Windfall

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**24 page guide
to all the
latest printers**

**Exercises that
make Visicalc
replicating easy**

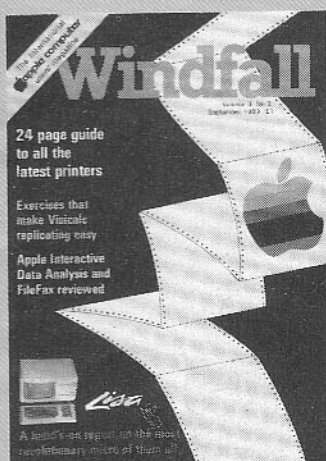**Apple Interactive
Data Analysis and
FileFax reviewed**

Lisa

**A hand's-on report on the most
revolutionary micro of them all**

AUGE.

Windfall

Vol. 3 No. 3 September 1983

LISTING

WHAT'S NEWS...

By David Creasey
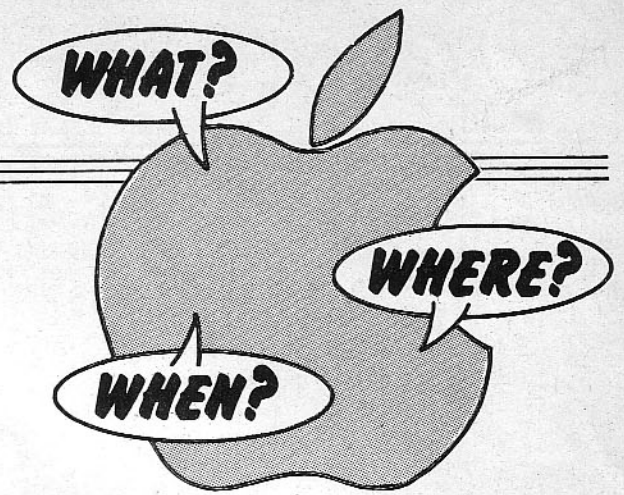
Peachtree picks up more Apple software

ONE of the first British companies to develop a software package for Lisa, Vlasak Computer Systems, has sold its Apple software operation to Peachtree Software.

Now the Vlasak range of Apple accounting software will be marketed under the name of PAAS (the Peachtree Apple Accounting System).

"This move will give us access to a large number of corporate and smaller end users", said Peachtree managing director John Hale.

"It is important for us to address this marketplace because as these users migrate to more advanced micros such as Lisa, so they will migrate with Peachtree".

He said the corporate end user is of particular interest because the Apple could be chosen by MSA (Peachtree's parent company) as one of the preferred micros for the company's mainframe/micro link in which micros access mainframe accounting software via Peachlink.

Some of Vlasak's marketing and support personnel will be joining Peachtree, and its research and development equipment is also included in the agreement. Peachtree also gains access to Vlasak's 150 dealers.

Beating dyslexia . . Peter Shaw with his Apple

The choice of heroes

APPLES get everywhere — albeit sometimes in disguise. They've been peered at by Royalty and by the Prime Minister, although in both cases the Apple logo has been discreetly covered — perhaps to avoid offending the dignitaries' stated political preference for British-made machines.

And now the trusty Apple II has turned up in a new British comic, Load Runner. One of the stories (in photo format, not cartoon) involves a group of computer-addicted schoolchildren.

The hero, Paul, owns an Apple II, although in the story the Apple logos on the disc drives have been clumsily covered over with white patches, and the micro itself is labelled "Akron 90".

However the labelling is irrelevant. Paul notes to himself: "I suppose I'm lucky to have a computer this good. Nobody else has anything as sophisticated".

There is nothing undercover about the choice of micro for television's American private eye Mat Houston though — he uses an Apple III.

Even Apple would be surprised at the different information and applications he manages to coax from the machine in the course of the weekly series, and the only thing hidden about it is the way it is stored.

The Apple is tucked away out of sight and upside down, being automatically swung out for use at the touch of a button.

A way with words

AN Apple is helping a dyslexic, third year student at Southampton University who is studying for a degree in biology.

Peter Shaws problems with producing written work were exacerbated this year when he started work on his final year thesis of around 10,000 words.

The thought of having to write it three or more times in order to make sure that it made sense to the examiners was a daunting prospect.

Then Peter bought an Apple and printer with a word processing program. "The amount of time this has saved me is enormous", he said.

"I am able to make all my corrections, including spelling errors, on the screen so that the final printout from the computer is as accurate as it is possible for me to make it".

Up and running

A DOZEN Apples could be taking a bus ride to France as part of a training program run by the University of Salford.

Several French companies have shown an interest in the project, planned for this autumn.

Five members of staff, all apart from the driver fluent in French, would man the university's Mobile Education Unit — a

converted double deck bus — and run two to three day courses on the Apple and its applications.

The courses will be run on the bus, with the Apples powered from a mains lead fed into an adjacent building.

In training for Lisa

LISA dealers are unique, claims Apple, because they are pioneering a new marketplace — that of the personal office system.

As a result Apple has embarked on an extensive training program for Lisa dealers which it hopes will set new standards.

Already 50 Lisa dealers have been appointed and more are in the pipeline. They started delivering Lisas to UK customers last month and the machines should be generally available by the end of September, says Brian Reynolds of Apple UK. Initially there could be a four week delay between placing an order and delivery.

"The dealers we have appointed have all had experience of selling systems into the office, although not the personal office system marketplace, because that didn't exist before Lisa", he said.

"We've given them more training than any Apple dealer before on any product, because we want them to be the best in the industry.

"They must know what they are talking about and how best to help the customer. Not just a few buzz words — he must know how to instal software, to connect Lisa to a mainframe and to take the technical worries off the customer's shoulders and help him achieve, with Lisa, what he wants to do".

It is an on-going training program that will incorporate sessions on any updates and new developments.

In the immediate future these developments include the release, scheduled for the end of this month, of Lisa Terminal, which will enable Lisa to communicate asynchronously with most computers, and Applenet, due for release at the end of October.

A business using several Lisas may want to become a servicing owner, holding a service kit with exchange modules on site.

Reynolds said he expects several customers to use large numbers of Lisas — "already some have ordered three or four to start with and we believe these companies, and others, will buy more as time goes on".
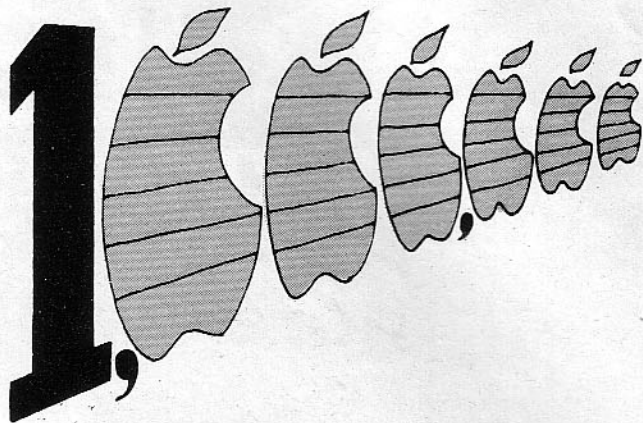
THE one millionth Apple has been produced at the company's manufacturing plant in Carrollton, Texas.

And it made history a second time when it became the first of more than 9,000 micros given to the students of California under Apple's Kids program, in which the company will donate an Apple IIe to every school in the state.

At a handing-over ceremony Apple's head of manufacturing, Del W. Yocam, described how the Apple II had contributed to the creation and success of many other businesses besides Apple.

"The Apple II alone has been responsible for $2.4 billion worth of business for us, our dealers and other companies who have made products for the machine since the computer was first sold in 1977," he said.

"But the entire personal computer in-

Apple makes a million

dustry is in its infancy. Projections are that only seven per cent of the potential market has been tapped and revenue will continue to grow at a rate of 50 per cent through this decade. By 1990, it will potentially be a $30 billion industry", he said.

Yocam said the production of the Apple IIe was being increased. "We're building them at a rate of one every eight seconds during the working day, and we're expanding our manufacturing capabilities to keep up with the popularity of this product", he said.

Lisa is here to stay

WORKING on the Lisa project was very exciting, according to Bruce Daniels, the Lisa Software manager at Cupertino.

"Apple said: 'Here is $50 million — go and do something revolutionary' — and for a small company, that money was a massive investment in what three years ago was a risky project", he said.

"We have done things that we ourselves didn't realise could be pulled off — even down to designing our own fonts for the machine".

Asked if Lisa was based on the work done on the Smalltalk system at the Xerox Palo Alto Research Centre, Daniels said: "We took the concepts, that is all, and if you look at the two systems they are very different.

"We have added our own things to it and made it into a mass marketable product".

Daniels confidently told *Windfall* that

Bruce Daniels: "A risky project"

Lisa would last through the 1980s, and the product range would probably exist even longer.

"It will be very much like the PDP11 minicomputer series from DEC or the IBM 360 series. There will be such a large installed base of machines that it won't go away — although eventually the machine will become obsolete and will be replaced by newer versions".

He said that in looking to the future Apple was investigating ideas such as artificial intelligence and expert systems. There was also "an interest in voice . . .

but that wouldn't be here for about 10 years".

He added: "Our major work in the short term will be improving what we have got — making Lisa faster, smaller and finishing off things such as networking, the toolkit and putting on languages such as C and Fortran".

Software cheaper

A MAJOR American software house, Insoft, has announced large price reductions on its Apple arcade game series.

The company, which markets GraForth and Electric Duet, is selling its Grapple, Spider Raid and Zargs games for $19.95 — a price reduction of between 33 and 43 per cent.

It is not clear whether these price cuts will apply to the UK market. If they do, it could herald the start of a rosy period of reasonably priced software.

"These games have sold well at $25.95 and $34.95, but we expect our sales to take a quantum leap at the lower price", said an Insoft spokesman.

Upgrade option

LISA owners are being offered an upgrade option by Apple. For £200 a year, a user will be sent software upgrades automatically and Apple says that several upgrades for the existing software will be released in the next year.

Apple has also confirmed that not only will there be a cheaper, less versatile member of the Lisa family, but that on the drawing board is a machine that is more expensive and more powerful than Lisa.

Bug in the air

SUCCESS in a project is never guaranteed — even if you have two Apples helping you. The elements themselves, quite apart from the human element, often get in the way —

as two balloonists, Mike Kendrick and Per Lindstrand found last month.

They'd been hoping to break the existing world altitude record for a hot air balloon in an attempt over Watton in Norfolk but a gust of wind caught the balloon and ripped it 25 feet from the ground.

So where do the Apples come in? The balloon itself is a million cubic feet, bullet-shaped envelope with an ascent capability four times faster than that of conventional balloons. It was developed with the help of an Apple II, programmed to calculate its optimum flight shape.

A 256k Apple III has a crucial role to play in the postponed record attempt. Its first function will be to relay the complicated check list from "mission control" to the take-off point.

For conventional balloons about a dozen checks have to be made before take-off — but 105 will be needed in Operation Skyquest. The III is needed to ensure that none of these checks are missed out.

After the launch the III will be fed information on wind direction and speed, the balloon's height and atmospheric temperature changes. It will use this data to plot the balloon's course and predict its landing point.

Apple win injunction

A HIGH Court order has been awarded to Apple Computer restraining Sirtel (UK) from importing, advertising and selling Microprofessor II, an Apple II workalike.

Mr Justice Whitford also refused a request by Sirtel that it should be permitted under the terms of the order to return its existing stock of the Microprofessor II to the manufacturers, Multitech Electronics, in Taiwan.

Under the terms of the order, Apple Computer will be entitled to inspect and test any new ROM for the Microprofessor II which Sirtel proposes to put on sale in the UK.

Commenting on the injunction, Peter Cobb, Apple's UK managing director, said: "We are not prepared to tolerate any form of illegal imitation of Apple products in our marketplace.

"There is absolutely no excuse for people selling competitive machinery to profit from Apple Computer's research and development programme."

"If you ask me, he's got a silicon chip on his shoulder"
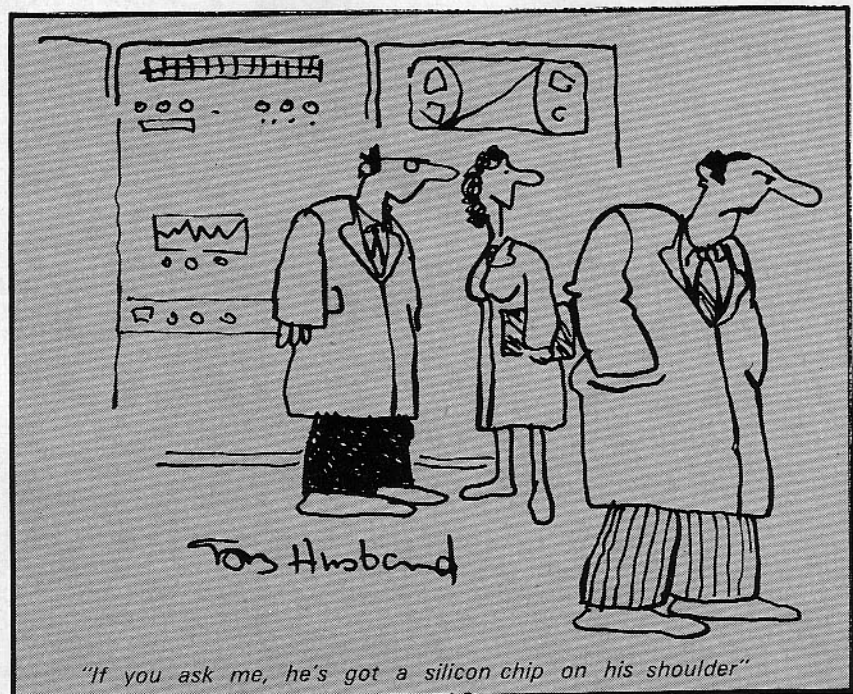
Amiable entrée to adventuring

REGULAR readers are no doubt inured to my monthly ramblings in the review columns, but now I've been let loose without even a game to focus on. Never fear, though, I intend to use this new-found freedom to discuss some of the wider issues (no, not Pac Man with an 80-column card) and generally gossip about games.

For example, have you played The Prisoner? If so, maybe you've noticed adverts for Prisoner II and wondered whether to buy it. Well, chances are you might be a bit disappointed if you do.

It's basically the same as the original, but with improved graphics. It has been made a bit harder in places, but there is enough similarity to make you feel you've done most of it before.

If you haven't played The Prisoner, then Prisoner II is definitely to be recommended, although I suspect it appeals most to people like me who remember the TV series. There is even a Prisoner fan club, called Six of One. I don't know if any of the members have played the adventure game, but if so I'd love to hear from them.

I'm occasionally asked to recommend an adventure game for people to start on, and I used to have difficulty answering. However, I recently came across Birth of the Phoenix from Phoenix Software.

The manual is a tutorial in adventuring, and comes complete with a game diskette. The game is text-only, but many of the
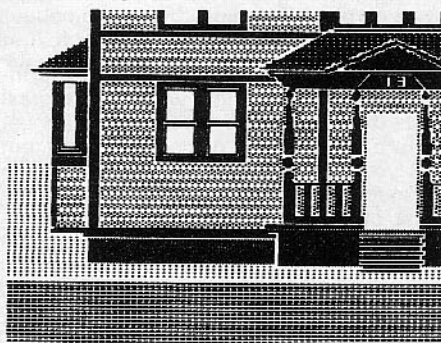
A scene from Transylvania a variant from the usual run of games

basic features of adventure games are introduced.

I can't review the package in the usual way because to do so would detract from the delight of discovering adventure games for the first time. However, if you've worn your space bar out playing Bandits and are wondering whether there is life after Microwave, you might like to note the

name. It's all you ever wanted to know about adventures but were afraid to ask.

The search for new contexts continues, of course. We've seen some interesting variants, like Transylvania from Penguin, Sherwood Forest from Phoenix, and of course On-Line's famous Soft Porn Adventure.

What next, I ask myself? How about UCCA Form, a game so complex that reading the manual is more than most people manage? Send your suggestions to me, and I'll plagiarise the best of them.

The other things I'd like you to send me (apart from parcels of used notes in small denominations) are any little things you've discovered about games which aren't in the instructions.

For example, you may have found out that pressing Ctrl-Z makes all the Space Invaders stand still while you shoot them . . . but you may be the only person who knows!

Tell me, and I'll tell everyone else. I might even mention your name while I'm at it.

Beavering away at evolution

RIGHT, settle down Class 2B, today's biology lesson is all about Evolution. Now, first of all there was the amoeba, then came the tadpole, followed by the rodent, beaver, gorilla, and finally we humans, not including you, Jenkins.

No, of course I don't mean Darwinian evolution, I'm talking about the great new game from Sydney Development Corp. In fact, Evolution is like six games in one because each of the six levels is different from the others.

As an amoeba (or "ameoba" as it says on the screen), you have to eat immobile DNA cells while avoiding spores, microbes and antibodies. You have a shield which you can use, but the bonus for completing the level is proportional to the amount of shield left unused when you finish your genetic lunch.

Once you evolve to the tadpole stage, your diet changes to elusive water flies and the predators become fish. Actually, the tadpole looks more like a frog, and points can be gained for jumping over the fish. Not jumping over the fish leads to a shortage of life.

Following life as a tadpole, you evolve

Title: Evolution
Authors: Don Mattrick and Jeff Sember
Publisher: Sydney Development Corporation
Requirements: Apple II

into a cheese-eating rodent who has to avoid snakes, a dam-building beaver (another rodent?) who has to contend with alligators, and then an orange-eating gorilla who has to protect his oranges from monkeys by throwing coconuts at them.

Of course, since the game was written by a human, the pinnacle of this evolutionary epic is the human race. Anthropocentrism rules, OK? What ever happened to Tadpoles Lib? We humans spend our time trying to kill genetic mutants who are polite enough to realise that in such matters it is better to give than to receive.

Success as a human leads to a mushroom cloud (which seems pretty realistic the way things are going) and life once again reverts to the amoeba stage.

The great cycle of life begins again, but survival is nowhere near as easy the second time around.

Did I say "easy"? Although the levels have the same theme, you versus a predator, they are all sufficiently different to make Sydney's "six games in one" claim not unreasonable.

The techniques, strategies and general pace differ from level to level, and each level is made harder as you start another cycle.

There are 99 levels, but it took me a long time to fight my way up to level 11. You can choose to start at level 1, 7 or 13, so as you gain proficiency it isn't necessary to slog through the lower levels each game.

If you select level 7, you start with a score of 3,000. However this isn't an easy route to the hall-of-fame scoreboard because, in order for your score to be entered, you have to evolve past human. Similarly, starting at level 13 gives an initial score of 6,000 with the same proviso.

