall, Milton Keynes.

"Computerfax, A Guide to BBC and Open University Resources in Computing, 1983"
Broadcasting Support Services, PO Box 7, London W3 6XJ.

Schools Council Project – Computers in the Curriculum
Chelsea College, University of London, Educational Computing Section, 552 Kings Road, London SW10 0UA.

Tecmedia Ltd, 5 Granby Street, Loughborough, Leics LE11 3DU.
(Training materials produced for MEP, funded by DTI.)

Department of Trade and Industry
Education Unit, Ashdown House, 123 Victoria Street, London SW1E 6RB.

National Extension College
Department 44, 18 Brooklands Avenue, Cambridge CB2 2HN.

Notting Dale Technology Centre,
191 Freston Road, London W10.

AUCBE (Advisory Unit for Computer Based Education)
Endymion Road, Hatfield, Herts AL10 8AU

CEDAR (Computers in Education as a Resource)
Imperial College Computer Centre
Exhibition Road, London SW7 2BX

CET (Council for Educational Technology)
3 Devonshire Street, London W1N 2BA
(Publishes information sheets on microelectronics and education as well as a catalogue of resources; *see their Guidelines in Chapter 9.)*

The Bliss Symbol Resource Centre (UK)
South Glamorgan Institute of Higher Education
Western Avenue, Llandaff, Cardiff CF5 2YB

Foundation for Communication for the Disabled
c/o Microwriter Ltd
31 Southampton Row, London WC1B 5HJ

Hereward College of Further Education
Bramston Crescent, Tile Hill Lane, Coventry CV1 9SW
(Microelectronics Resource Centre)

REMAP (Rehabilitation Engineering Movement Advisory Panel)
Groups throughout the country who give help with aids either mechanical, electrical or electronic. For details of your local group contact the SEMERC or:
The Secretary, 25 Mortimer Street, London W1

Newcastle Handisystem
Department of Medical Physics
Newcastle General Hospital, Newcastle-upon-Tyne
(This consists of a suite of programs to enable the severely handicapped person to perform a number of tasks using an Apple II micro.)

ILEA Resource Centre for Motor and Associated Handicaps
Charlton Park School, Charlton Park Road, London SE7 8HX

Manufacturers and Suppliers

Concept Keyboard manufacturer:
Star Microterminals
22 Hyde Street, Winchester, Hampshire SO23 7DR

Educational software for Concept Keyboard:
Ian Glen (Headteacher)
Brays School, Brays Road, Sheldon, Birmingham B26 1NS

General purpose touchboard:
Star Devices
PO Box 21, Unit 21, Mill Lane, Newbury, Berkshire

Canon Communicator manufacturers:
Canon (UK) Ltd
Waddon House, Stafford Road, Croydon CR9 4DD

Manufacturer of the Edinburgh Masker:
Findlay Irvine Limited
Bog Road, Penicuik, Scotland

Turtle manufacturer:
Jessop Microelectronics
Unit 5, 7 Long Street, London E2 8HN

Sound Bubble manufacturer:
Deron Electronics
Unit 7, New Enterprise Workshops, Albion Road, Byker, Newcastle NE6 1LQ

Manufacturers of the Kursweil Reading machine:
Omnifont International Limited
12 High Street, Chalfont St Giles, Bucks HP8 4QA

Manufacturers of SPLINK:
Tools for Living
PO Box 13, Goldaming, Surrey GU7 1TA

Supplier of Telecom Gold:
British Telecom
PSS Marketing, 1 Swan Lane, London EC4R 3TH

Sue Harris, ACORN Customer Services, ACORN Computers Limited, Cambridge
Technopark, 645 Newmarket Road, Cambridge CB5 8PD
Has a file of information which includes details of "control aids" which enable people with a wide variety of disabilities to control a micro if the standard keyboard is not suitable. Also has information on sources of specialist software, adapted keyboards and input aids, speech synthesis for the blind and BBC controlled physiotherapy equipment.