The game can be played on keyboard or

joystick, and for the most part I prefer the latter. When I get to gorilla level, though, I switch to keyboard and then back to joystick if I make it to human. As I said earlier, the levels call for different techniques.

Each level has a tune at the beginning and another one at the end, and the action has its own sounds, all of which can be suppressed if you want to pretend you've evolved into Beethoven. As usual, ESC pauses the game while you straighten out your double helix.

Evolution is Sydney's first venture into the games market. If you've encountered Sydney Development before, the chances are that you've got a mini or mainframe tucked away somewhere and that you're a project management or stockbroking portfolio management freak. My guess is that we'll hear a lot more of Sydney in the micro market from now on.

I've seen the game criticised on the grounds of its dubious relationship to biology. However, such comments seem churlish at best. I've never heard NASA vouch for the authenticity of Space Invaders, but it hasn't stopped millions of people enjoying it!

Evolution may set you back a bit more than the average game, and Sydney obviously justify this with the "six-in-one" approach. With people like Penguin Software actually reducing prices, competitiveness in the market may be the ultimate test of the game's success. However, from, the purely fun point of view, I can recommend it.

Are you paying attention, Jenkins? What did I say about coconuts, then? Write out 100 times, "I must learn to spell 'amoeba'."

Quite amazing

Title: Wayout
Author: Paul Edelstein
Publisher: Sirius Software
Requirements: 48k Apple II/II+ and pair of scissors

"STEP right up! Step right up! It's new, it's fun, it's aMAZing! It's WAYOUT, a game so exciting that it can make a blind man talk, a deaf man see!"

That's how Sirius introduce Wayout, and if the pun escaped you I'd better point out that it is a maze game. Actually, it is 26 different mazes, each of which make Hampton Court look like child's play.

When you enter each maze you have a compass and a map-maker, but you may not have them for long. The maze is inhabited by a Cleptangle who likes to steal such items and run away. You can get them back from him by cornering him, but first you have to find him. He is tireless in his kleptomania so you'd better make the most of the aids while you have them.

If you have both aids, the screen display will tell you in which direction you are looking and a map will be drawn as

WAYOUT was chosen by Video Games Player magazine to receive its 1983 Golden Joystick award for best graphics of the year.
Said editor Dan Gutman: "It is a rare game that combines graphic excellence, playability and fun, to capture the hearts of the players."

you move around. If you lose either of them, you lose that source of information and if you lose both you must rely on sight and memory.

There is one other bit of help in your search for the way out — the fireflies which live in the maze are blown by the wind, and the wind sometimes blows in through the way out.

The display of the maze is quite amazing (sorry). If you imagine that it is made up of vertical panels, you are literally looking at the panels and can see them recede in perspective. As you turn around, so your sight scans past the panels. As you move along a corridor there is a real sense of movement as walls loom up and you make turns down other corridors. If you've ever played Wizardry you'll know the sort of thing, but this is much smoother.

It is your view into the maze that forms the central part of the display, with your map-maker below and a compass in each upper corner.

Movement is achieved with either paddle, joystick or keyboard. Of these, paddle or joystick are probably easiest once you have got the hang of looking at the display. On keyboard, you have the option of direction keys, as long as your compass hasn't been stolen.

The game can be saved for later return, which is useful because your first visit to a maze may be a long one. Another option lets you "remember" up to nine different locations which you can return to at will. This is very useful for exploring all exits from an intersection systematically. You

can also freeze the action temporarily while you answer the phone, and the various sounds can be toggled off.

As you wander around the maze your moves are counted and displayed and your score is the distance travelled. Hence the object is to get as low a score as possible. Each maze is the same each time you visit it, so you can improve on your score on subsequent visits. The game saves the low score for each maze to the disc.

About the only problem I had was recognising the way out. According to the manual, "When you see a door that pulsates in bright colours, you'll know you've found the one and only Wayout!" On our colour TV the Wayout pulsated orange and white — exactly the same as the Cleptangle (who is meant to be that colour). On several occasions I avoided the Wayout thinking it was the Cleptangle. After a few times even this wasn't a problem because proximity to the Cleptangle is accompanied by a clicking sound, which means that the game can be played on a monochrome set with no trouble.

I must admit I did have one other little problem, but it's nothing Sirius could do anything about. You see, I have absolutely no sense of direction. However, my wife (who navigates me to the local shops, etc.) found the game extremely enjoyable and not a little demanding. Maybe if I play it for long enough I'll improve my sense of direction.

One nice thing about Sirius games is that they occasionally include a little something in the package — iron on transfers for T shirts seem to be the favourite. In Wayout you are provided with a special cut out compass and glasses with which to adorn yourself while you play. The compass was just right for me, and the glasses certainly made me look Wayout!

Movement's a must

Title: Aztec
Author: Paul Stephenson
Publisher: Datamost
Requirements: None stated

WHILE some people are happy to work within an arcade/adventure dichotomy, others have been beavering away in the middle ground and some very interesting games have resulted.

Aztec is a case in point. It's described

as a real-time adventure, although playing it sometimes feels more like giving a piano recital of one of the faster concertos. For example, there are "regular" movement keys enabling you to walk, run, jump, kneel/crawl, stop, turn left, turn right, climb, place and light dynamite, open, look and take!

In addition to the regular keys, you can use F to go into "fight" mode, in which you have a choice of seven keys depending on the sort of weaponry you have acquired.

The purpose of all this manual dexterity is to search through the lost pyramid (which you've found) in order to find the fabulous Golden Idol. The pyramid is populated by all manner of strange and unfriendly beasts, not to mention the booby traps left by the insanely jealous Professor Von Foerster, so you need all the movement keys you can muster.

Not only must you find the idol (no mean task in itself) but your score is based on the time it takes you to do so *and* get out alive. Descending into the depths of the pyramid isn't too difficult, in fact you often go down quicker than you expected. Getting back up again is more likely to cause you trouble, although the manual points out that under certain conditions you can climb anything.

There are eight levels of difficulty, with the score also taking account of the level played. Personally, level 1 is enough to keep me busy and when I tried level 8 I didn't last more than a few seconds!

You start your quest with three units of strength and three sticks of dynamite. I'd have opted for a machine-gun myself, but if you want any weaponry you have to look for it. You also need to find some special elixir if your strength is depleted. There is an inventory command which temporarily displays a list of your possessions at the bottom of the screen.

The animation in Aztec is really good. It's written by Paul Stephenson who also wrote Swashbuckler. I must confess I never really liked Swashbuckler — it always felt awkward — but it was an innovative game and Paul has obviously developed his techniques since then and the results are great.

The movements of the various beasts are quite straightforward, but the movement of the man is terrific. He even falls over if you walk him into a wall or through a hole in the floor, and is obviously dazed for a brief spell.

The pyramid has eight floors of eight rooms, and each room can have up to three levels. The arrangement of floors varies from game to game and is randomly drawn from 32 possibilities. The opponents are decided by the difficulty level, so the number of different combinations is quite large.

The game can be paused (which stops the timer) and can also be saved. Only one game can be saved, but it can be resumed as often as you like so it's worth saving the game if you get in a good position.

I've had an occasional problem with Aztec when the game has hung and needed rebooting. However, I had an early copy and Datamost may well have sorted this out by now.

According to the manual, "there is always a reasonable answer or a way out of any situation, though that does not mean any specific solution is easy". In my case, I think the first thing to do is go back to my five-finger exercises if I'm ever going to be successful at Aztec.
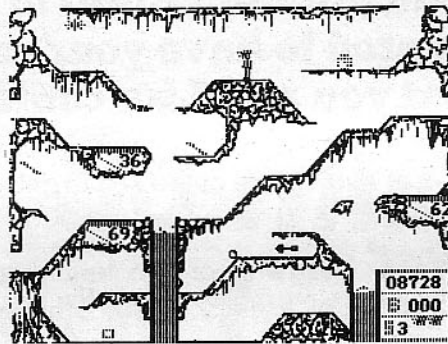
Great balls of lava

Title: Crisis Mountain
Author: David Schroeder
Publisher: Synergistic Software
Requirements: Apple II

IF you're a science fiction fan, you've probably noticed that the pictures on the front of sf books invariably bear little relation to the story inside. Similarly, I'm always interested to see how the illustration on the front of a game manual is translated into graphics on the screen.

In Crisis Mountain the man on the front looks big and butch like a lumberjack, in a checked shirt and Mountie-type hat. On the screen, he is transformed into someone resembling Andy Capp!

The action takes place inside a supposedly extinct volcano where, until recently, a terrorist group had been hiding. When the volcano became partially active, the terrorists fled, leaving behind a number of bombs and their loot.

As usual, you (in your wisdom) have volunteered to risk life and limb by digging up and defusing the bombs. As you move

through the caverns you must avoid flying rocks, debris and molten lava. The bombs are ticking away, so you must hurry.

The bombs are represented by counters, and if any of them hits zero then the big bang occurs. Graphically, this is a complete over-the-top production in which the screen alternately cracks up and goes "inverse" — great stuff if you like flashing lights.

Level 1 has only two bombs, but as you work your way up the levels either more bombs appear or they start from lower numbers in a harder-to-reach location. In other words, it gets harder. There are only two different layouts used, and these alternate from level to level.

If you have the spade, you can dig the bombs out quite fast, otherwise you have to resort to using your hands. Being hit by lava causes you to drop the spade but it doesn't simply drop at your feet. The laws of gravity obviously don't operate inside volcanoes.

The real strength of Crisis Mountain is the animation of Andy Capp. He has a lovely bouncy walk until hit by one of the bits of debris. He then slows down or, in some cases, is reduced to crawling. He can also jump over the balls of lava which roll around, thereby retaining his strength. When killed, he sprouts wings and floats up to heaven (or at least the top of the screen).

The one thing that can't be dodged is Bertrum, the radio-active bat. No volcano should be without one. With lava, you can hide in various places, but Bertrum will get you wherever you are. Fortunately, he doesn't appear until you have a healthy score, by which time you might have worked out a strategy to cope with him.

Although many of the treasures are accessible, some of them require quite a bit of skill in controlling Andy. You don't need the treasures in order to stop the bombs but you do if you want a high score. Once you're skilled in moving around, there is still enough randomness to keep you on your toes.

The game can be played with paddles but joystick is recommended. The instructions seem to say that paddles need to be supplemented with the space bar but they don't agree with what happens on my joystick, so I can't vouch for them. The game can be paused via the ESC key, and the sounds can be toggled off.

According to the instructions, there are nine levels to Crisis Mountain. Imagine my anticipation, then, when I completed level 9. However, the game then proceeded to level A and then level B before I died of a surfeit of lava.

I'm quite used to counting 8...9...A...B... but I usually start at zero, not 1, when I do. If anyone has reached the *end* of Crisis Mountain, please let me know.🍎

A NEW sport has reached Britain. It is one that Apple hopes — and we suspect — will become something of a craze. It's called playing with Lisa.

Following our introductory reviews on Lisa (we were the first magazine in the world to publish technical details when the machine was first announced last February) we borrowed a Lisa from Apple for a week to investigate the concept further.

Since Lisa should be available to the general public from this month we decided to gather together the first-time impressions of several people. We have not presented this as a typical review of a machine and its software because Lisa doesn't fit into that category. Rather it is an entity, a whole system in itself, and we have treated it as such.

Initial reaction was surprisingly uniform — a general curiosity, followed by comments about "it looks nice, but what does it actually do" through to criticisms about it being rather slow, or impractical.

Those most critical however tended to be the ones who later hovered, waiting for a chance to get their hands on the machine.

The hands-on learning curve was also uniform. After being given a brief explanation on use of the mouse to access menus, windows and icons, everyone started using the machine productively.

After a period of experimentation people were producing nice work with only occasional forays into the manuals. Whatever part of Lisa they started using, they found it easy to switch to another tool because of the common commands and menu options.

With proper use Lisa is not slow and the time taken to power up and power down the system shouldn't bother business users.

We found Lisa was extremely versatile and mixing pictures and text was remarkably easy to achieve. A gauge of the machine's power is the sheer frustration felt when you go back to a normal micro and find you just cannot do what you want.
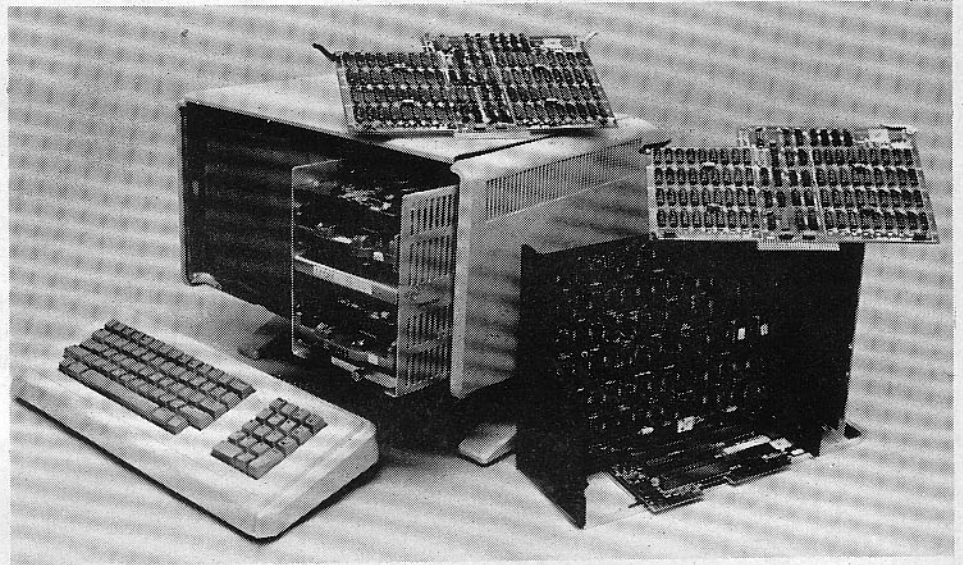
So much more to Lisa than meets the eye

By MAX PARROTT

SIMPLY put, Lisa is a 16/32 bit micro/minicomputer with a suite of programs allowing the user to wordprocess, draw pictures, draw graphs, do spreadsheet problems, keep lists and so on — and print the results without too much effort.

Great you say, what's so special about that? Actually quite a lot, but it is very hard to appreciate without seeing the machine or, even better, using it.

Lisa's screen is best described as a desktop. Behind the desktop is a filing cabinet (actually the Profile hard disc drive) containing all the paperwork, drawing tools, calculator, and data (perhaps derived from one of the tools) which you will ever use.

You can easily take something out of the filing cabinet and put it on the desk for immediate or future use by using the mouse to get it for you.

The object retrieved is visible on the desk as a small image called an icon. You can place it where you will on the worktop and reach out to use it with the mouse any time you like.

Interestingly the previously used object can be saved and put away back in the filing cabinet, or shoved to one side of the desk for later use, or just left where it is and the new object laid on top of the old.

Even more interestingly, the analogy between the screen and a desk must be a good one because at the end of a working session it suddenly became clear to me that this desk resembled closely the one I have at work and the one I have at home. That is, all three were very untidy.

However, both at work and at home my respective bosses tell me to clear it. Here I tell Lisa and it does it just like that. Commands such as this are communicated without any typing, the faithful mouse does it all. I was amazed how little keyboard use is actually necessary to create paperwork.

I first created a series of four beautifully labelled and titled histograms and the only typing involved was the actual text and the data used. Selection of format, justification of text and scaling of the axes was either done automatically by Lisa or by Lisa with myself in command through the agency of the mouse.

Similarly, this piece of prose is being written on Lisa and I am actually seeing on the screen what will be printed, not a representation with some characters imagined. I can see on the screen emboldened titles, fonts in different sizes including italics, Greek and other symbols modern, and gothic in pica, elite, and 15 pitch sizes — all mixed as required with or

without proportional spacing.

Underlining, superscripts, subscripts, different line spacings and tab settings can all be seen as I type. Of course, I am typing the text, but *all* the commands to justify text, underline or select font are being communicated to Lisa *via* the mouse.

That is to say that the control characters used to control layout by all the other word processors that I have ever seen are completely unnecessary. Therefore I don't need to remember their syntax because everything is laid out in front of me. If I use the mouse to change the type style I just point it at the appropriate command on the top line of the screen and press the button.

The possible options are immediately displayed on top of my work. I choose one by pointing the mouse at it, let go the button and the choice is made. The options disappear and my work is left clear to proceed. I use the mouse to scroll through the work, using arrows displayed at the corners of the page.

There is a block to indicate where I am on the page and I can move this with the mouse quickly to any part of the text.

Insertions are made by simply positioning the mouse at the appropriate point in the text and pressing the button. Text can then be typed or removed as wanted.

This idea of using the mouse to travel through the text is not unique to the word processor. Rather it is fundamental to the whole concept of Lisa. Objects may be moved around the desk, brought out to cover other objects, or moved aside to make room for others by pointing the mouse and moving it.

For example, I can move the digital clock and calendar face to any part of the desk and leave it showing underneath my present work if I need to consult it regularly or I can cover it with my work which I can temporarily move aside to uncover the clock.

I can do more than just uncover the clock face, however. I can move the text aside, summon up the calculator and do arithmetic, put it away and return to my piece of text merely with a few taps of the mouse's button.

Incidentally, even the calculator (which has reverse Polish or normal notation) is not used by pressing keys. On the screen appears, when selected, a facsimile of a calculator. You press the keys by pointing with the mouse and pressing the button. The results are displayed in an X and a Y register and a tally roll is kept at the side so that previous calculations may be reviewed.
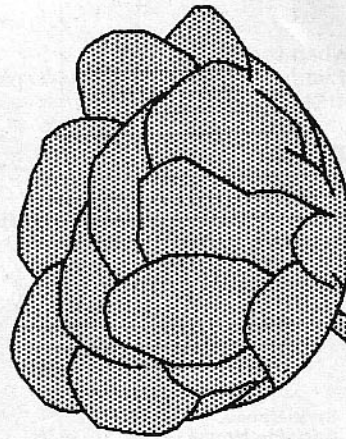
It is a measure of the ease of use of the system that all of this has been accomplished without once using the manuals. In fact, I wonder how much more powerful the system must be than I am giving it credit for. Certainly all operations are easily accomplished and more importantly can be generally undone.

For example, I chucked away one piece of work (by moving its icon to the wastepaper basket) and then switched off the computer. Later I switched it on again and retrieved my work from the bin by pointing the mouse at it and moving it out. Whenever an operation is attempted which may be dangerous Lisa warns you or prevents you from carrying it out.

Before starting with Lisa properly as a drawing and typing tool I wondered if the mouse was really a gimmick! It isn't, the mouse is genuinely a great time saver and is so easy to use.

It moves around four or five inches to cover one dimension of the screen and of course can be used by either the right or left hand. I found that the wrist needs to be supported by the desk — the real one that is — otherwise it aches after a few minutes but when used properly gave no problem at all over a full working day.