Useful addresses in Europe

Irish Republic

Health, Department of (An Roinn Slainte)
Custom House
Dublin 1

Social Welfare, Department of (An Roinn Leasa Shoisialiagh)
Aras Mhic Dhiarmada
Dublin 1

ARM (Association for the Rights of the Mentally Handicapped)
53 Avondale Lawn
Blackrock
Co Dublin

Disabled Persons Action Group
8 Charlemont Street
Dublin 2

Irish Association for Spina Bifida and Hydrocephalus
Ground Floor
Joseph Plunkett Tower
Ballymun
Dublin 11

Irish Epilepsy Association
249 Crumlin Road
Dublin 12

Irish Wheelchair Association
"Arus Chuchulain"
Blackheath Drive
Clontarf
Dublin 3

The Mental Health Association of Ireland
2 Herbert Avenue
Merrion Road
Dublin 4

National Association for the Mentally Handicapped of Ireland (NAMHI)
5 Fitzwilliam Place
Dublin 2

St Michael's House
(Association of Parents and Friends of Mentally Handicapped Children)
Willowfield Park
Goatstown
Dublin 14

The Union of Voluntary Organisation for the Handicapped
29 Eaton Square
Monkstown
Co Dublin

Federal Republic of Germany

Bundesarbeitsgemeinschaft Hilfe fur Behinderte
Kirchenfeldstrasse 149
4000 Dusseldorf 1
(Federal Association of Help for the Handicapped)

Bundesverband Legasthenie e. V.
Lutherstrasse 14
3000 Hannover 1
(Federal Assocation of Congenital Alexia)

Deutsche Gesellschaft der Forderung der Hor-Sprach-Geschadigten e. V.
Bernadottestrasse 126
2000 Hamburg 52
(German Society for the Assistance of Persons with Impaired Hearing and Speech)

Bundesvereinigung Lebenshilfe fur geistig Behinderte e. V.
Raiffeisenstrasse 18
3550 Marburg/Lahn 7
(Federal Association of Help for the Mentally Handicapped)

Deutsches Taubblindenwerk
Albert-Schweitzer-Hof 27
2000 Hannover 71
(German Organisation of Dumb–Blind Persons)

Deutscher Blindenverband e. V.
Bismarckallee 30
5300 Bonn 2
(German Association of the Blind)

Deutsche Gesellschaft "Bekampfund der Muskelkrankheiten" e. V.
Hohenzollernstrasse 11
7800 Freiburg im Brsg.
(German Society "War on Muscular Diseases")

Arbeitsgemeinschaft Spina Bifida und Hydrocephalus e. V.
Kaiserstrasse 6
5750 Minden
(Spina Bifida and Hydrocephalus Assocation)

Bund zur Forderung Sehbehinderter e. V.
Kirchfeldstrasse 149
4000 Dusseldorf 1
(Federation for the Assistance of Persons with impaired Eyesight)

Bundesverband fur Spastisch Gelahmte e. V.
Kolner Strasse 375
4000 Dusseldorf 13
(Federal Association for the Spastically Paralysed)

Bundesverband "Hilfe fur das autistische Kind" e. V.
Bebelallee 141
2000 Hamburg 60
(Federal Association "Help for the Autistic Child")

Bundesverband zur Forderung Lernbehinderter e. V.
Kerpener Strasse 157–163
5014 Kerpen 3
(Federal Association for the Assistance of Persons with Learning Handicaps)

Belgium

Nationale Vereniging
voor Hulp aan Verstandelijk Gehandicapten
Bosstraat 13
1050 Brussels

International League of Societies for Persons with Mental Handicap
13 rue Forestiere
B-1050 Brussels

France

Associations pour handicapes mentaux:

Union Nationale des Associations de Parents d'Enfants inadaptes (UNAPEI)
15 rue Coysevox – 75018 Paris

Comite d'Etudes et de Soins aux Arrieres Profonds de la Region Parisienne (UNAPEI)
81 Rue Saint Lazare – 75009 Paris

Groupment de Recherches Practiques pour l'Enfance
13 rue Allard – 94160 Saint Mande

Bureau d'Etudes et de Recherches (BER)
69 rue Blanche – 75018 Paris

Office Chretien des Handicapes
11 rue Francois Monthon – 75738 Paris Cedox 15

Federation Française d'Education par le Sport des Personnes Handicapes Mentales
182 rue Raymond Sarserand – 7501 Paris

Eclaireuses Eclaireurs de France
66 Chaussee d'Antin – 75009 Paris

Association de Volontaires pour la Cooperation Franco amencaine au Service des Inadaptes Mentaux (FAVA)
28 Boulevard du Temple – 75011 Paris