The keyboard is detached from the console and is a joy to use — certainly better than the IIe's keyboard as far as key positioning is concerned. There is clearly a keyboard buffer, although I don't know how big it is, because whenever Lisa took time to update the screen, nothing was lost when I carried on typing.

The keys have auto repeat and there is also a numerical keypad. One key can change the keyboard to another set of characters, a pull-out underneath will display the appropriate set.

The console has two five inch floppy

A Lisa-generated flower
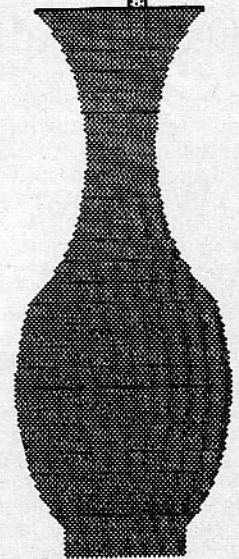
disc drives, fitted presumably to enable back-up copies of the software tools and your work to be kept.

Flipping through the draft manuals which accompanied the review machine, after playing with it for a couple of days, I noticed a remark which suggested that software tools are provided on floppies and transferred to the Profile as required, but once transferred they will run on that Lisa only. In other words no copying of programs for your friends.

The screen has superb clarity, and though it is monochrome only, it has so many shades available that lack of colour isn't important.

The brightness and dimness (the screen will automatically dim when not being used, to wake up instantly when the keys or the mouse are touched) are set by one of the icons. Once set, Lisa will remember your preferences, which also stretch to the speaker's loudness, the maximum time interval allowed between double clicks of the mouse's button and other sundry items.

Lisa also remembers what's on your desktop when you switch on next morning *and* exactly where you left it. If Lisa has not been switched off for too long the clock will also remember the time and date but a weekend appears to be too long a time for its rechargeable battery to last if it has not been used for some time.

The software tools — that is, the word processor, the drawing and graphing tools, the list handling tool, the calculator, the spreadsheet and so on — are every bit of what you would expect of a modern piece of software.

They are fast, easy to handle, and integrated. Manipulations of the options and commands have the same expected effect in each of them so that time spent in learning the control of one is time saved in learning the others. In fact because they are so well integrated the user tends to forget them as separate entities or programs but treats them all as part of one whole which clearly is what the designers intended.

Over the week in which *Windfall* had Lisa many people came to marvel and try to have a go at it. Without exception everyone very quickly caught on to the concept of the operating system's control and gaily created text, graphs and pictures.

We did not push the data handling and spreadsheet utilities as far, but they handled well in the more limited tests we carried out. The tools are aimed at an office situation but could, within reason, be used in a scientific situation.

The word processing, combined with the drawing capabilities, is good for scientific reporting but the graph drawing, although very good for an office and usually more than adequate for some scientific usages, does not offer all the line fitting and statistical options which would be more generally used, although the spreadsheet part of Lisa can be very effectively employed.

Lisa is capable, of course, of using results from the spreadsheet program directly to plot bar charts, pie charts, scatter charts and line charts with the

> **AFTER a brief encounter with LisaProject (one of Lisa's six built-in software programs), Peter Thomason concluded that the package was a brilliant step forward in the management application of computers.**
>
> **However, he added that it is *so* user friendly that it could cause a problem for people new to the methods of project management!**

BY and large, all reasonable business software is what is called user friendly, that is, easy on the brain.

At least this is the idea — not to need too much inside knowhow as a prerequisite to using a package.

However, it is a very important point for the user of any business application that he *must* understand the technique upon which any package is based.

Therefore, without hesitation, I recommend that users of CPM/PERT application software visit their local library, read their manual(s) and start by *thinking*.

Just as every good programmer works his mental way through each program before putting pen to paper, so every manager must understand the technique first if he is to use it successfully.

Since I understand the technique, on encountering LisaProject it is so user friendly that I wonder if the Lisa team is not encouraging a superficial understanding of project management and actively discouraging a real in-depth appreciation!

Although this is only a very superficial evaluation of LisaProject, it will build on my review of Micronet in the July issue of *Windfall*.

Rather Micronet-ish, LisaProject goes as far as resource usage reports, but not resource analysis or smoothing as in MicroPlanner.

There are several unique features, the main being an ability to manipulate and "draw" a network on the screen. As far as it goes, LisaProject is a brilliant step forward in management application of computers.

But with one reservation. Each network is lost in practice if it can't be seen in toto. It is all very well to view a small section of it on the screen (à la Visicalc) yet I couldn't use it without a big "all-in-one" representation of the whole project — but maybe that's me!

Another most fundamental point is that, just like novice programmers who splurge their program, built up directly line-by-line on the screen without preparation, so this package may easily encourage the same type of "spaghetti" project networks.

Before every project, each activity with all its details should be listed by hand. Next a network is drawn up from this data. At the network drawing stage a number of logical anomalies will become evident unless the network is rather small.

By imputting this information directly into LisaProject a user runs the grave risk of missing out some of the logic links and over-doing it in others. So the user must in practice manually draw up his network before using LisaProject. He might get away with using the direct entry method if he first lists all his activities with their apparent preceding and succeeding activities.

It is noteworthy that the initial LisaProject publicity sheet gives no data on capability, number of activities etc.

LisaProject is a very interesting and potentially very useful piece of software. It must be used properly to get the best out of it and may indeed herald the birth of the next generation of Visicalc-style micro tools. But it needs careful examination before full commitment.

same range of options as text or shading as the word processor and the drawing options provide. Soon tools will be released to enable Lisa to be programmed with full use of the icons which will make it a very powerful scientific tool as well.

The printer attached to the Lisa was a new Apple dot matrix which handles text and graphics very well indeed. The final printed page is a very good facsimile of the screen.

I suspect that the quality is good enough to obviate the need, for most users, of a daisy wheel printer although one can be used as an option.

We have no way of knowing how good the daisy wheel would be at handling pictures and the fine text detail but pre-sumably it would be slow. At the highest resolution even the dot matrix is pretty slow.

It is a great joy not to have to control the printer to produce the desired output, no embedded printer control codes, no passing of special codes to printer interfaces to enable graphics mode or change text mode. Just command Lisa to print and it does just that, faithfully copy-ing the pages you have prepared.

Lisa can make the printer produce pictures normally or on their side with an extended horizontal, landscaped, perspec-tive. I noticed that some distortion of the picture occurred in this mode although it was only noticeable with graphs, especially on text.

The printer can be made to print while you get on with other tasks on the screen but there are delays sometimes caused apparently by the printing mechanism having to access the Profile.

Everything to be printed is first saved to hard disc so there is a delay before any printing is done. Lisa detects little errors such as the printer not being on-line and beeps softly to let you know. Rough drafts

8 R=CH$_2$CH$_2$CH=CMe$_2$
9 R=Me
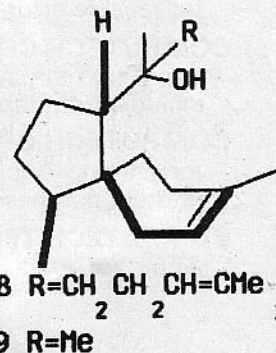
LisaDraw speedily produces chemical structures like this

of text may be quickly printed but these are produced without the changes in fonts and underlinings which will appear in the final version.

Although everyone liked and very much desired Lisa as an office companion (imagine explaining this to the wife!) being human we had some complaints. The chief one, because none of us could afford it, was the price — although, when you consider what you're getting, it's not too bad. The next complaint was the noise generated by Profile's cooling fan and the lesser humming noise when the head went seeking a track to read or write although it probably is no worse than many typewriters.

Another complaint, by some, was the time taken to switch the machine on and off.

To protect all the data generated in a day's use, everything is saved before the machine switches itself off and of course everything so saved is brought out the next morning. I noticed that a tidy desk is certainly put away and brought out more quickly so perhaps I could be induced to be more tidy.

Actually this is not a serious complaint because Lisa gets on with the job of switching on (when it does a lot of internal self-testing) and switching off all by itself and may be safely left. You may need to reset the clock which seems silly to me. Perhaps people who can afford a Lisa need to work all weekend!

I'D HAD about 10 minutes "tuition" before loading up my car at Apple UK and setting off down the motorway to the *Windfall* offices and thinking "I wonder if they'd believe me if I said it was stolen while I was in the cafe"? *[No, we wouldn't! Ed.]*

The first thing I decided was that I could do without the manuals. This wasn't out of arrogance so much as sheer laziness and impatience to get started.

The worst thing that seems to have resulted from this policy is that I lost the pad of LisaDraw paper — I must have in-advertently thrown it in the wastebasket. However, I had a used piece in one of my files, and with a bit of thought managed to recreate a blank pad.

So, how is Lisa? The phrase which springs to mind is "I have seen the future, and it works". The only thing you *can't* do with the mouse is enter text. Everything else is simply a matter of sliding the mouse around the table, clicking the button a few times, and watching in amazement as the integrated software does all the rest.

The user-friendliness has to be seen to be believed. The error messages are polite without being flowery and you usually have to confirm that you don't really want to do whatever prompted the message.

I also liked the ability to have several things going on simultaneously, although it may be because of this that I lost the drawing paper. It makes report writing much easier if you can work on the figures and text alongside each other, cutting and sticking as you go.

I could eulogise for a few more para-graphs, but it might be more useful to say what I *didn't* like about Lisa.

Firstly, I found the constant noise of the Profile a bit irritating, although to be fair it is not much worse than the fan on my Apple II.

I also found the Profile a little slow. It takes over a minute to power up, and more surprisingly it takes the same time to power down. When Lisa accesses it in order to prepare one of the windows, this also takes more time than I expected.

There must be a trade-off between power and speed, I suppose. A system which is powerful and flexible is neces-sarily complex and therefore takes longer to move through its internal structure.

So, how would I sum up my first impressions? As all the best footballers say, "Well, Brian, I'm over the moon, Brian . . . and I'm sick as a parrot that I can't keep it, Brian".

Prefixing Pascal

One of the facilities of Pascal is to prefix a disc in drive 5: so that you can refer to it for Transfering, Changing, Removing, etc, by a colon (:).

But every time you change discs, you must reset the prefix using the prefix facility (see page 28 of the Apple Pascal Operating System Reference Manual).

If you change discs often then prefix not the disc, but the drive, by prefixing the drive 5: with the drive door open. Thereafter any disc in drive 5: can be referred to by a simple colon (:).

For instance, to transfer a file named TESTING.TEXT from drive 5: to 4: can be achieved by :-T?T,*$ meaning any file starting and ending with a "T" to the root volume (*) and to have the same name ($).

P.F. & K.J.P. Wilson

Inputting EXEC file

Zero page location $76 lets the Apple know whether it is in program or immediate mode by storing there the value $FF for immediate mode or any other value for program mode. Location $AAB3 (on a normal 48k Apple with DOS 3.3) tells DOS whether a TEXT file is being EXEC'ed or not; a zero value says it is not being EXEC'ed. Armed with these two pieces of knowledge it is easy to make an EXEC file accept input from the keyboard. For example:

```
HOME
POKE 118,0: POKE 43699,0: INPUT "WHICH
PROGRAM DO YOU WANT TO RUN";A$: POKE
43699,1
PRINT CHR$(4) "RUN"A$
```

could be part of a larger TEXT file.

Max Parrott

$FF quirk

The Apple Reference Manual indicates that the location $FF in the zero-page memory is not used by any system routines. This makes it a tempting area for the programmer, and it appears to be popular.

Recently we have had trouble with $FF being corrupted during program running, and have traced this to the STR$ routine, which like other string routines uses the bottom of page 1 to assemble the string. Unfortunately, STR$ starts at $FF instead of $100, so that the first character of the string appears in $FF.

This appears to be quite deliberate, as the normal FOUT routine entry at $ED34 (where Y is set to 1) is bypassed and Y is set to 0 at $E3C8. In addition the string start address is set explicitly to $00FF at $E3CF-$E3D2.

We have not seen this quirk referred to anywhere before, and felt that it should be given wider publicity, so that others can be forewarned.

M.F. Sheppard
& K. Williamson

Let's make music

Here is a hex dump of four sound routines to experiment with:

Tone – POKE 0, NOTE: POKE 1, DUR: CALL 768.

Whizz - POKE 788, NOTE: POKE 800, TYPE: CALL 787.

Bang – POKE 808, DUR: CALL 807.

Buzz – POKE 823, DUR: POKE 825, TYPE: CALL 822.

These will allow sound effects to be added to programs easily.

M. Bowyer

```
*300.34B

0300: AD 30 C0 88 D0 04 C6 01
0308: F0 08 CA D0 F6 A6 00 4C
0310: 00 03 60 A2 00 8A 18 E9
0318: 01 D0 FC 8D 30 C0 E8 E0
0320: 64 D0 F2 88 D0 ED 60 A0
0328: 32 AD 30 C0 8E 00 E0 CA
0330: D0 FD 88 D0 F4 60 A0 10
0338: A2 E0 8A 18 E9 01 D0 FC
0340: 8D 30 C0 E8 E0 50 D0 F2
0348: 88 D0 ED 60
```

Get the SCALE right

Sometimes a Basic program which uses a shape table will produce ragged lines over the screen, whereas other times the program will behave perfectly correctly. This is caused by not setting SCALE (and just possibly ROT) before DRAWing or XDRAWing the shape.

When switching on the computer, the zero page location $E7 which holds the value of SCALE can have a random value (probably 255, $FF). This may also be affected by other programs run previously.

So what you see is the correct shape but drawn 255 times bigger and it appears as a number of random lines across or down the screen.

You can test this easily by deliberately setting SCALE to 255 and running your program.

Try out the listing without setting the SCALE first (omit line 100).

Then repeat with the SCALE set and see the difference!

Max Parrott

```
10  DATA  1,0,4,0,36,36,36,36,36,
         36,36,36,36,36,36,36,128,0
20  FOR I = 16384 TO 16401: READ
         J: POKE I,J: NEXT
30  POKE 232,0: POKE 233,64
40  HGR
50  HCOLOR= 3
60  J = 9
70  FOR I = 1 TO 279 STEP 2: XDRAW
         1 AT I,161
80  J = J - 1
90  IF J < 1 THEN J = 9
100  SCALE= J
110  NEXT
120  GOTO 70
```

. . and here are more tips for fertile minds

A common cri de coeur heard about Applesoft programs is that after starting the printer, disc commands will not work.

The most likely reason is that the printer was switched on with a simple PR#1 command. This actually switches off DOS which can be switched on again with a **CALL 1002.**

It is generally better however, to switch on the printer with a PRINT D$"PR#1" where D$ has been previously defined as CHR$(13) + CHR$(4).

Several programs in Windfall and other magazines need to be relocated above the hi-res page(s) because of memory constraints. This has been accomplished using either a preloader Basic program or an EXEC file. It is however, possible to do it from within the program itself as follows:

```
9   REM FOR CLEARING FIRST PAGE
10  IF PEEK(103) = 0 AND PEEK(104) = 64
    THEN GOTO 40
20  POKE 103,0: POKE 104,64: POKE 16384,0
30  PRINT CHR$(4) "RUN PROGRAM"
40  REM START OF PROGRAM
```

Several times in Windfall readers have promoted the idea of using FRE(0) within program loops to "speed up" (actually disguise) the process of garbage collection in Applesoft programs.

There is another way. The zero page pointer $6F,70 (decimal 111,112) gives the start of string memory.

If we change this to point past any "temporary" strings we may set up then only "permanent" strings are pointed at, and we can avoid garbage collection. The easiest is probably to have a subroutine which sets a pair of variables equal to the pointer, thus:

```
1 AL = PEEK(111): AH = PEEK(112): RETURN
```

and another which will reset the pointer after a tempory string is no longer needed, thus:

```
2 POKE 111, AL: POKE 112, AH: RETURN
```

The same idea could be used with the normal variable space but generally it seems less worthwhile.

The dreaded 'OUT OF MEMORY' error may well be caused by your program jumping out of FOR ... NEXT loops too many times. Although you can get away with it now and again it is not really recommended. The solution is to exit the program in an orderly fashion. Suppose your loop is something like this:

```
100 FOR I = 1 TO 100
110 GET A$
120 IF A$ = " " THEN GOTO 1000
130 NEXT I
```

a better loop would be:

```
100 FOR I = 1 TO 100
110 GET A$
120 IF A$ = " " THEN I = 100: NEXT I: GOTO
1000
130 NEXT I
```

One of the best ways of creating an EXEC file is merely to write it out using a word processing package which stores files as standard TEXT files. One such package is Applewriter II.
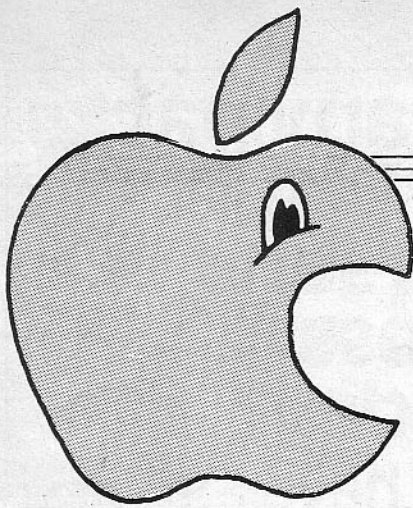
THINK TANK
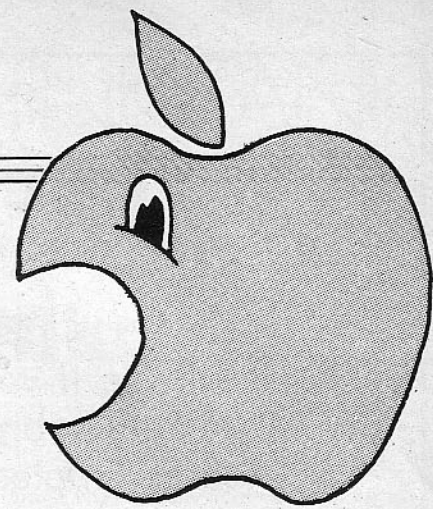
Making the most of your lower case chip

I AM sure the *Windfall* offer of lower case chips has added to the large number of Apple users who now have this facility, writes **Duncan Langford.** I had been meaning to buy one for some time, and I found my Windfall chip both easy to fit, and useful.

As an exercise, I have written a simple program to convert my old favourite FID to lower case display. The original program is very effective, but the screen display is rather obtrusive. Adding lower case transforms things.

The program itself is straightforward. Lower case display has a value of 32 more than the upper case value. POKE 1024,193 puts a capital 'A' in the top left corner of the text screen. POKE 1024,225 (193+32) will put a small 'a'.