Netherlands

The National Council on the Care of the Mentally Retarded
(L.O.2)
PO Box 415
3500 AK Utrecht

The Netherlands Rehabilitation Association
(N.V.R.)
PO Box 323
3500 AH Utrecht

National Social Welfare Council
Eisenhower Room 146
2517 KP The Hague

Cerebral Palsy Association
PO Box 457
2501 CL The Hague

Dutch Sports Association for the Mentally Handicapped
Koninginnegracht 101
2514 AL The Hague

NORTH AMERICA

Canada

Canadian Federation of Sports Organisations for the Disabled
333 River Road
Tower A, 11th Floor
Vanier
Ontario K1L 8B9

Adult Cerebral Palsy Institute of Metro Toronto
Bellwoods Park House
300 Shaw Street
Toronto M6J 2X2

Association pour deficients mentaux
(region de Quebec)
525 Boulevard Wilfred Hamel est
Quebec G1M 2S8

B.C. Mental Retardation Institute at U.B.C.
Bob Berwick Memorial Centre
2765 Osoyoos Crescent
Vancouver V6T 1X7

Canadian Association for Children and Adults with Learning Disabilities
Kildare House
323 Chapel Street
Ottowa K1N 7Z2

Provincial Associations:

Alta. Association for Children and Adults with Learning Disabilities
1103 Baker Centre
10025–106 Street
Edmonton T5J 1G9

B.C. Association for Children and Adults with Learning Disabilities
980 W 21st Avenue
Vancouver V5Z 1Z1

Man. Association for Children with Learning Disabilities
1070 Clifton Street, Room 5
Winnipeg R3E 2T7

N.B. Association for Children with Learning Disabilities
c/o E W Kraglund
101 Tartan Street
Saint John, N.B. E2K 4G9

N.W.T. Association for Children and Adults with Learning Disabilities
Box 242
Yellowknife, N.W.T. XDE 1H0

N.S. Association for Children with Learning Disabilities
c/o Marilyn Marcon
PO Box 932
Sydney, N.S. B1P 6G4

Ontario Association for Children with Learning Disabilities
1901 Yonge Street
Ste. 504
Toronto M4S 2Z3

P.E.I. Association for Children with Learning Disabilities
c/o Nell Smith
41 St Claire Avenue
Charlottetown, C1A 2C7

Quebec Association for Children with Learning Disabilities
(Assoc Quebecoise pour les enfants ayant des troubles d'apprentissage)
1181 rue de la Montagne
Montreal H3G 1Z2

Sask. Association for Children with Learning Disabilities
c/o Carolyn Blackwell
258 East Place
Saskatoon, Sask. S7J 2X9

Yukon Association for Children with Learning Disabilities
c/o Joan Craig
32 Sunset Drive
Whitehorse, Y1A 4M8

Canadian Association for the Mentally Retarded
Kinsmen NIMR Building
York University
4700 Keele Street
Downsview
Ontario M3J 1P3

Divisional Headquarters
46–825 Sherbrooke Street
Winnipeg R3A 1M5

107 Queen Street
Moncton, N.B. E1C 1K5

45 Aldernay Drive
Ste. 915
Dartmouth, N.S. B2Y 2N6

155, 1200 W. 73rd Avenue
Vancouver, V6P 6G5

11728 Kingsway Avenue
Edmonton T5G 0X5
Telephone: (403)451–3055

3031 Louise Street
Saskatoon
Sask. S7J 3L1

1376 Bayview Avenue
Toronto M4G 3A3

1193 Place Phillips
Ste. 3950
Montreal H3B 3E1

Box 280
Charlottetown C1A 7K5
Box 4489
St John's
Nfld. A1C 6C8

Metro Toronto Association for the Mentally Retarded
8 Spadina Road
Toronto M5R 2S7

Montreal Association for the Mentally Retarded
8605 Berri Street
Ste. 300
Montreal H2P 2G5

National Institute on Mental Retardation
4700 Keele
York University
Kinsmen Building
Downsview
Ontario M3J 1P3

Yukon Association for Special Needs People
Box 4853
Whitehorse, Y.T. Y1A 4N8

United States of America

Accreditation Council for Services for Mentally Retarded and Other Developmentally Disabled Persons
5101 Wisconsin Avenue
N W Suite 405
Washington DC 20016

American Association of University Affiliated Programs for the Developmentally Disabled
1234 Massachusetts Avenue, NW
Washington DC 20005

Association for Children with Retarded Mental Development
817 Broadway
New York
NY 10003

Association for Retarded Citizens
2501 Avenue, J
Arlington
TX 76011

Down's Syndrome Congress
1640 W Roosevelt Road
Chicago
IL 60608

Down's Syndrome International
11 N 73rd Terrace, Room K
Kansas City
KS 66111

Institute for Comprehensive Planning
PO Box 185
Valparaiso
IN 46383

Little City Foundations
4801 W Peterson Avenue
Chicago
IL 60646

Mental Retardation Association of America
211 E 300 South Street
Suite 212
Salt Lake City
UT 84111

National Association of Developmental Disabilities Councils
1234 Massachusetts Avenue
NW Suite 203
Washington DC 20005

National Association for Down's Syndrome
PO Box 63
Oak Park
IL 60303

National Association of Private Residential Facilities for the Mentally Retarded
6269 Leesburg Pike
Suite B–5
Falls Church
VA 22044

National Association of State Mental Retardation Program Directors
113 Oronoco Street
Alexandria
VA 22314

National Down's Syndrome Society
146 E 57th Street
New York
NY 10022

Parents of Down's Syndrome Children
c/o Montgomery County Association for Retarded Citizens
11600 Nebel Street
Rockville
MD 20852

SHARE Inc
PO Box 1342
Beverley Hills
CA 90213

Young Adult Institute and Workshop
460 W 34th Street
New York
NY 10001

Paraplegic and Quadraplegic Assoc of NSW
833 King Georges Road
Hurstville, 2220
Australia

Asthma Foundation of New South Wales
249 Pitt Street
Sydney, 2000
Australia

Autistic Children's Association of NSW
41 Cook Street
Forestville, 2087
Australia

Royal NSW Institute for Deaf and Blind Children
111 Chandos Street
St Leonards, 2065
Australia

Down's Syndrome Association of NSW
PO Box 2365
North Parramatta, 2150
Australia

The Epileptic Welfare Association
158 Pacific Highway
North Sydney, 2060
Australia

Specific Learning Difficulties Assoc of NSW (SPELD)
PO Box 94
Mosman, 2088
Australia

Assoc for Children with Learning Disabilities
Suite 1
21–3 Belmore Street
Burwood, 2134
Australia

Cystic Fibrosis Association of NSW
21 Belmore Street
Burwood, 2134

National Acoustic Laboratories Hearing Centres
77 York Street
Sydney 2000

Shepherd Centre
Raglan Street
Darlington 2008

Federation for Junior Deaf Education
122 Harrington Street
Sydney 2000

Division of Guidance and Special Education
New South Wales
Department of Education
PO Box 415
North Sydney 2060

The New South Wales Council on the Ageing
34 Argyle Place
Sydney 2000

The Association for Welfare of Children in Hospital
80 Phillip Street
Parramatta 2150

Community Liaison Unit
Intellectual Handicap Branch
Queensland Department of Health
Legacy House
56 Mary Street
Brisbane, QLD 400

Slow Learning Children's Group of WA (Inc)
1305 Hay Street
West Perth, WA 6005

The Muscular Dystrophy Assoc of NSW
80 Wellington Road
East Lingfield, 2070
Australia

NSW Society for Crippled Children
Chalmers Street
Surrey Hills, 2010
Australia

Amputee Children's Society
47 Carvers Road
Oyster Bay, 2225
Australia

Royal Blind Society of NSW
4 Mitchell Street
Enfield, 2136
Australia

Spina Bifida Assoc of NSW
PO Box 15
Carlingford, 2118
Australia

Health Commission of NSW
McKell Building
Rawson Place
Sydney, 2000
Australia

Federation for Junior Deaf Education
32 York Street
Sydney, 2000
Australia

The Hyperactivity Association
29 Bertram Street
Chatswood, 2067
Australia

ACT Assoc for the Retarded Handicapped Citizens' Assoc
PO Box 636
Fyshwick
ACT 2609
Australia

ACT Council of Social Service
PO Box 195
Civic Square
Canberra
ACT 2601
Australia

AAMR (SA Branch) Inc
1/8 Nora Street
Maylands
SA 5069
Australia

Action for Intellectually Handicapped Citizens
PO Box 26
Wollahra
NSW 2030
Australia