To convert all upper case to lower, therefore, we need to add 32 to all upper case values. FID loads from location 2051 to 6737, so if we BLOAD it first, we could use PEEK and POKE to work the conversion.

We only want to convert letters, so we will select only values between 193 (A) and 218 (Z).

First, it is important to set LOMEM — the lowest memory location available to Basic — to a value above the top of FID. Otherwise our conversion routine may trample all over FID instead of converting it. LOWMEM: 10000 will be fine.

PEEKing the original FID on a FOR/NEXT loop will show where the text sections are located. They lie between 4903 and 6390. Theoretically, therefore, keying:

```
FOR I = 4903 TO 6390: POKE I,
   PEEK (I) + 32 * ( PEEK (I) >
   192 AND PEEK (I) < 219): NEXT
```

should convert all upper case to lower. In fact, it also converts a vital chunk of FID's workings.

My final routine is in two parts, to bridge the affected locations between 5000 and 5190.

The other main part of the program is the result of much PEEKing. It changes 39 locations to upper case. This really improves the appearance of the display by capitalising important words.

Finally, the last part changes the position of the wording "FID Version.." and makes the version type LC.

To simplify matters the whole program is written to create a text file, which will itself load FID and convert it before saving it back to disc as FIDLC.

To use, simply type in the listing, taking great care to avoid leaving out quotation marks. It is always worth an extra check when writing a program which generates a text file.

When RUN, the program will create an EXEC file called FIDFILE. Make sure FID is on your disc, and that there's space for a 20 sector program to be added. Then just EXEC FIDFILE.

```
100  REM  FID LOWERCASE CONVERTER

110  REM   (C) DUNCAN LANGFORD
120  REM   11, HILLVIEW RD,
130  REM   CANTERBURY, KENT, UK.
140  D$ = CHR$ (4):F$ = "FIDFILE
150  TEXT : HOME : PRINT "WORKING
     ...
160  PRINT D$"OPEN"F$
170  PRINT D$"WRITE"F$
180  PRINT "LOMEM:10000
190  PRINT "TEXT:HOME:VTAB14:FLAS
     H;";CHR$ (34);"WORKING";CHR$
     (34);":NORMAL:POKE34,23
210  VTAB 23: HTAB 1: PRINT "BLOA
     DFID
220  REM  CONVERT TO L/C: #1
230  PRINT "FORI=4903TO5000:POKEI
     ";CHR$ (44);"PEEK(I)+32*(PE
     EK(I)>192ANDPEEK(I)<219):NEX
     T
240  REM  CONVERT TO L/C #2
250  PRINT "FORI=5195TO6390:POKEI
```

```
     ";CHR$ (44);"PEEK(I)+32*(PE
     EK(I)>192ANDPEEK(I)<219):NEX
     T
260  REM  SET CAPITALS
270  FOR I = 1 TO 39
280  READ J
290  PRINT "POKE";J; CHR$ (44);"P
     EEK(";J;")-32
300  NEXT
310  FOR I = 5902 TO 5915: READ J

320  PRINT "POKE";I; CHR$ (44);J
330  NEXT
340  PRINT "BSAVEFIDLC"; CHR$ (44
     );"A2051"; CHR$ (44);"L4686
350  PRINT "TEXT:HOME
360  PRINT "?"; CHR$ (34);"DONE.
370  PRINT D$"CLOSE
380  PRINT "NOW TYPE 'EXEC FIDFIL
     E', FIRST MAKING  SURE THAT
     THERE'S A COPY OF FID ON TH
     E DRIVE LAST ACCESSED!
390  DATA 5220,5256,5266,5281,536
     3,5491,5530,5566,5607,5637,5
     657,5668,5690,5703,5705,5714
     ,5733,5818,5827,5832
400  DATA 6051,6089,6116,6128,614
     3,6158,6195,6250,6263,6277,6
     289,6303,6312,6324,6344,6359
     ,6373,6387,6227
410  DATA 198,201,196,160,214,229
     ,242,243,233,239,238,160,204
     ,195
```

Zero in on page conflicts

ONE of the problems of writing fast machine code subroutines on the Apple is the lack of available zero page memory, writes **J.P. Lewis.**

Almost all the useful space for doing indirect indexed, or indexed indirect etc. addressing is taken up by all the flags, pointers, and temporary storage addresses that Applesoft needs.

The solution is amazingly simple once you realise that Applesoft is very rarely running while your machine code routines are being used. All you need to do is copy the zero page into some spare memory as you start, then copy it all back as you finish (Figure I is a fragment showing the assembler code needed to do this).

- A more devious example of this game dawned on me a little while ago while discussing a problem of data logging with a friend who was experimenting with an analogue to digital converter.

Basically he wanted to sample an incoming signal as frequently as possible, then plot a graph of it on the hi-res screen. Since he had produced a set of high speed plotting routines that could handle up to 256 points extremely quickly, this was the maximum number of data values he wanted to capture at once.

The A/D converter he had built was capable of working so fast that he needed very little time between triggering the conversion and reading the data, and he could already handle a signal of 55kHz. The key segment of code he used looked like Figure II. Note particularly the indexed addressing. Unfortunately this wasn't good enough, as he really wanted to get closer to 100kHz sampling.

After some discussion he came up with a query about how much room there might be on the stack for pushing the data as it came in. As soon as he had said this I realised that the problem was solved.

All we had to do was put the stack (which is, after all, just a single memory page, $100-$1FF) somewhere else while the sampling was going on, then bring it back before we had a crash. This left a whole 256 bytes for pushing the data as it came in, and cut down the time between samples by over 40 per cent.

The key coding for this job, with comments, is shown in Figure III. The crucial point to recall if you want to use this sort of trick for your own applications is that you must NOT do any JSRs or RTSs from the moment you get rid of the stack until you bring it all back again.⬤

```
          .OPT NOS
          *=6000

          LDX £0
LOOP1     LDA $0,X
          STA BUFFER,X
          INX
          BNE LOOP1

          ;The routine goes in
           here
          LDX £0
LOOP2     LDA BUFFER,X
          STA $0,X
          INX
          BNE LOOP2
          RTS

BUFFER    =*
```

Figure I: Fragment of code to surround a routine that needs a lot of spare space on page zero

```
          TRIGER  =$COA1  ;Triggers conversion on A/D
                          ;converter in slot 2
          VALUE   =$COA0  ;Value returned here.

                  .OPT NOS,NOL
                  *=$6000

                  LDA TRIGER      ;Start first conversion
                  LDX £0
                  NOP
LOOP1             LDA VALUE       ;Get last reading
                  STA TRIGER      ;Start next conversion
                  STA BUFFER,X
                  INX
                  BNE LOOP1
                  RTS

          BUFFER  =*

                  .END
```

Figure II: Fragment of normal type of data-reading loop

```
          STACK   =$100
          VALUE   =$COA0
          TRIGER  =$COA1

                  .OPT NOS

                  *=$6000
                  LDX £0
LOOP1             LDA STACK,X     ;Save the stack.
                  STA BUFFER,X
                  INX
                  BNE LOOP1

                  TSX             ;Find current value of stack pointer
                  STX TEMPST
                  LDA TRIGER      ;Trigger first conversion
                  LDX £$FF        ;Set pointer to bottom of stack
                  TXS

LOOP2             LDA VALUE
                  STA TRIGER
                  PHA             ;As the value is pushed onto the
                  TSX             ;stack, the stack pointer is
                  BNE LOOP2       ;decremented, so TSX sets the zero
                  LDA VALUE       ;flag when the stack is full.
                  STA STACK,X     ;Save the last loaded value.

LOOP3             LDA STACK,X     ;Put the stack page into the
                  STA DATA,X      ;data block, and replace the
                  LDA BUFFER,X    ;original stack values.
                  STA STACK,X
                  INX
                  BNE LOOP3

                  LDX TEMPST      ;Put the stack pointer back to
                  TXS             ;its original value.

                  RTS

          TEMPST  =*
          BUFFER  =TEMPST+1
          DATA    =BUFFER+$FF

                  .END
```

Figure III: Data reading loop, using the stack space

Apple Interactive Data Analysis

A REVIEW of the Apple IIe by Peter Brameld in last April's *Windfall* summed up the changed situation since the first Apple appeared in 1977 as follows: "At that time (1977) most users were computer buffs with a good understanding of how the machine worked, along with the wish to get to grips with the nuts and bolts of the system. By contrast, today's user is seen as a professional person who wishes to supplement existing skills without having to bother how the computer works."

If this statement is true of hardware it is certainly also true of software. The "professional person" has to carry out his business activities and make crucial decisions in the context of increasingly complex markets.

He has never had so much data available, but how can he reduce it to manage-

By CHRIS MACKEL

able proportions and assimilate it into the business?

The cost of writing adequate software is just too high. What tends to happen is that guides to programming gather dust on our shelves, while he is left to hand-crank data — often failing to give adequate analytical treatment simply because the basic manipulation is too time consuming.

At the output end he is left trying to pressurise visual aids (if he is lucky enough to have one) into producing graphs on time, and into tedious checking of tables for typing errors.

For those who have experienced these problems and frustrations, Applitech's Apple Interactive Data Analysis (AIDA) appears like an oasis in the wilderness for a weary traveller. But is it a friendly rest for the business user or simply just another expensive (£450 for the whole package) mirage? This article will answer this question by first outlining what AIDA will do and then describing the author's experiences with it.

AIDA is a Pascal-based program and comes in the form of two floppy command discs plus data disc(s) and a reference manual. To operate the system the user will require the Apple II — a IIe version is being developed — with 64k, two disc

drives and a monitor. To obtain hard copy a printer and plotter are necessary.

The first disc gives the user access to the program and contains all the basic routines except for Forecast. If the user requests "Forecast" then this requires the insertion of the second disc as a replacement for the first. Once inserted, this disc will carry out all the basic routines contained on the first disc except for Report write, so there is no need for constant switching between program discs.

So what exactly will AIDA do? Well, before discovering that you have to gain access via your own personalised password — a useful device if you have your company's sales records locked up on the disc.

Once into the program the first major feature is the main menu. This main menu, or command level, and subsidiary menus or task levels for each basic function, are the signposts around which AIDA is built.

The user progresses by responding positively to the plain English questions/commands appearing on the monitor or retraces their steps to the previous task level via the escape key. This basic feature of plain English, and routing through well developed menus, makes the whole program very user friendly.

The request for HELP will gain a screen listing with summary explanation of all the major functions of AIDA. The request for INPUT gives the user the options of either storing a new variable or adding further data to an existing series. The user can also go directly to any point in an existing data series to correct an error without disturbing other observations.

Time series data may be on a daily, weekly, monthly, quarterly or yearly basis.

Cross-sectional and survey data can also be processed. If the user elects the daily option then they must also choose between a five and seven day week. If a five day week is chosen then the user is automatically locked into the inbuilt calendar.

Try entering data for a Sunday and you will get a rude noise and a derogatory comment, but beware, it doesn't know about Bank Holidays. A non-available option (NA) is there for missing data, but again beware because at present NA in a data file prevents the forecast option from functioning.

Once the frequency interval for date is chosen the program automatically prompts with each new entry date at the completion of the previous observation. It is impossible to exceed the parameters set, for example five lots of quarterly data, and impossible to use the same variable name twice — all features adding to its user friendliness and idiot-proof qualities.

Once data is stored the user has the option of the TRANSFORM command. This can take any form specified by the user from simple arithmetic changes to more complex mathematical expressions. Also, of course, tranformations can be made using an existing variable as an operator — for example food sales as a percentage of total sales for the last 36 months.

Any new variable created in the transformation can be saved or dumped. It is not possible to store the transformation routine in an interactive form, but it can be saved via a comment routine for future reference.

For those who have toiled with graphs in the past, the GRAPHING routine will be a welcome highlight of the program. Up to

A punter's view

Figure I: Bar chart produced on Watanabe plotter
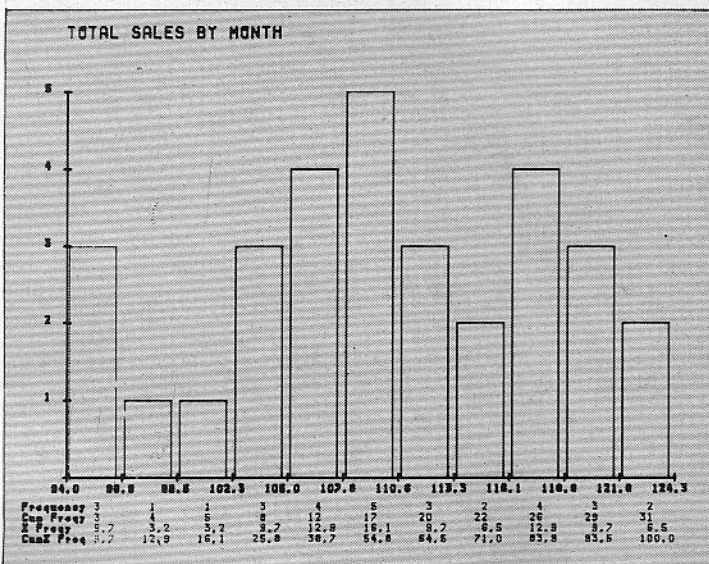
Figure II: Histogram with full statistics

four variables can be plotted using either an Anadex 9501 with buffer, or Epson range of printers or a variety of plotters — currently Watanabe and Sweet P. I have used the package with a Watanabe six pen plotter. For plotting one variable the user has the option of:

● Overwritten: For example monthly data for five years, split into annual periods and each year overwritten, an excellent way of comparing seasonality of sales etc.

● New: Each period plotted on a new graph.

● Bar chart: Shown in Figure I.

● Histogram: Printed with relevant statistical information and shown in Figure II.

With two or more variables the options are reduced to a straightforward graph of the variables against one another (Scattergram) or a graph of different variables against time as shown in Figure III.

As you can see, the graphics are of a high order and capable of direct reproduction. Presentation can be improved by options of including the origin and/or extending the vertical axis beyond the maximum recorded value.

The DIRECTORY command gives the user further important data manipulation procedures. Its most basic function is to list existing variables, but more importantly the user can change variable names, delete variables, transfer data from one disc to another, and alter both the periodicity and range of existing variables.

These are all crucial functions to any data manipulation program, and it is a

Figure III: Four variables plotted over time

function which I am using more and more as my data bank grows.

Using the simple PRINT routine a summary of statistics, including mean, range, and standard deviation, can be obtained for each variable. With the REPORT routine (which is not on the forecast disc) composite tables of existing variables can be created and printed out. An example is shown in Table I. Once created the table can be stored for future use.

For those acquainted with statistical analysis, the REGRESSION command will be self explanatory. For those to whom statistics is alien territory regression simply means plotting one variable (Y) against one or more other variables (X) to see if there is any explanatory dependency of the Y variable upon the X variables.

For example, to what extent can the variability in total sales (Y) be explained by advertising expenditure, price charged, competitors prices etc? For those interested in technical details the regres-

FINANCIAL INDICATORS 1979 TO 1981				
Date	FT 500	FT 113	INTEREST RATES	GOVT STOCK PRICES
Dec1978	243.10	286.81	12.50	20.30
Jan1979	242.70	290.82	12.50	20.00
Feb1979	243.90	281.91	14.00	20.40
Mar1979	276.80	270.09	13.00	23.30
Apr1979	298.00	263.48	12.00	23.30
May1979	293.10	267.81	12.00	22.10
Jun1979	276.90	260.71	14.00	21.90
Jul1979	267.60	257.50	14.00	23.10
Aug1979	268.90	247.50	14.00	23.40
Sep1979	271.70	253.06	14.00	23.30
Oct1979	274.70	263.24	14.00	22.00
Nov1979	247.80	269.22	12.00	21.10
Dec1979	249.50	266.18	17.00	21.30
Jan1980	257.90	268.76	17.00	22.40
Feb1980	275.20	273.73	17.00	20.40
Mar1980	266.30	291.45	17.00	19.70
Apr1980	262.10	302.77	17.00	19.80
May1980	264.80	312.02	17.00	20.60
Jun1980	276.80	318.93	16.00	21.00
Jul1980	294.10	319.64	16.00	22.20
Aug1980	295.00	318.30	16.00	20.90
Sep1980	301.80	311.52	16.00	21.40
Oct1980	307.40	311.01	16.00	21.70
Nov1980	318.90	320.45	14.00	21.50
Dec1980	309.00	329.17	14.00	20.60
Jan1981	297.70	332.60	14.00	20.80
Feb1981	309.20	243.50	14.00	20.90
Mar1981	314.10	248.70	12.00	20.80
Apr1981	327.10	259.70	12.00	20.60
May1981	197.80	252.10	12.00	
Jun1981	185.35	257.30	12.00	

SOURCE:STATISTICAL DIGEST

Table I: Financial data produced via the report routine

sion is carried out using ordinary least squares, or by an iterative process to take account of autocorrelation. The program can handle large regression problems quickly — a 50 x 20 matrix can be computed in approximately two minutes.

The FORECAST command requires a change of disc, and once inserted the user has the option of identifying the underlying trend in the data by exponential smoothing or moving average techniques. These smoothed values can then be extrapolated forwards using a least squares regression procedure.

Even for those with little previous statistical experience, the ability to easily deseasonalise data using a moving average will be a welcome benefit — knocking the "spring sales effect" out of monthly sales data or removing the "accounting period effect" from stock exchange data.

To the statistical buff these techniques may appear very Mickey Mouse, but they do have the major advantages of simplicity, speed and ease of operation. For the average professional user these will be quite adequate, providing they

remember that judgement and interpretation are the key to successful forecasting.

All smoothed and extrapolated values can be saved and graphed using any of the routines available under the GRAPH command.

Finally comes the END command, which enables the user to exit AIDA gracefully and successfully. All new data is automatically stored on disc, and unused space on the disc is mopped up. Any number of data discs can be mopped up in this phase.

The originators of AIDA deserve high marks for the conception of the program and its undoubted potential, but what has been my experience as a user of the package over some months?

As an introduction to my remarks I must admit that having heard of AIDA I pushed Applitech into letting me have it before it was probably ready for general release. As a result I am now into my fourth, and very much improved, version which is working perfectly without any of the earlier bugs.

I have also found that the INPUT routine works just as the manual said it should. Access and user friendliness are excellent and idiot traps in the program make it very difficult to generate erroneous entries.

The inbuilt calendar for daily data is an excellent innovation which was not present in my first version. Without this facility the plotting of daily data in graphical form was difficult to interpret. Clerical assistants at work have also found the routine extremely easy to use.

I have also bought a numerical keypad — a worthwhile addition to the Apple II if you have masses of data to enter quickly.

I am making increasing use of the Transformation routine. It is a pity that TRANSFORM routines cannot be saved in an interactive form, but at least they can be recorded as a comment. Applitech assure me that if I find that I am using a particular routine a lot then they can probably write it into the program.