Adelaide Work Preparation Centre
155 Holbrooks Road
Underdale
SA 5032
Australia

Association for Handicapped Citizens
33 Pacific Highway
Waitara
NSW 2077
Australia

Assoc of Sheltered Workshops of NSW
17/4 Selems Parade
Revesby
NSW 2212
Australia

Australian Assoc for the Mentally Retarded
GPO Box 647
Canberra
ACT 2601
Australia

Australian Assoc for the Mentally Retarded (SA Branch)
PO Box 229
Stepney
SA 5069
Australia

Autistic Children's Assoc (NSW)
PO Box 18
Chatswood
NSW 2067
Australia

Commonwealth Rehabilitation Service
295 Ann Street
Brisbane
QLD 4000
Australia

Commonwealth Rehabilitation Service
Custom Credit House
83 Smith Street
Darwin
NT 5790
Australia

Commonwealth Rehabilitation Service
Mt Newman House
200 St George Terrace
Perth
WA 6000
Australia

Commonwealth Rehabilitation Service
240 Currie Street
Adelaide
SA 5000
Australia

Commonwealth Rehabilitation Service
193 Liverpool Street
Hobart
TAS 7000
Australia

Commonwealth Rehabilitation Service
117 Clarence Street
Sydney
NSW 2000
Australia

Commonwealth Centre
Corner Spring and Latrebe Streets
Melbourne
VIC 3000
Australia

Community Liaison Unit
Intellectual Handicap Branch
Queensland Dept of Health
Legacy House
56 Mary Street
Brisbane
QLD 400
Australia

Department of Health
81 Smith Street
Darwin
NT 5790
Australia

Developmental Disabilities Section
NSW Health Commission
McKell Building
Rawson Place
Sydney
NSW 2000
Australia

Disabled Persons Resource Centre of NSW
323 Castlereagh Street
Sydney
NSW 2000
Australia

Div for Intellectually Handicapped Mental Health Services
WA Dept of Health
53 Ord Street
West Perth
WA 6005
Australia

Down's Children Inc
PO Box 65
Burnside
SA 5066
Australia

Endeavour Foundation
PO Box 40
Newstead
Queensland 4006
Australia

Family Education Unit
PO Box 229
Ryde
NSW 2112
Australia

Granville Work Preparation Centre
1 Cowper Street
Granville
NSW 2142
Australia

Handicapped Citizens' Assoc Act Inc
PO Box 636
Fyshwick
ACT 2609
Australia

Handicapped Persons' Assoc of the Northern Territory Inc
PO Box 37363
Winnellie
NT 5789
Australia

Intellectual Handicap Section
Capital Territory Health Commission
GPO Box 825
Canberra
ACT 2601
Australia

Intellectual Handicap Services Branch
Queensland Dept of Health
Legacy House
56 Mary Street
Brisbane
QLD 4000
Australia

Intellectually and Physically Handicapped Children's Assn (NSW)
88 Gloucester Road
Hurstville
NSW 2220
Australia

Intellectually Disabled Services Council
127 Greenhill Road
Unley
SA 5061
Australia

L'Arche Australia
PO Box 261
Burwood
NSW 2134
Australia

Mental Health Services Commission
141 Hamden Road
Hobart
Tasmania 7000
Australia

Mental Retardation Division
Health Commission of Victoria
GPO Box 4056
Melbourne
Victoria 3001
Australia

NSW Council for the Mentally Handicapped
8/118 Pacific Highway
Greenwich
NSW 2065
Australia

NT Dept of Community Development
PO Box 3369
Darwin
NT 5794
Australia

New South Wales Council of Social Service
34 Liverpool Street
Sydney
NSW 2000
Australia

Queensland Council of Social Service
97 Wickham Street
Fortitude Valley
QLD 4006
Australia

SA Institute of Developmental Disabilities
Underdale Campus
Holbrooks Road
Underdale
SA 5032
Australia

Slow Learning Children's Group of WA (Inc)
1305 Hay Street
West Perth
WA 6005
Australia

South Australian Council of Social Service
194 Morphett Street
Adelaide
SA 5000
Australia

South Yarra Work Preparation Centre
44 Claremont Street
South Yarra
VIC 3141
Australia