The quality of graphing shown in the diagrams reproduced speaks for itself. For those whose previous encounters with plotting programs was that you required extensive programming experience, and that actually getting the plot in the right place at the right size, resembled finding the co-ordinates for Startrek — then relax.

Plain English requests come up on the monitor enabling you to position the origin and set the size of the plot in 1/10th inch steps.

The plotting arm moves in response to each of the parameters set, and requires you to OK the dimensions before beginning the plot proper. In this way a plot can be graded in size from postage stamp to A3 (depending on plotter) and/or positioned to suit a space left in printed text.

My six pen plotter obviously prints the original in colour, but I have found that the different symbols used, plus key, are sufficiently distinctive for a monochrome reproduction.

AIDA was originally written for the

Watanabe 10 pen plotter and at first I had problems with the six pen machine. Labels were overwritten along the X axis, but this problem has now been solved as you can see from Figure III.

When using the overwritten option it is best to use the ALTER routine (directory task level) in order to plot each year's data plotted in a different colour/symbol.

Also a colour monitor would be a definite advantage, as reproduction of graphs on the screen is so fast that it is difficult to tell which line is which in mono.

At first I used the DIRECTORY and PRINT commands for little more than listing variables, but I am finding them increasingly useful tools for carrying out a variety of data manipulations.

For someone who previously spent hours hand jigging data, recreating tables and searching for missing sheets of paper, it provides an excellent relief.

As I have said, the forecasting option provides a very basic tool kit, but then what else would you expect on a micro? The important thing is that again it gives you easy access and therefore puts another guide to decision taking within desktop reach.

The user must, of course, be aware that the forecast will only be as good as the data used, the appropriateness of the co-efficients chosen and the user's ability to interpret the results.

To summarise, I have found the conception of the program excellent. It will do everything that I envisaged one day writing my own program to do.

More importantly, I have it now, without the expenditure of countless hours of programming. It is extremely user friendly so that a wide range of colleagues and clerical staff have successfully used it with a minimum of training.

Over the initial few months I have had a number of headaches, but these related more to my impatience to get my hands on AIDA than any inherent weakness in it. Further, I have found Applitech very quick to correct faults or amend the program. For example, the adaptation to suit the six pen plotter, and the introduction of the calender.

Applitech say that they are committed to a program of development (a promise which they have so far kept) and talk of a merge routine and a 28 day month input option.

Apparently they are also working on a hard disc version which will give the possibility of networking and discrete levels of access to data via separate personalised user codes. This hard disc version will be marketed world wide through Atlantic Software, Nottingham.

I suppose the final test of any program is, do I regret parting with the cash? The answer must be "No." My increased work efficiency and that of my colleagues make the £450 for the complete package extremely good value.

* Dr Mackel is Senior Economist, Economics Division, School of Agriculture, University of Aberdeen.

File-Fax, easy to understand and fun to use

FILE-Fax, by TMQ Software, includes master disc, fold-out reference guide and manual. The tutorial is designed "to be concise and understandable to those who have little or no background in computers" and we think this is a justifiable claim — it is easy to read and understand, with many illustrations of screens.

The program requires at least 48k and one disc drive. Although this may be of minimal interest to readers of *Windfall*, File-Fax also runs on the Atari 800, the IBM PC, the NEC PC8-8001 and the Osborne 1.

The same manual serves for all these micros, which leads to some either/or pages which are well dovetailed into the manual.

There are now many database management programs for the Apple IIe — at least 20 are available on the British market. The authors of database programs generally assume that the user's greatest need is to make mailing lists, or lists of employees.

However, we know many Apple owners who use their computers for a wide range of purposes, but not for lists of addresses or employees. Perhaps the British are less geared to these uses than their American cousins.

Database management is, however, only an elaborate name for the process of making lists, searching, sorting, and, if necessary, printing them. So if you keep any kind of record that you need to consult often, such as a card index, catalogue or bibliography, lists of the journeys your pigeons flew, the number of eggs your hens laid, or the peals of Bob Major you have rung, you might consider transferring the records to a database management system.

The Visidex manual lists no fewer than 101 applications for the Visidex system. It would be interesting to hear of unusual applications of database programs by *Windfall* readers.

Database programs for the Apple normally allow the user to design the format into which the data is entered — the fields, records and files (although there is not very much manipulating of complete files, which often take up a whole disc).

The program should make it easy for the user to edit both the format and the data without horrendous problems.

Database programs offer sort procedures in some or all fields alphabetically or numerically, often in both ascending and descending order (that is A-Z, Z-A, 1-999, or 999-1).

Associated with sort there is often a selection capability operating in some or all fields ("list names of all convicted burglars named Daniel with blue eyes and size 13 shoes").

Finally the program should produce a "report" from the data, either a screen display or a printout of some or all of the material, arranged and printed in a format designed by the user. Sometimes you cannot get sorted and selected data on the screen, only at the printing stage. This limitation does not occur in File-Fax.

It fulfils all the requirements of the standard database management program for a micro, and in several areas offers extra advantages. It can be used with only one disc drive, because once the File-Fax

By BARBARA and CHARLES ENGLISH

disc has been booted the program itself is totally resident in memory and the master disc can be put away.

For those who don't have a second drive this saves a lot of time swopping discs. Even for those who have two or more drives it is good to think that your expensive program disc is as safe as possible — yes, we know you can get a replacement disc for $20 or so from Buffalo Grove, Illinois, (computer companies in the US have such eloquent addresses) but imagine the hassle.

You are not restricted solely to one disc, however. You can run any number from one to eight off File-Fax if you have multiple disc drives.

Working our way past the none too attractive title page we discovered that the program is basically menu-driven,

```
                RELEASE 2 MAIN MENU

A.   DATA ENTRY AND RETRIEVAL

                   UTILITIES

B.   DEFINE SYSTEM CHARACTERISTICS
C.   CATALOG A DISK
D.   PRINT AN APPLICATION SCREEN
E.   COPY A DISK

APPLICATIONS                  REPORT FORMATS

F.   CREATE                   I.   CREATE
G.   MODIFY                    J.   MODIFY
H.   EXPAND                    K.   DELETE

             PLEASE ENTER YOUR SELECTION
```

The main memary of File-Fax

except for the actual designing of the record (and subsequently the report) which is done using cursor controls like a word processor.

The designing process allows great flexibility in the layout of the record, with special commands offered which shift individual lines around the screen as desired. For instance, CTRL—A automatically centres any line, CTRL-L inserts additional lines and CTRL-K kills excess lines. The cursor is controlled by the square of letters:

WER
SDF
XCV

We found this slightly more awkward than the more familiar:

I
JK
M

for as the left hand is using the control key at the same time, both hands are working in a confined space on the left-hand side of the keyboard.

Each File-Fax record occupies one screen page. The screen page contains 24 horizontal lines, of which the first line is reserved for a title, and the last line for information and error messages.

But the record (the screen page) can contain a maximum of 31 fields, for you can put more than one field on a line.

A telephone number such as 01-123-456 might be entered as three fields (code, exchange, number) The advantage of entering it as three fields rather than one is that you can subsequently search or sort code, exchange and number separately.

The screen page is 40 columns wide. The field name, the [] or < >brackets that designate the input field and the data in the field must therefore fit within 40 columns (use no more than 40 characters). So
AREA WHERE SUSPECT LAST SIGHTED [CLIMBING BUCKINGHAM PALACE WALL BY MEWS GATE]
would not do. The field must fit in one line on the 40 column screen.

The screen always tells you when you are creating a new application and the line
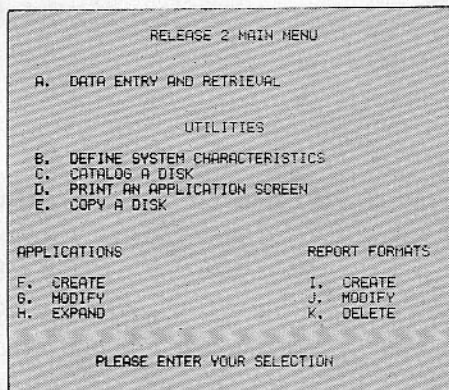
```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
*                  ELEMENTS                    *  1
*                                              +  2
*                                              +  3
*                                              +  4
*                                              +  5
*   ELEMENT NAME           [            ]+  6
*                                              +  7
*                                              +  8
*   FORMULA                [   ]          +  9
*                                              + 10
*                                              + 11
*   ATOMIC NUMBER              < >        + 12
*                                              + 13
*                                              + 14
*   MASS NUMBER                < >        + 15
*                                              + 16
*                                              + 17
*   ELECTRON CONFIGURATION <>/<>/<>       + 18
*                                              + 19
*                                              + 20
*                                              + 21
*                                              + 22
*                                              + 23
+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+*+
```

*Figure I: A typical
application screen*

```
 S   L   C   F   ATTRIBUTES
13   6  27  F@  AZ BL LJ
 2   9  27  FA  AZ BL LJ
 3  12  26  FB  09 BL DP VN RJ
 3  15  26  FC  09 BL DP VN RJ
 2  18  26  FD  09 BL VN RJ
```

and column on which the cursor is standing. This is very helpful. How often we have wished our neighbourhood (un)friendly mainframe had the same facility.

Having designed your own record and fields, the program allows you to specify what sort of information goes into the fields. If one of your field names was "TYPE OF CRIME" you could predetermine that the answer subsequently typed in must be alphabetical, that is one or more words.

The program would, if you had so defined the attributes of the field, reject an entry of "999" but accept one of "ARSON".

The attributes that control the type of characters that can be entered into the field are AZ (alphabetical), YN (yes/no), BL (blank), +− (plus or minus numbers), DP (decimal point), 09 (numerical), VN (valid number), DC (dollars and cents).

Two additional commands (of a somewhat different type) that can be set at this stage are LJ, RJ (left, right justification). Combinations of attributes can be set. This definition of attributes, a characteristic of mainframe programs, is an excellent way to avoid wrong entries in the data, At least it rejects all those entries that are arrant nonsense, such as WEAPON (01-666-111) although typing errors such as WEAPON (LUGGER) would still slip by.

If no attributes are set, defaults operate that allow any type of data in any field. A useful feature is that the "application screen" (equivalent to an uncompleted form) can be printed, along with the attributes set.

Figure I is an example of an application screen created to record some facts about chemical elements. The lines of the screen are numbered, and the columns at the foot record the size of the field, the line and column number of the field, the internal field name, and the attributes that were set for the screen.

File-Fax stores data in an order established by the first field (in the example above, ELEMENT NAME). That can be changed, however, by telling the program to sort the data according to fields other than the first before displaying it on the screen or printing it (for example, sorting the elements by MASS NUMBER).

The sorting can be up to eight levels, so that eight different fields can be specified to distinguish nearly identical cases.

For instance, if an application screen was created to enter books, and an eight-level sort was requested, by surname, initial, book title, publisher, date of publication, number of edition, overall size and number of pages, all books found to be identical in the first field chosen for the sort — let us say SURNAME QUETZL — would then be sorted by the second field specified INITIAL<>Z .

All those that turned out to be written by QUETZL, Z, would be further sorted by the third field TITLE, giving for instance QUETZL, Z, MAGIC SQUARES, and if there were several books of that description, the sort process would go through the eight levels until, hopefully, some unique difference was established.

Alphabetical sorts in File-Fax run from A to Z. Numerical sorts in File-Fax, rather unusually, from low numbers to high, and not vice versa. So, exam marks can be listed from the bottom mark upwards, but not in the usual order.

This we thought was a limitation of the program, and our only serious criticism. Numerical sorts, more than alphabetical ones, should be able to work in both directions.

Any records entered in the database can be searched for, displayed or altered. This can be a keyword search, but an additional facility is that it is not necessary to remember the whole or even much of the entry.

If you are looking, say, for an entry which contains somewhere in it the letters LOU you can search all fields for such a combination of letters by the command !LOU.

Finally File-Fax allows you to create a report from your data, and display this on screen or in print in a format designed by the user. Up to four report formats can be stored on the primary disc.

The reports can be from 10 to 132 columns wide and, as in the "create an application" mode, the bottom of the screen keeps the tally of line and column, and adds title and field. If you use more than 40 columns of the ordering screen the screen will scroll across.

We liked the program very much. It was easy to understand, and as the manual promised, not only easy but fun to use.

Help screens were available at every stage on the command CTRL−G, and there were plenty of warnings and understandable (and very polite) error messages. All the menus were clear and unambiguous. The use of inverse lettering or blocks helped towards easier editing.

Possible criticisms: Some might find a single screen of 22 by 40 too small a space for a full record. We thought, as mentioned above, that numbers should be able to be sorted from highest to lowest as well as from lowest to highest, but File-Fax only allows the latter. These criticisms apart, it is a useful, straightforward and flexible program.
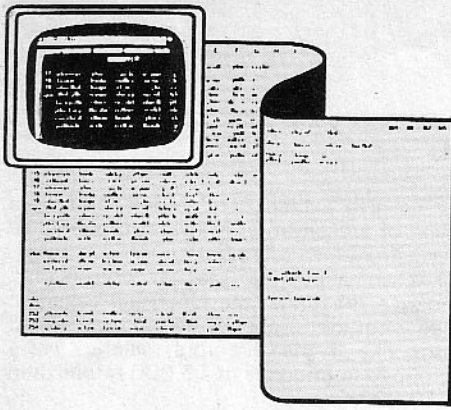
When it comes to mastering Visicalc

PRACTICE MAKES PERFECT

By NICK LEVY

ONE of the main stumbling blocks that every Visicalc user must overcome (or for that matter also every Multiplan and Supercalc user) is to master the skills of REPeat dupLICATING — replicating — or what Multiplan and Supercalc call COPYing.

Your learning curve of using Visicalc will quickly come to a halt or stay at a plateau for a very long period until you learn to execute correctly and instinctively the various combinations of key stroke sequences which follow the /R command.

Learning how to replicate is almost like learning to play a musical instrument. The skills can only be acquired with regular practice. In the same way as you improve your ability of playing musical instruments by continuously practising scales, so you can also improve your performance of using Visicalc by playing the replicating scales.

Just as the sounds produced by musical scales are not considered proper music — although some of these scales are real music to my ears compared to some of the noises that I hear performed at concerts — so replicating scales are no more than nice looking Visicalc models which have no specific practical applications except as a training aid.

Before proceeding further I have to introduce three special notations which we are going to use in our replicating practice.

[R] stands for RETURN. In other words, when you see the sign [R] press the RETURN key. This is not a recognised conventional notation and applies only to the presentation that follows.

: (colon) used in the course of replicating acts as the RETURN key and performs exactly the same function as pressing [R]. This is worth repeating: Typing a colon (:) in the process of replicating has the same effect as pressing [R] (RETURN).

Incidently, you can also type a colon instead of RETURN at the end of a GO TO command. Why not try it for yourself? Type >Q123: and see what happens, or better still type /X>Q123:.

'↑' stands for the co-ordinate of a specific Visicalc cell (for example G20, K123 etc). Such co-ordinates can either by typed or (better for training purposes) can be entered automatically by pointing with the cursor to the relevant cell. This too is not a conventional notation and is only introduced for the purpose of the presentation which follows. All the other notations used for practising the replicating scales are exactly as shown on the Apple keyboard.

There are only four possible key stroke sequences beginning with /R (the start of the replicate command). Remember that in the following notations the colon (:) performs the same function as [R] (the RETURN key). If you are using the Apple IIe you will be better off pressing [R] instead of the colon because the colon in the IIe is in the upper case mode. The four possible replicating sequences are:

   (a) / R : ↑ :
   (b) / R : ↑ . ↑ :
   (c) / R . ↑ : ↑ :
   (d) / R . ↑ : ↑ . → :

The first sequence will copy a single cell into another cell.

The second will copy a single cell into a number of cells in any one row or column.

The third will copy a single row or a column into another single row or a column (respectively). Note that you cannot replicate a row into a column or a column into a row.

The fourth will copy a single row or a column into several rows or columns.

Finally, if you are copying formulas, Visicalc is going to ask you a few simple questions. We are going to deal with these in the replicating exercises which follow.

To start practising the replicating scales, load the Visicalc program and follow these instructions:

1. Type /GC5[R]
2. Place the cursor on A1 and type 1[R]
3. Place the cursor on B1 and type 1+A1[R]
4. With the cursor on B1 type /R:C1.L1:R
5. Place the cursor on A2 and type 1+A1[R]
6. With the cursor on A2 type /R:A3.A15:R
7. Place the cursor on A16 and type /[R]
8. With the cursor on A16 type /R:L16:
9. Place the cursor on A1 and type /B[R]
10. With the cursor on A1 type /R:B1:
11. With the cursor on A1 type /R:A2:
12. With the cursor on A1 type /R:H1:
13. With the cursor on A1 type /R:A10: *(Pause — the following command will clear the screen!)*
14. Type /CY and start all over again.

Repeat this exercise till you find that you can carry out the 14 steps in two minutes without looking at the script. Then repeat it once more but this time stop after the seventh step. Move the cursor along row No. 1 and note the formulae in each of the cells from B1 to L1. These formulae should appear on the top line of the screen (the Entry line) and they should read: 1+A1, 1+B1, 1+C1, etc.

Place the cursor on B1 — it should show 2 and contain the formula 1+A1 — and type alternately:

   /R:C1.L1:N
   /R:C1.L1:R

Before typing the final N or R in each of

the above two commands always pause for a moment and look at the highlighted cell reference appearing on the third line from the top of the screen (the Edit line). It should show 1+A1, with the A1 being highlighted.

Note that the same formula also appears on the very top line of the screen (the Entry line). Observe that when you end the replicating command with N, then whatever value is in A1 will appear in every cell from C1 to L1. But if you end the replicate command with R, then there are going to be different values in each of the cells from C1 to L1.

Repeat this exercise four times.

Arising from the above exercises, try to draw your own conclusions as to when you should respond with N and when to respond with R if prompted to do so by the Visicalc program.

Next place the cursor on A2 – it should contain the formula 1+A1 – and type alternately:

/R:A3.A15:A
/R:A3.A15:R

Repeat four times.

Observe the changes that occur on the screen when you type either N or R in response to Visicalc's prompting. Note that responding with N (for no change) means that the content of the cell which is highlighted in the Edit line will appear as part of the calculations in every one of the cells into which a formula is being copied. So if you do not wish this to happen, always respond with R (for relative) and let Visicalc find the relevant cell reference.

So far we have covered the first two out of four possible replicating key stroke sequences. Keep practising the twelve steps described above and you will be ready to start working on the next set of replicating scales which will appear in the next issue of *Windfall*.