St John of God Training Centre
Kendall Grange
Morisset
NSW 2264
Australia

Star Victoria Association for Retarded Citizens
55 Victoria Parade
Collingwood
Victoria 3066
Australia

Tasmanian Council of Social Services
206 Elizabeth Street
Hobart
Tasmania 7000
Australia

The Hospitaller Order of St John of God
PO Box 261
Burwood
NSW 2134
Australia

The Mentally Incurable Children's Association
462 Great Eastern Highway
Redcliffe
WA 6104
Australia

The Retarded Citizens' Welfare Association of Tasmania Inc
GPO Box 1385P
Hobart
Tasmania 7001
Australia

The Subnormal Children's Welfare Association
PO Box 229
Ryde
NSW 2112
Australia

Victorian Council of Social Service
290 Wellington Street
Collingwood
Victoria 3066
Australia

Western Australian Council of Social Service
11 Freeman Road
Mt Lawley
WA 6050
Australia

Manufacturers in Australasia

Wormald International Sensory Aids Ltd
PO Box 3044
Christchurch
New Zealand

Wormald International Sensory Aids
Suite 1
Ascalon Building
22a Hunter Street
Parramatta, NSW 2150
Australia

New Zealand

Adult Cerebral Palsy Society Inc
(Secretary – Mrs C Crawford)
3/8 Peer Street
Christchurch 4

New Zealand Epilepsy Association Inc
National Secretary
Box 683
Hamilton

New Zealand Federation for Deaf Children Inc
National Secretary – Mrs M Gunn
1 Kirkwood Avenue
Christchurch 4

New Zealand Society for the Intellectually Handicapped Inc
National Director
Box 4155
Wellington

Laura Fergusson Trust for Disabled Persons
Director
Trust Board
Box 17–045
Greenlane
Auckland

Director-General
Department of Social Welfare
Private Bag
Wellington

Director-General
Department of Health
PO Box 5013
Wellington

Director-General
Department of Education
Private Bag
Wellington

The Secretary
Accident Compensation Commission
Private Bag
Wellington

Additional help available in Australia

Australian Council for Rehabilitation of Disabled (ACROD)
Head Office: 33 Thesiger Court, Deakin, ACT 2600 Tel: (062)84-4333
Branches:
N.S.W.: PO Box 185, Epping, NSW. 2121 Tel: (02)804-488

Victoria: Ms Lindsey MacMillan c/o Association for the Blind, 7 Mair Street, Brighton Beach, Victoria 3188 Tel: (03)598-8555

Queensland: Mr Colin Lamont, PO Box 123, East Brisbane, Queensland 4169 Tel: (07)356-8255

South Australian: Bedford Industries Rehabilitation Association, PO Box 20, Daw Park, SA 5041 Tel: (08)277-1888

West Australia: Mr Barry Lefort (Executive Officer) PO Box 558, Subiaco, WA 6008 Tel: (09)382-2017

Tasmania: Mrs R. Jackson (Executive Secretary), 456 Churchill Avenue, Sandy Bay, Tasmania 7005

National Association for Training the Disabled in Office Work (NADOW)
(Run computing for handicapped training courses)
504 Pacific Highway, St Leonards, NSW 2065 Tel: (02)43-0303
Branches in:
Queensland: Fashion House, 150 Edward Street, Brisbane, Queensland 4000 Tel: (07)229-4710

Technical Aid for the Disabled
(Give advice on technical problems and have run seminars on computing for handicapped people.)
PO Box 108, Ryde, NSW 2112 Tel: (02)808-2022

Disabled People International Resources Centre
(Have considerable information on resources, organisations etc for disabled people)
397 Lyons Road, Five Dock, NSW 2046 Tel: (02)713-1103

Wheelchair and Disabled Association of Australia
Head Office: 49 Blackbutts Road, Belrose, NSW 2085 Tel: (02)451-1511
Branches elsewhere in NSW at Wollongong, Newcastle, Forbes, Lismore – contact Head Office for details.