We are now going to look at a "confidential" list of directors' salaries (Exhibit I). The model does not necessarily apply only to directors' salaries. It could just as well apply to a table of mileage per journey or hours per job or weight per batch etc. But it always sounds better and looks more interesting if the figures are made to refer to a confidential list of directors' salaries, even if the whole thing is completely fictitious.

Exhibit I shows that our company has 12 directors earning a total of £300,000. Four directors earn between £10,000 and £20,000 and are paid a total of £61,000 which accounts for 20 per cent of the directors' salary bill (see rows 18 to 20).

Five directors earn between £20,000 and £30,000. Their wage bill is £122,000 and accounts for 41 per cent of all the bill. Two directors earn between themselves £72,000, equal to 24 per cent of the salary bill, and so on.

To give Exhibit I its proper name, this type of presentation is known in statistics as a frequency distribution.

It so happened that at one of the board's meetings, the chairman asked to see what the frequency distribution would look like if the directors' salaries were grouped in intervals of £5,000 rather than £10,000.

Within seconds of making this request Exhibit I was transformed into Exhibit II, and it was all done by just changing a single value in cell C3 (and pressing the ! twice).

The formula in C3 was originally +C2+9.99999 (ie 0 + £9,999.99). This was changed to +C2+4.99999 and all the other changes followed from there, because the formula in D2 is +C3+.00001 (that is whatever value is in C3 plus one penny), and the formula in D4 is +D2+C3-C2 and so on along rows 2 and 3.

Now how was the count of the directors in each category made? You could not use Visicalc's @COUNT command because @COUNT counts each of the zeros between C5 and N16 as 1. So @COUNT will always report that there are 12 directors in each of the 12 salary brackets in Exhibit II (making a total of 144 directors). The secret of counting lies, therefore, in a simple technique which does not make use of Visicalc's @COUNT command and is demonstrated in Exhibit III, which is a continuation of Exhibits I and II.

Each cell between C24 and N35 is linked to a cell between C5 and N16. For example, the formula in E28 is @MIN(E9,1). As E9 (Exhibit II) contains 10, and as 1 is less than 10, cell E28 will display 1. Similarly the formula in E29 is @MIN(E10,1). As E10 contains 0, and as 0 is less than 1, cell E29 will display 0.

All we have to do now is to add up all the 1s in each column between rows 24 and 35 and record the results in row 20 (Exhibit I or II) and we get the number of directors in each category.

The board was fascinated with the model and was curious to find out how the model would react if one of its members's salary was increased to £64,000 while the frequency distribution continued to be displayed at £5,000 intervals.

It was agreed to change Director Hall's salary (cell B12) to 64. The results are shown in Exhibit IV.

As you can see, warning signs in the form of asterisks have suddenly appeared in column O. Visicalc was thus made to signal that everything is not as it should be, implying that either the salary range used by the model must be extended or that the group intervals should be increased.

How is it all done? How was Visicalc made to signal that a certain input was outside the range that can be handled by the model? It's all done by a combination of special cell formatting and formulas, which we shall discuss in one of the forthcoming articles in this series.

At a subsequent meeting the board was rather displeased with Director Adams' performance which was not good enough for a man earning £25,000. So it

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		---)	DIRECTOR'S	SALARIES	-	FREQUENCY	DISTRIBUTION				(---	CONFIDENTIAL!			
2		SALARY	0	10	20	30	40	50	60	70	80	90	100	110	
3		NAME '000	10	20	30	40	50	60	70	80	90	100	110	120	
4	---														
5	ADAMS	25	0	0	25	0	0	0	0	0	0	0	0	0	
6	BALL	18	0	18	0	0	0	0	0	0	0	0	0	0	
7	COX	25	0	0	25	0	0	0	0	0	0	0	0	0	
8	DAVIS	35	0	0	0	35	0	0	0	0	0	0	0	0	
9	EVANS	10	0	10	0	0	0	0	0	0	0	0	0	0	
10	FORD	22	0	0	22	0	0	0	0	0	0	0	0	0	
11	GILES	15	0	15	0	0	0	0	0	0	0	0	0	0	
12	HALL	18	0	18	0	0	0	0	0	0	0	0	0	0	
13	IVES	37	0	0	0	37	0	0	0	0	0	0	0	0	
14	JAMES	45	0	0	0	0	45	0	0	0	0	0	0	0	
15	KEEN	28	0	0	28	0	0	0	0	0	0	0	0	0	
16	LORD	22	0	0	22	0	0	0	0	0	0	0	0	0	
17	---														
18	TOTAL	300	0	61	122	72	45	0	0	0	0	0	0	0	
19	% PAY	100	0	20	41	24	15	0	0	0	0	0	0	0	
20	COUNT	12	0	4	5	2	1	0	0	0	0	0	0	0	
21	===														

Exhibit I

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		---)	DIRECTOR'S	SALARIES	-	FREQUENCY	DISTRIBUTION				(---	CONFIDENTIAL!			
2		SALARY	0	5	10	15	20	25	30	35	40	45	50	55	
3		NAME '000	5	10	15	20	25	30	35	40	45	50	55	60	
4	---														
5	ADAMS	25	0	0	0	0	0	25	0	0	0	0	0	0	
6	BALL	18	0	0	0	18	0	0	0	0	0	0	0	0	
7	COX	25	0	0	0	0	0	25	0	0	0	0	0	0	
8	DAVIS	35	0	0	0	0	0	0	0	35	0	0	0	0	
9	EVANS	10	0	0	10	0	0	0	0	0	0	0	0	0	
10	FORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
11	GILES	15	0	0	0	15	0	0	0	0	0	0	0	0	
12	HALL	18	0	0	0	18	0	0	0	0	0	0	0	0	
13	IVES	37	0	0	0	0	0	0	0	37	0	0	0	0	
14	JAMES	45	0	0	0	0	0	0	0	0	0	45	0	0	
15	KEEN	28	0	0	0	0	0	28	0	0	0	0	0	0	
16	LORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
17	---														
18	TOTAL	300	0	0	10	51	44	78	0	72	0	45	0	0	
19	% PAY	100	0	0	3	17	15	26	0	24	0	15	0	0	
20	COUNT	12	0	0	1	3	2	3	0	2	0	1	0	0	
21	===														

Exhibit II

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
23															
24		0	0	0	0	1	0	0	0	0	0	0	0	0	
25		0	0	0	1	0	0	0	0	0	0	0	0	0	
26		0	0	0	0	0	1	0	0	0	0	0	0	0	
27		0	0	0	0	0	0	0	1	0	0	0	0	0	
28		0	0	1	0	0	0	0	0	0	0	0	0	0	
29		0	0	0	0	1	0	0	0	0	0	0	0	0	
30		0	0	0	1	0	0	0	0	0	0	0	0	0	
31		0	0	0	1	0	0	0	0	0	0	0	0	0	
32		0	0	0	0	0	0	0	1	0	0	0	0	0	
33		0	0	0	0	0	0	0	0	0	0	1	0	0	
34		0	0	0	0	0	1	0	0	0	0	0	0	0	
35		0	0	0	0	1	0	0	0	0	0	0	0	0	

Exhibit III

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		---)	DIRECTOR'S	SALARIES	-	FREQUENCY	DISTRIBUTION		<---	CONFIDENTIAL!					
2		SALARY	0	5	10	15	20	25	30	35	40	45	50	55	
3	NAME	'000	5	10	15	20	25	30	35	40	45	50	55	60	
4	—														
5	ADAMS	25	0	0	0	0	0	25	0	0	0	0	0	0	
6	BALL	18	0	0	0	18	0	0	0	0	0	0	0	0	
7	COX	25	0	0	0	0	0	25	0	0	0	0	0	0	
8	DAVIS	35	0	0	0	0	0	0	0	35	0	0	0	0	
9	EVANS	10	0	0	10	0	0	0	0	0	0	0	0	0	
10	FORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
11	GILES	15	0	0	0	15	0	0	0	0	0	0	0	0	
12	HALL	64	0	0	0	0	0	0	0	0	0	0	0	0	**
13	IVES	37	0	0	0	0	0	0	0	37	0	0	0	0	
14	JAMES	45	0	0	0	0	0	0	0	0	0	45	0	0	
15	KEEN	28	0	0	0	0	0	28	0	0	0	0	0	0	
16	LORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
17	—														
18	TOTAL	346	0	0	10	33	44	78	0	72	0	45	0	0	**
19	% PAY	100	0	0	3	10	13	23	0	21	0	13	0	0	**
20	COUNT	12	0	0	1	2	2	3	0	2	0	1	0	0	**
21	===														

Exhibit IV

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1		---)	DIRECTOR'S	SALARIES	-	FREQUENCY	DISTRIBUTION		<---	CONFIDENTIAL!					
2		SALARY	0	5	10	15	20	25	30	35	40	45	50	55	
3	NAME	'000	5	10	15	20	25	30	35	40	45	50	55	60	
4	—														
5	ADAMS	25	0	0	0	0	25	0	0	0	0	0	0	0	
6	BALL	18	0	0	0	18	0	0	0	0	0	0	0	0	
7	COX	25	0	0	0	0	0	25	0	0	0	0	0	0	
8	DAVIS	35	0	0	0	0	0	0	0	35	0	0	0	0	
9	EVANS	10	0	0	10	0	0	0	0	0	0	0	0	0	
10	FORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
11	GILES	15	0	0	0	15	0	0	0	0	0	0	0	0	
12	HALL	18	0	0	0	18	0	0	0	0	0	0	0	0	
13	IVES	37	0	0	0	0	0	0	0	37	0	0	0	0	
14	JAMES	45	0	0	0	0	0	0	0	0	0	45	0	0	
15	KEEN	28	0	0	0	0	0	28	0	0	0	0	0	0	
16	LORD	22	0	0	0	0	22	0	0	0	0	0	0	0	
17	—														
18	TOTAL	300	0	0	10	51	69	53	0	72	0	45	0	0	
19	% PAY	100	0	0	3	17	23	18	0	24	0	15	0	0	
20	COUNT	12	0	0	1	3	3	2	0	2	0	1	0	0	
21	===														

Exhibit V

decided to symbolically express its dissatisfaction by reducing Adams' salary by one penny. The 25 in cell B5 in Exhibit II was changed to 24.99999 and after pressing the ! twice, Exhibit II turned into Exhibit V.

Cell B5 still displays 25, but that is because the whole model was formatted with /GFI to display Integers only.

Looking at the Entry line of B5 (the very top line of any VC screen — not displayed in any of the exhibits accompanying this article but always appearing when VC is seen on a monitor — will reveal that the

● *Nick Levy is the principal of Interface Management Resources and gives specialist lectures on spreadsheets.*

content of the cell is not 25 but 24.99999.

Note that Adams' salary in the frequency distribution has moved from column H in Exhibit II to column G in Exhibit V, and that rows no. 18, 19 and 20 have all been adjusted accordingly.

What it all goes to show is that although a VC model only displays results in thousands of pounds, it can still be made sensitive enough to detect changes of one penny.

The formula in cell C5 (in any of the Exhibits I, II, IV or V) reads @IF(@AND B5)=C2,B5<=C3),B5,0). What this means in a simpler language is that provided the content of cell B5 is larger or equal to the content of cell C2, as well as less or equal to the content of cell C3, then enter the value of B5 in cell C5, otherwise put 0 in C5. This formula is then replicated into every cell between rows 5 and 16 (columns C to N).

For the benefit of readers who cannot spare the time to reconstruct the model, I have prepared a VC data disc containing the above frequency distribution model. The disc is configured to work on any Apple using the 16 sector version of Visicalc.

It costs £10 including VAT and postage, or £11.50 (airmail postage) for overseas readers, and is available from: Visicalc September Disc Offer, Windfall, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

NOT so very many years ago the prophets of high technology were promising a paperless world, in which the electronic storage and transfer of information would eliminate the need for printed records.

In fact computers are voracious and wasteful consumers of paper, and no serious computer user can do without a printer. The choice of machine depends on two factors:

☐ *What do you want to do with it?*
☐ *How much can you afford to pay?*

There are basically four kinds of printer to consider:

The letter quality printer is similar to a typewriter. It may have a golfball head or a daisywheel, which has pre-formed letters arranged on the ends of the "petals".

In either case there is a relatively slow mechanical process required to spin the type head into position before striking the ribbon.

The great advantages of these printers are the quality of type, which is as good as the best electric typewriter, and the huge variety of type styles (fonts) available.

The disadvantages are that they are relatively slow, and that you cannot mix different type styles in one document without stopping the machine to change the printing head.

The dot matrix impact printer produces characters by shooting combinations of pins against an inked ribbon, giving that slightly fuzzy look which is characteristic of most computer output. It is fast, cheap and versatile.

You can move from Roman characters to Arabic or Greek, without changing the printer head. You can produce enlarged characters for headlines, include graphics, or emphasise a phrase by putting it into italic or bold face.

The great disadvantage of dot matrix impact printers is that the quality is not as good as daisywheel or golfball printers.

The dot matrix thermal printer builds up letters from arrangements of pins, but instead of striking an inked ribbon, produces an image directly by burning a mark onto specially processed paper. The Silentype printer used this technology and was widely used by early Apple owners.

These printers are cheap and quiet, but

There's a strong case for two printers . .

By CHRISTOPHER ROPER

they are not suitable for general office use.

The laser controlled ink-jet printer is not yet very important to micro users, but it probably will be. It literally squirts ink onto the paper in the required patterns.

Its advantages are extremely high speeds, great versatility, and the ability to handle multiple colour combinations. Its disadvantages are that it still lacks the precision of the daisywheel, and it is expensive.

So how do you choose? Most businessmen instinctively opt for the daisy-wheel printer. The technology is familiar and the output is identical to that of a typewriter. Provided you are mainly interested in producing a relatively low volume of letters and reports, with a high

premium on appearance, this may be the right decision.

But remember that the daisywheel printer is only half, or even a quarter, as fast as some equivalently priced dot matrix printers.

If the printer will also be used by the accounts department, or if you need to produce long reports which go through several drafts and revisions, you should perhaps consider having two printers, one for fair copies and the other for general data processing.

There is a compromise. The quality of print from a dot matrix impact printer is related to the number of pins used to make up the image.

Swiss and Japanese printers are now appearing on the market which produce output acceptable to many business users. The letters are proportionately spaced (which means an 'i' does not occupy as much room as an 'o') and the fuzziness has almost gone.

One note of warning. Japanese printers

→
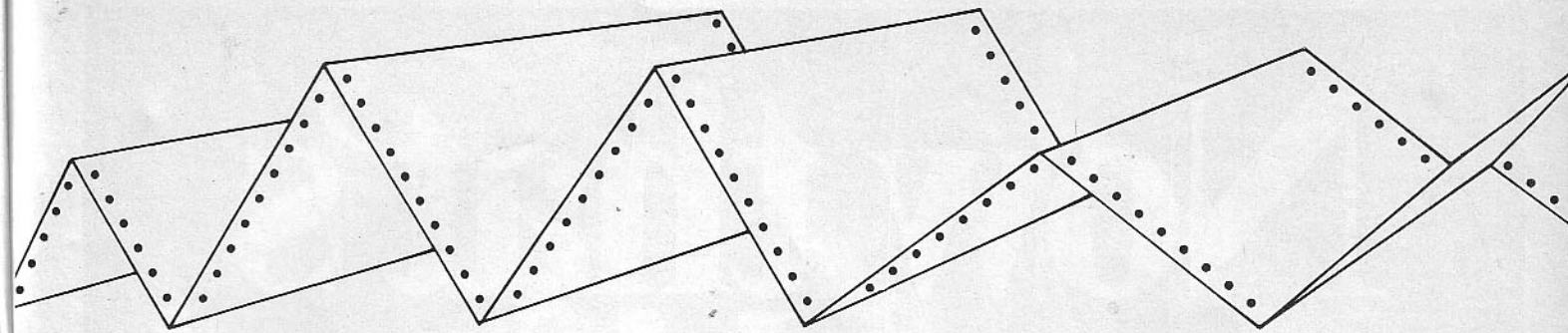
of this type were developed to produce intricate Japanese characters and when applied to the Roman character set, their output seems a little spidery.

The Swiss firm Hermes offers matrix printing which comes closest to daisywheel quality, but still has not solved all the software problems.

These problems are the ones they don't mention in the glossy advertisements and brochures. Electronic printers are software driven. This means that inside them there are programs and microprocessors, which have to communicate with the programs and microprocessors inside your microcomputer.

Perhaps the only safe rule is to make sure you see the printer working together with your computer, doing the job you want it to do, before you buy it.

In general printer manuals are badly designed and written and are not intended for the non-technical user. In order to start or stop, change fonts, or underline a phrase, the printer waits for signals from the computer to which it is attached.

The means of sending these signals should be simple but often isn't. More technical aspects of this problem have been dealt with in earlier issues of *Windfall*.

The choice of an appropriate interface card to link your printer with an Apple is also important. If the printer can produce pictures as well as text, you will need an interface card that will support graphics.

Another refinement, important if you have bought a daisywheel printer, is a buffered printer card. This is a card with its own memory store, which allows the user to feed text through to the printer card and then have the computer free for some other task.

With an unbuffered card, you have to wait for the printing to finish before you can use the computer again.

Printer speeds vary from the slowest dual-purpose typewriter/printers (15-25 characters per second) through the fastest daisywheel printers (80-100 cps) to the fastest dot matrix impact printers (200-400 cps).

I am talking here about printers likely to be used by an Apple owner. There are, of course, million-pound laser printers, which can print out the Bible while you make a cup of tea.

A final consideration concerns the printer carriage width and type of paper you want to use. For many purposes —

letters and reports, for example — a maximum line length of 80 characters may be adequate. But your accounts department may find that an intolerable restriction and look for up to 150 characters a line.

For many purposes continuous, concertina folded paper may serve your need. But if you are going to have to feed in single sheets of headed notepaper, or invoices which need precise alignment, make sure that this can be done. You may find you need a single sheet feeder, which can add 40 per cent to the cost of the printer.

There are two basic types of paper feed, friction and tractor. Note that with continuous sheets of invoices or labels,

friction feed soon loses its alignment. For that kind of work you need the paper to be pulled through the printer by sprocketed wheel.

The first thing to do when considering which printer to buy is to sit down and decide what it will be required to do, and the volume and the frequency of the work. Most of the criteria can be satisfied with a single machine if you have no budgetary limitations.

But in general, speed stands in an inverse relationship to print quality, and it may sometimes be cheaper, and more satisfactory, to have two different machines for different jobs than an expensive compromise which you hope will cover all possibilities.

Market is expanding

THE market for printers in Britain is expanding apace with the growth in micro sales. There is now a greater variety of machines available, generally at lower cost, than there was 16 months ago, when we carried our last printer feature (May, 1982).