Australian Quadraplegic Association
Branches in:
Victoria: 70 Station Street, Fairfield, Victoria 3078 Tel: (03)489-0777
NSW: 1 Jennifer Street, Little Bay, NSW 2036 Tel: (02)661-8855
West Australia: 30 Meldrum Way, Koondoola, WA 6064 Tel: (09)342-4728
Queensland: 10 Credlin Street, Mackay, Queensland 4740 Tel: (079)574142
South Australia: 16 Tester Drive, Blackwood, SA 5051

Paraplegic and Quadraplegic Association
Branches in:
Tasmania: Jane Street, Bracknell, Tasmania 7302
South Australia: c/o Spinal Unit, Holland Avenue, Northfield, SA 5085
West Australia: PO Box 257, Subiaco, WA 6008
Victoria: c/o Yara-Me, 295 Maroondah Highway, Croydon North, Victoria 3136
Queensland: Paraplegic Welfare Association, PO Box 111, South Brisbane, Queensland 4000
NSW: 33 Burlington Road, Homebush, NSW 2140

Spastic Centre of New South Wales
Allambie Road, Allambie Heights, NSW 2100 Tel: (02)451 0922

Spastic Society of South Australia Inc
98 Woodville Road, Woodville, SA 5011
or
PO Box 49, Woodville, SA 5011
Tel: (08)268 5000

Spastic Society of Victoria
627 Chapel Street, South Yarra 3141
or
PO Box 452, South Yarra, Victoria 3141
Tel: 241 9862

Spastic Paralysis Welfare Association Inc SA
98 Woodville Road, Woodville, SA 5011 Tel: (08) 268 5000

Spastic Welfare Association of Western Australia Inc
PO Box 61, Mt Lawley, WA 6050 Tel: (909)443 0211

Spina Bifida Association of New South Wales
82 Hampden Road, Battery, Point, Tasmania 7000
or
PO Box 114, Rosney Park, 7018
Tel: (002)23 4537

Spina Bifida Association of Queensland
387 Old Cleveland Road, Coorparoo, Queensland 4151
or
PO Box 245, Coorparoo, Queensland 4151
Tel: (07)397 7096/397 7875

Spina Bifida Association of South Australia Inc
30 Lewis Street, South Brighton, SA 5048
or
GPO Box 349, Adelaide, SA 50001
Tel: (08) 298 6191

Spina Bifida Association of Tasmania
29 Strahan Street, North Hobart, Tasmania 7000
or
PO Box 114 Bellerive, Tasmania 7018
Tel: (002)44 3825 or 72 4918

Spina Bifida Association of Victoria
PO Box 88, South Melbourne, Victoria 3205

Spina Bifida Association of Western Australia
218 Douglas Avenue, Kensington, WA 6151

(Further information is available from: ASTAM BOOKS Pty Ltd.,
16 Renwick Street, Drummoyne, Sydney, NSW 2047, Australia)

INDEX

Micros for Handicapped Users

Peter Saunders

With a Foreword by Baroness Masham of Ilton

"Micros for Handicapped Users" has been written to enable the previously disabled person to benefit from the new technology in ways which lead to independence.

This book does not include computer programs but it does explain in plain English how a micro can become an easily managed aid, offering independence in the home and the possibility of extended contacts outside.

From the Foreword:

> "This book will give hope, advice and information for many who are disabled or for those who want to help them".

The Contents include:

How a micro can help you. The kinds of programs written for disabled people by winners of THE TIMES National Microcomputer Challenge. The application of Information Technology for those with Special Needs. Micros in Special Education. Self-help for parents. Electronic mail and robotics in the service of disabled people. Lists of useful organizations and helpful people in various parts of the world.

The book has been designed and produced so that the pages lie flat when the book is open.

The illustration on the front cover of the book is taken, with permission, from a publication of the Information Technology Awareness Programme (Department of Industry).

The book includes first-hand accounts by, among others:

* an elderly man, housebound and disabled, who has discovered new interests.
* a parent who teaches his Down's Syndrome teenager with the aid of a micro.
* a profoundly deaf young woman is able to converse with others, miles apart.
* teachers of multiply handicapped children who report that pupils have made progress of a kind previously thought impossible.

The author's experience as a member of the Community Health Council and as Chairman of a local MENCAP society have given him insight into some of the needs of disabled and handicapped people. In addition, as a Consultant to the Open University (Micros in Schools Project) he has acquaintance with the requirements of teachers in Special Education.

Also in this series:

COMING TO TERMS WITH MENTAL HANDICAP
By Ann Worthington
ISBN 0 9507930 0 0

SIXTEEN – AND THEN WHAT
By Andrina E McCormack
ISBN 0 9507930 1 9

Helena Press
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ISBN 0 9507930 2 7