There are several reasons for this. People are now coming to terms with the "new" era of micros.

The availability of cheaper micros and more sophisticated software has persuaded many more small businesses to buy a system, and with word processing and database management, printers are now regarded as a necessity.

A business system is not complete without a means of providing hard copy for reports and invoices.

The other major trend is the narrowing of the performance gap between the fast dot matrix printers and the slower, more expensive letter-quality daisywheel printers. This doesn't mean that daisywheels are "speeding up", rather that the quality of the characters produced by dot matrix printers is improving.

One of the most popular type of printer used with the Apple is the Epson range — from the RX80 at around £298 to the FX80 (£438) and the MX100 F/T III (£499). However, several Japanese and Taiwanese companies are now providing cut-price copies of the Epson range, which they claim are totally Epson compatible, at retail prices well under £300.

As these printers gain credibility they could pose a major threat to existing brand name manufacturers and force them to reduce prices still further.

Above the Epson FX80 range prime requirements for dot matrix printers are full carriage width (132 columns), high speeds (in excess of 150 characters a second), good paper handling, both tractor and friction feed and higher density dot matrices.

Ranged against the dot matrix business printer is the daisywheel, which is used, because of its speed limitations, mainly in word processing systems where quality of output is more important than speed.

However once sufficient letter quality is achieved on the dot matrix printers, coupled with the ability to do graphics and change fonts by software control, or standards of acceptance in letter quality are reduced, the high speed dot matrix may become a more efficient method of producing hard copy than using either a daisywheel printer by itself or in conjunction with a cheaper dot matrix machine.

Daisywheel printer manufacturers are fighting back by reducing prices, but unless they can maintain standards of quality while dropping prices, the future for their products could look bleak.

Choice of printer is often closely related to the price of a system — it is rare to find a user who is willing, initially, to pay more for his printer than for his micro.

Major matter of maintenance

By DAVID AIRD
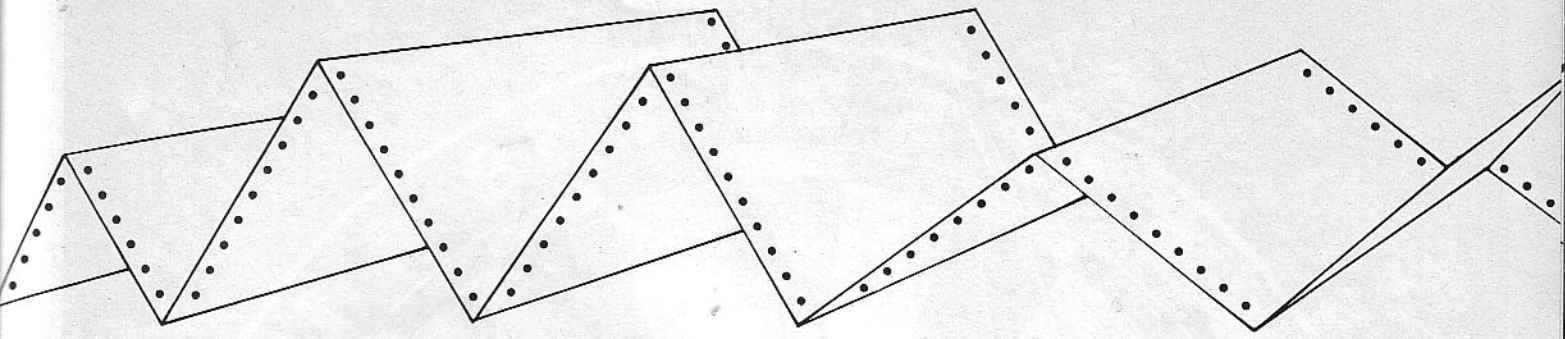
MICRO users often ignore the need for maintenance and place too much faith in the reliability of the hardware. They take their Apples and printers for granted and do not consider the consequences to their business of a system failure, assuming that they will get service immediately the system goes down.

This assumption is correct — but on what terms? The problem is compounded if different equipment has been installed by different vendors or dealers because more than one organisation may be required to repair a complex fault in one component that may have triggered off a fault in another.

There are now more than 60 independent maintenance companies in the UK and it is worth considering taking out a service contract with one of them if you can't afford to have an Apple, a printer or a disc drive out of service for several days or more.

When choosing a company make sure it has adequate resources to meet your specific needs. The Computers Services Association has its own code of ethics for membership and this provides a good guideline for the end user.

Printer manufacturers often only service large OEM customers and generally have limited workshop and field service facilities. They may respond to a cry for help — but it could take 30 days.

A service company will often respond within hours, either replacing faulty components or providing a spare machine while the faulty equipment is taken away for repair.

A service contract should be tailored to a user's exact requirements based on response time, Saturday and Sunday call-out and the availability of standby equipment.

Printers give the most trouble in computer systems. Most manufacturers quote around 3,000 hours for MTBF (mean time before failure) on their equipment. This is the equivalent of eight hours' continuous use every day for 18 months.

Typical life expectancy of a printer should of course be longer. But it is interesting to note that some manufacturers are becoming reticent about quoting MTBF figures, in some cases preferring to refer to the number of strikes of the printing hammer — an irrelevant indicator.

One of the reasons service companies exist is that few micro users adhere to the instructions in a printer or micro manual and do not call in an engineer unless there is a breakdown. Without regular preventative maintenance, the prospect of 3,000 hours' use from a printer are substantially reduced.

Paper in all shapes and sizes

By GORDON JACKSON

THE paperless office doesn't exist. Even the most efficient invoicing system becomes the most inefficient without invoices, and no matter how good your printer you still need something to print on.

Stationery is as important a part of a business system as a micro itself — so what is available?

The most widely used is continuous listing paper, which can be bought off the shelf in many sizes, either plain or with green lines printed across it (similar to music manuscript paper) to make reading across the columns easier.

Most sizes are available in one or more parts. For instance, four-part paper consists of a top original and three copies. It can be OTC (one time carbon), which has carbon paper interleaved between the parts, or carbonless paper, known as NCR (no carbon required). NCR copies usually give a blue image, but a black type, which is easier to see and photocopy, is now available.

The same principles relate to continuous form. This can come pre-printed, often to match a specific software package which then fills in the user's name and address and other relevant information, such as invoice/despatch note details.

One way of improving the image of these off-the-peg forms is to have them overprinted with the company name and address before use. However if you are likely to print more than 4,000 forms it is worth considering having the whole form pre-printed to your specification, rather than using over-printing.

Forms can be printed to fit almost any requirements, but it is important to match the needs of the job to be done with the capabilities of the micro/printer system and software, so that you end up with a usable and understandable format.

It is sensible to get advice from a computer forms specialist, as there are many potential pitfalls for the inexperienced. If a multi-part form is required, for example, can the printer cope with the required number of copies and still produce an image on the bottom copy? Should the paper be lightweight (to cater for several copies) or heavier so that it survives frequent handling?

All computer stationery has sprocket holes down each edge, and it is often convenient to have these included in a perforated, removable margin. Paper sizes quoted usually include the margins. These are generally $\frac{1}{2}$in wide so that a form 11in deep by $9\frac{1}{2}$in wide will have a usable area of 11in by $8\frac{1}{2}$in.

For some purposes the slightly rough edges left on the form by the perforations are not suitable. Options to cater for this include a hopper feed attachment on your printer (expensive) and the use of normal letterheads, or to have letterheads stuck to a continuous backing sheet which carries the letterhead through the printer and can then be peeled off.

Another option is to use continuous letterhead of form with perforations that leave a clean edge (called finecut perforations).

Mailing labels are important items in business. Adhesive labels are sold in many stock sizes or can be made to order in one or more colours on a wide variety of materials and in any shape. Options include continuous tags, useful in the packaging and point of sale industries, and continuous envelopes, used as a replacement for labels. These too are available in most sizes or can be made to order to cater for such things as wage systems.
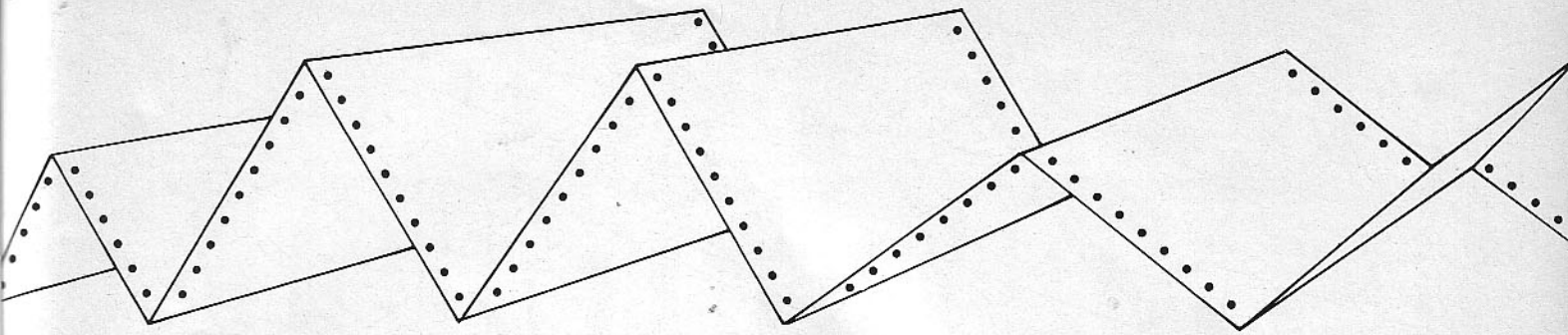
A buffer can save you hours

A PRINTER buffer is basically a device to store the information a computer sends out and hold it until the printer is free to print it – for under normal conditions the computer can send out information at a faster rate than the printer can print.

This means that the operator has to sit and wait until the printer has finished before he can do anything else. Using a buffer means that after the computer has dumped the information to the device you can continue to operate it even while the printer is processing that information.

It is even possible to turn the computer off while the printer is printing.

I work with Visicalc using the 128 RAM card, and with such large files I have found that I was sometimes having to wait up to half an hour before I could use my computer again. Even with small files it was tedious and time consuming to

By FRAN TEO

have to wait until I had control of the computer again. That was when I started looking at printer buffers.

I chose the Pipeline which offers three types of buffering:
● FIFO (First in First Out)
● Random access printing, which allows you to combine printed output from all your favourite programs without having to resort to the "cut and paste" technique.
● Bypass mode.

The Pipeline comes with 8k of memory as standard, although you can upgrade it in multiples of 8k to 128k. As the buffer

uses a data compression technique, which means that sequences of duplicate characters sent from the computer are reduced to their barest essentials, it is possible to store up to a megabyte of information in the 128k buffer.

But think carefully before insisting that you need the 128k buffer since it is double the price of the 8k version.

FIFO, or using the Pipeline as a simple printing buffer, is the mode whereby the first set of data fed into the buffer is the first set of data printed.

When using the Pipeline in this mode your computer will see a printer ready status, regardless of whether the printer is offline or not, until the buffer is full.

When the buffer is full, the actual status of the printer is sent to the computer and new data will only be accepted at the rate that the printer can print.

One very useful trick that can be utilised when using FIFO is multiple copies. You can use this feature to tell the Pipeline to print the contents of the buffer over and over again until you tell it to stop. And while the buffer is churning out its multiple copies you can be doing something totally different with the computer. I am constantly using the feature.

Using random access printing (RAP) you can combine text, spreadsheet output and graphics (or anything else) in whatever order you wish the printout to appear in.

In this way you can generate personalised letters, memos or reports without the use of further software. The Pipeline has a series of "buckets" into which you can drop the information.

By labelling the buckets you can then command them to be printed out in whatever order. You can even print multiple copies of a bucket if you want to.

The bypass mode means exactly what it says – when the buffer is switched to bypass the computer sends data directly to the printer in the ordinary fashion.

The Pipeline is a little yellow box that sits between the dot matrix printer and a Centronics-compatible parallel interface.

As a technically disorientated person I approach instruction manuals with some misgivings, but it was a relief to read the Pipeline's manual and be able to understand it.

It is well documented and has some very helpful examples to guide one through the RAP commands. It also has an invaluable section of hints and tips at the back.

The Pipeline is available from Pete and Pam Computers.

Printer control on tap

By MIKE GLOVER

MANY users of the Epson printer have difficulty in sending it the control codes necessary to take advantage of the different print sizes and styles.

Fingerprint from Dresselhaus Computer Products seeks to overcome these difficulties by enabling many of the features to be controlled by tapping the on line switch from one to nine times.

The small device is installed inside the Epson MX 80/100 and is activated by holding down the on line switch until a beep is heard.

From then on you tap the on line switch and are rewarded with further beeps which must be counted until the number of beeps (including the first initialisation beep) reaches the count for the desired function.

This following table shows the relationship of beeps to function:

Number of Beeps	Result
1	Reset
2	Condensed
3	Double width
4	Emphasised
5	Double strike
6	Perforation skip-over
7	Indent left margin
8	8 lines per inch

9 and 10 should be italics and superscript, but don't work with UK printers.

Printer codes can be combined and

the device comes with a handy crib sheet which can be stuck on the printer.

A nice feature is the ability to stop the printer at the end of a line and change functions – some Visicalc users would appreciate this.

Installation instructions are very clear and I took about 15 minutes to fit the Fingerprint. It is necessary to bend some capacitors flat and bend one pin on an eprom – which is a bit frightening.

You also need good eyesight to count your way down a large chip to pin 11 and clip on a spring hook. If this sort of thing is not your cup of tea then I suggest buying the device from a dealer who will fit it for you.

I don't know what effect this sort of installation might have on guarantees but it might be worth a thought.

Fingerprint is a very neat idea. Whether you would want to use one depends on how easily you can control the Epson normally, although for some software Fingerprint is likely to be much more convenient.

Fingerprint is distributed by Northamber, price £45.

Prices on the way down

AN indication of the trend towards falling printer prices is given by the £425 Seikosha GP700A dot matrix colour printer.

Distributor DRG Business Machines says it can produce seven prime colours and 30 shades of colour in one pass at 50 characters a second. Each separate dot is addressable in a different colour.

The print head incorporates a four-colour ribbon and four replaceable inkwells and features of the machine include friction feed, repetitive, compressed and expanded printing.

The standard interface is Centronics parallel. Digitek International has also developed a ROM for its Super Printmaster card which enables colour screens to be dumped from the Apple in high and low resolution and in expanded mode.
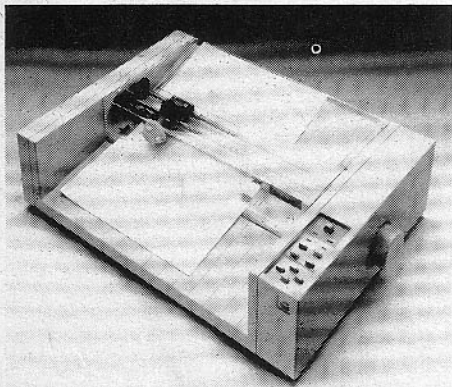
Apple's 410 colour plotter

Colour plotter for Apple

A NEW direction for Apple is marked with the launch in the UK this month of the company's 410 Colour Plotter.

"It is a valuable and essential addition to our range and underlines our commitment to service the end-user comprehensively", said Steve Holmes of Apple UK.

"Its introduction is a direct response to the growing demand for computer aid in graphics orientated business, industry and education".

The Apple Plotter is a four-pen, flat-bed machine which supports paper and transparency materials up to A3 in size, has its
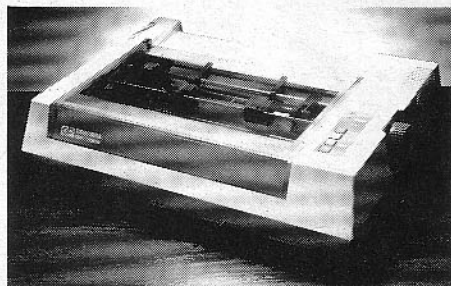
Seikosha GP 700-A colour printer

own 128k ROM — to enable complex shapes to be drawn at a single command — and is compatible with both the IIe and III. It will cost around £700.

Accessories include four types of pen with a choice of two widths — transparencies for overhead projection and a choice of either A4 (297x210mm) or A3 (420x297mm) plotter paper.

The pens, which come in eight colours, are filled with either a water-based ink for use on paper, or an oil-based ink for use with transparencies.

The plotter is compatible with Apple Business Graphics and with most other graphics software programs.

Latest from Epson

THE latest addition to the Epson range is the RX80F/T printer.

Priced at around £350, it has dot addressable graphics, condensed and double width printing, Centronics parallel interface as standard and a print speed of 100 characters a second. Epson says it fills a need for a
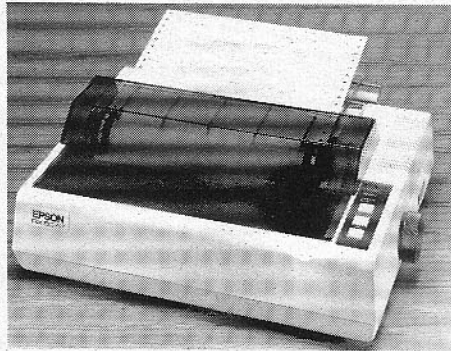
The Epson RX80F/T

printer with all the features of the RX80 but also offers both tractor and friction feed.

Also new in the Epson stable is the HXR 15, a 13 cps daisywheel which costs around £500. It is manufactured by Brother but sold in the Epson livery.

Competition

A NEW low-cost competitor to the Epson range is the MT80 which is distributed in the UK by Mellordata, Riva Terminals and CK Computers.

It is an 80 column 80 cps bi-directional machine with dot addressable and line graphics capabilities. It costs £285.

It prints compressed, double width or emphasised with a choice of seven national character sets and features include underlining, super and subscripts, horizontal and vertical tabbing and a right hand margin.

Paperfeed is tractor, single or fanfold, and it interfaces with either RS232 or 8 bit parallel cards.

Cool price

THE latest interface cards also reflect the trend towards falling prices in the printer market.

The Parallel Printer Card from Cirtech costs only £32. It is a very small card ($2\frac{1}{2} \times 2\frac{1}{4}$in). Cirtech says it features high noise immunity PCB design giving improved performance and cooler operation.

Switch link

"SHARE expensive peripherals" is a common catchphrase in micro marketing. The idea is that micros are used more frequently than printers, plotters or disc drives, and so it makes sense to share the latter equipment between two or more computers.

The Softronics 3-20 switch links a peripheral to up to three micros in this way. And they don't have to be the same type.

The unit is a manual, five pole three-way switch with common output which enables three micros to share a common parallel interfaced device. The switch costs £99 from Softronics.

Share a printer

A DIFFERENT approach to shared peripherals is the Printersharer from Keyzone — a solid state device requiring low current DC supply.

It is not just a transfer switch, and as a result a user is not restricted to short printer leads. Each unit costs £59 and links up to three micros to a Centronics parallel type device.

The Printersharers can be used in multiples, allowing an unlimited number of Apples to share one printer.
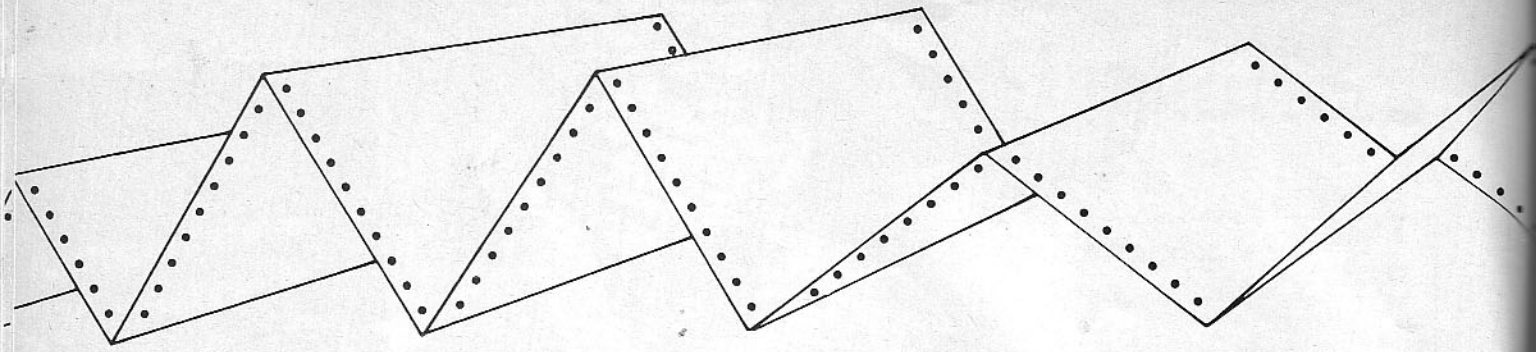
Lowdown on printer talk

Buffer: Used to store characters received from the computer before printing. This frees the computer's processor more quickly. The larger the buffer, the more quickly the computer is freed to do other tasks.

Daisywheel: The mechanism used by the better text quality printers, and which gives them their generic name. They have pre-formed characters on a fast spinning plastic or metal disc which upon impact by a hammer leave an impression on paper via a ribbon. Sometimes graphics may be formed slowly by using the full stop to create one dot. The NEC Spinwriter uses a thimble rather than wheel but the effect is much the same.

Dot matrix: Another method of printing. A row of needles strike the ribbon leaving an impression on the paper. The head mechanism then moves slightly horizontally and more of the character is created. The greater the number of needles and the closer they are together, the better the text impression. Dot matrix systems tend to be used more for graphics.

CPS: The number of characters printed in one second. This is not absolutely related to the rate of printing as such figures are maximised.

Print matrix: The number of horizontal and vertical dots used to create characters on a dot matrix (see above) or similar printer. The numbers may be different from those used in graphics mode on the same printer.

Paper feed: Paper is fed through the printer in one or more of three ways: Friction feed, where the paper is gripped tightly by the platen much the same as on a conventional typewriter; pin feed, where small needles on the ends of the platen engage with small holes on the edges of the paper which is then dragged through the machine; tractor feed, where similar needles but generally mounted above the platen perform the same function. Tractor feeds tend to be more adjustable horizontally to take different widths of paper. To reproduce graphics usually requires pin or tractor feed.

Interfaces: Electronic gubbins which allow the Apple to talk to the printer. There are different protocols, each with their own subdivisions. When buying a printer ensure that the interface works to your satisfaction.

Descenders: Just look at letters like p, q, g, j. Some printers don't print parts of these below the line and consequently the text produced doesn't look so good.

Bi-directional: To speed up printing some printers don't bother to return to the start of a line to print the next line. Instead they print the next line from the right to the left. Often when printing the denser text fonts available many will only work uni-directionally.

Platen: The roller which carries the paper, similar to a typewriter.

Typeface: See font.

Font: The style of type produced, such as italics, Pica, Elite. Some printers may produce more than one. Daisywheels may be interchangeable.

Typewriter/printer: Some electronic typewriters may be connected to the computer to produce letter quality text, albeit slowly.

Driver software: Probably not needed with modern interfaces. Were once used to drive printers via the games ports, etc. May still be needed to produce graphics on some machines.

Screen dump: Copying the contents of the screen, whether textual or graphical, to the printer.

Letter quality: Generally taken to suggest the very best quality of text impression left on the paper. An expression used mainly by daisywheel advertisers but increasingly by dot matrix people as well.

Thermal printer: Uses little hot spots to create the text on specially treated paper, much in the same way as a dot matrix printer but without a ribbon and without the moving needles. The paper costs more but the printers are cheaper. The quality tends not to be so good.

Ink jet: Squirts smidgens of ink at the paper to create dots which in turn create the text much as with dot matrix printers but without the moving needles or the ribbon.

Baud rate: A measurement of the rate at which information is sent to the printer from the computer via a serial interface. Make sure that the printer and the computer (via the interface) match.
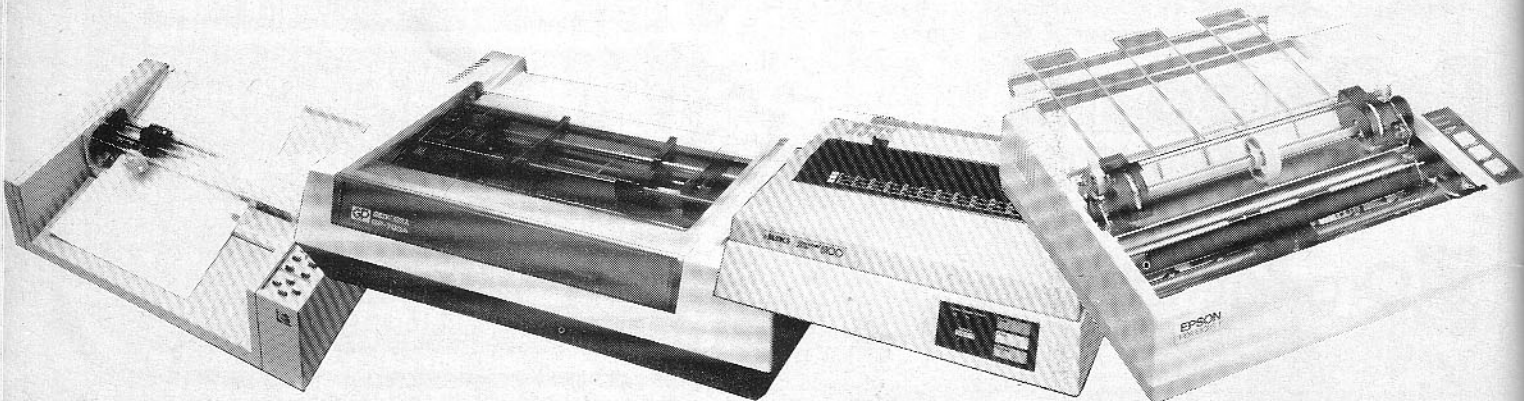
Windfall A–Z guide to the printer marketplace

DAISYWHEEL

Model	Distributor	Price £	Speed max cps	Interchangeable Wheels	No. of Characters per Wheel	Two Colour Ribbons	Buffer Size	Friction	Tractor	Pinfeed	Roll	Single Sheet	Auto	Paper width	Serial	Parallel	Potential Graphics	Backspacing	Embolden	Super/subscript	Bi-directional	Underlining	Tab
Apple D/W Printer	A5, E1, P5	1341*	40	●	130		2k	●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Aptec F/W RP1300	A2, D2	1190	37	●	124	●	8k	●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Aptec F/W PR1600	A2, D2	1635	60	●	124	●	8k	●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Brother CE50	C1	499	13	●	96		48k	●						13.5 in	●		●		●				
Brother CE60	C1	525	13	●	96		48k	●				●	●	13.5 in	●								
Brother																							●
Crown Ranger	C1	795	19	●	96		48k	●	●			●		16.5 in	●		●	●	●		●	●	
Brother HR1	B1, C1, D1, D2, L2, M1, N3, P5, T2	695	16	●	96		2k	●	●			●		16.5 in	●	●		●	●	●		●	
Brother HR15	B1, D1, D2 M1, N3, T2	545	13	●	96	●	3k	●	●			●	●	13.5 in	●	●		●	●	●	●		
Brother HR25	B1	TBA	25	●	96	●	3k	●	●			●	●	16.5 in	●	●		●	●	●	●	●	
CAE 550	T1	675	17	●	96			●	●			●		14 in	●	●		●	●	●	●	●	
Dataproducts DP35	D8		35	●	96	●	256 chrs	●	●			●		15 in	●	●		●	●	●	●		
Dataproducts DP55	D8, S1	1467	55	●	96	●	256 chrs	●	●			●	●	15 in	●	●		●	●	●	●	●	
Diablo 620	D3, G1, R1, Z1		20	●	96		2k	●	●	●	●	●	●	15 in	●	●		●	●	●	●	●	
Diablo 630 API/ECS	G1, D3, N3, R1, Z1		45	●	96	●	2k	●	●	●	●	●	●	15 in	●	●	●	●	●	●	●	●	●
Diablo 630 API	G1, D3, N3, R1, Z1		45	●	192		2k	●	●	●	●	●	●	15 in	●	●	●	●	●	●	●	●	
Diablo HPR05	G1, D3, E1, N3, R1, Z1		45		96	●	4k	●	●	●	●	●	●	15 in	●	●	●	●	●	●	●	●	●
Diablo PPI	D3, R1		45	●	96		2k	●	●		●	●		15 in	●	●	●	●	●	●	●	●	
Diablo KSR	D3, G1, R1		45	●	96		4k	●	●		●	●		15 in	●	●		●	●	●	●	●	
Facit 4560	A4, F1	810	22	●	107		2k	●	●			●		15 in	●	●		●	●	●	●	●	
Facit 4565	F1	1240	40	●	107		2k	●	●			●		15 in	●	●		●	●	●	●	●	
Fujitsu SP830	N3, Z1	1900	80	●	96	●	256 chrs	●	●			●		15 in	●	●		●	●	●	●		
GD-14	G1	475	13	●	96		2k	●	●			●		13.5 in	●	●		●	●	●	●		
Handy (Serial) Printer	I2	1300	40	●	96	●	512b	●	●			●		15 in	●						●		
Juki 6100	M2	459	18	●	100		2k	●	●			●		13 in	●	●		●	●	●	●	●	
Multiwriter IV KSR	T1	2500	55	●	96		4k	●	●			●		14 in	●	●		●	●	●	●	●	
NEC Spin/wter 7700	N3, T2	2100	55	●	128	●	256 chrs	●	●	●		●		16 in	●	●		●	●	●	●	●	
NEC Spin/wter 3500	T2		35	●	128		2k	●	●	●		●		16 in	●	●		●	●	●	●	●	
NEC Spin/wter 2000	T2		20	●	128		256 chrs	●	●	●		●		16 in	●	●		●	●	●	●	●	
Olivetti DY211	D4, M1, O1	868*	21	●	100		1k	●	●			●		17 in	●	●		●	●	●	●	●	
Olivetti DY250	O1	915	35	●	100		3k	●	●			●		16 in	●	●		●	●	●	●	●	
Olivetti DY311	D4, M1, O1	1300*	36	●	100		3k	●	●			●		17 in	●	●		●	●	●	●	●	
Olivetti ET121	E1	745	40				4k	●	●		●	●		17 in	●					●			
Olivetti ET221	E1	974	40	●				●	●		●	●		17 in	●					●			
Olivetti PR430	E1	1400	30												●								

*Average Price   † Thermal

The characteristics referred to in the table reflect the full potential of the various machines — however these optional extras are not included in the price quoted.

DAISYWHEEL

Model	Distributor	Price £	Speed max cps	Interchangeable Wheels	No. of Characters per Wheel	Two Colour Ribbons	Buffer Size	Friction	Tractor	Pinfeed	Roll	Single Sheet	Auto	Paper width	Serial	Parallel	Potential Graphics	Backspacing	Embolden	Super/subscript	Bi-directional	Underlining	Tab
Olivetti PR460	E1	2000	60												●								
Olympia Compact	P4	468	14	●	100			●					●	14 in	●	●		●				●	
Olympia ESW100	D1, I1	498	17	●	96			●	●			●		13 in		●		●	●	●		●	●
Olympia ESW102	D1, I1, N3, P4, P5	798	17	●	96	●	4k	●	●			●	●	17 in	●	●		●	●	●	●	●	●
Olympia ESW103	E1, I1, N3, P4, P5	1073*	20	●	96	●	4k	●	●			●	●	17 in	●	●		●	●	●	●	●	●
Olympia ESW3000	D1, I1, P4, N3	1136	50	●	100		4k	●	●			●	●	17 in	●	●		●	●	●	●	●	●
Olympia ESW CO	I1	498	14	●	100			●				●		13 in		●		●	●	●		●	●
Qume Sprint 7/45	Q1	1800	45	●	96			●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Qume Sprint 8/35	Q1	1220	35	●	96			●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Qume Sprint 8/50	Q1	1325	50	●	96			●	●			●	●	15 in	●	●	●	●	●	●	●	●	●
Qume Sprint 9/45	N3, Q1	1730	45	●	96		1.5k	●	●			●	●	15 in	●	●		●	●	●	●	●	●
Qume Sprint 9/55	N3, Q1	2145	55	●	96		1.5k	●	●			●	●	15 in	●	●		●	●	●	●	●	●
Qume Sprint 10/35	Q1	1300	35	●	96		25bytes	●	●			●	●	15 in	●	●		●	●	●	●	●	●
Qume Sprint 11/40	A4, N3, P5, Q1, T1	1364*	40	●	96		500bytes	●	●			●	●	15 in	●	●		●	●	●	●	●	●
Qume Sprint 11/55	A4, N3, P5, Q1, T1	1522*	55	●	96		500bytes	●	●			●	●	15 in	●	●		●	●	●	●	●	●
Qume 11/Widetrack	A4	2127	40	●	130		2k	●	●	●	●	●	●	15 in	●	●		●	●	●	●	●	●
Richo RP1600S	N3	1456	60	●	124	●	4k	●	●			●	●	14 in	●	●	●	●	●	●	●	●	●
SCM TPI	I1	485	12	●	88			●	●			●		13 in	●	●		●				●	●
Silver Reed EXP500	S2	399	14	●	96			●	●	●				12 in	●	●		●				●	●
Silver Reed EXP550	S2	659	17	●	96		2k	●	●	●		●		15 in	●	●		●	●		●	●	●
Silver Reed EXP770	S2	995	31	●	96		48k	●	●	●		●		15 in	●	●		●	●	●	●	●	●
Sintrom Laser	S1	9460	758		95		3 pages					●		B4	●	●	●			●		●	
Smith Corona TPI/S	D4, N3, P5	442*	12	●	88			●	●		●	●	●	13 in	●			●				●	●
Smith Cornoa TPI/P	D4, N3, P5	485	12	●	88			●	●		●	●	●	13 in		●		●				●	●
TEC F10-40	D6, N1, N3, P5	1285	40	●	96			●	●			●		15 in	●	●		●	●	●	●	●	●
TEC F10-55	D6, N3, P5	1675	55	●	96			●	●			●		15 in	●	●		●	●	●	●	●	●
TEC A10	D6	560	20	●	96			●						15 in	●	●							

DOT MATRIX

Model	Distributor	Price £	Speed max cps	Print Matrix	Buffer Size	Friction	Tractor	Pinfeed	Roll	Single Sheet	Paper Width	Serial	Parallel	Potential Graphics	Embolden	Super/subscript	Descenders	Underlining	Bi-directional	Platen up and down
Amber 2400	L1	78	15	5 x 7	25 chrs	●		●			5.8 cm	●	●	●						
Amber 4000	L1	110	30	5 x 8	47 chrs	●		●			5.8 cm	●	●	●	●			●	●	
DP 6500	A3	1950	500	29 x 18	20.5k	●	●			●	15 in	●	●	●	●	●	●	●	●	
DP 9000A	N3, A3, D4	1215	200	9 x 9	2.7k		●				9.5 in	●	●	●	●	●	●	●	●	
DP 9001A	A3, D4	1215	200	11 x 9	2.7k		●				9.5 in	●	●	●	●	●	●	●	●	
DP 9500A	N3, R2, A3, D4	1215	200	9 x 9	2.7k		●				15.6 in	●	●	●	●	●	●	●	●	
DP 9620A	R2, N3, A3, D4	1295	200	13 x 9	2.6k		●				15.6 in	●	●	●	●	●	●	●	●	
DP 9625A	R2, A3, D4	1450	200	26 x 18	5.5k		●				15.6 in	●	●	●	●	●	●	●	●	
WP 6000	R2, N3, A3, D4	2275	285	58 x 18	20.5k	●	●			●	15 in	●	●	●	●	●	●	●	●	
Apple Dot Matrix	A5, P5, E1	416*	120	9 x 8	3k		●	●	●		25 cm	●	●	●	●		●			
Centronics 150-2	D4	588	150				●				9.5 in	●			●					
Centronics 152-2	D4	677	150				●				15 in	●			●					
Centronics 154-2	D4	779	120				●				15 in	●	●		●					
Centronics 159-2	D4	919	150				●				9½ in	●			●					
Centronics 351	D4	1720	200				●	●							●	●				
Centronics 353	D4	2119	200				●	●							●	●				

DOT MATRIX

Model	Distributor	Price £	Speed max cps	Print Matrix	Buffer Size	Friction	Tractor	Pinfeed	Roll	Single Sheet	Paper Width	Serial	Parallel	Potential Graphics	Embolden	Super/subscript	Descenders	Underlining	Bi-directional	Platen up and down
Dataproducts M120	D8	180	7 x 5	1k	16 in		●				16 in	●	●					●	●	
Dataproducts M200	D8		340	7 x 5	1k		●				16 in	●	●					●	●	
Dataproducts P80	D8	1054	200	18 x 9		●	●			●	9 in	●	●		●		●	●	●	
Dataproducts P132	D8	1195	200	18 x 9		●	●			●	15 in	●	●				●	●	●	
Dataproducts P480	D8	540	110	18 x 9		●		●		●	9 in	●	●							
Datasouth DS180	D9	1395	180	9 x 7	2k		●				15 in	●	●	●	●	●	●	●	●	
Datasouth DS220	D9	1895	220	9 x 10	2k		●			●	15 in	●	●	●	●	●	●	●	●	
DD 1303	D10		120		3.5k		●				15 in	●	●		●	●	●	●	●	
Diablo EMP†	D3	3300	450		Various	●					9.5 in	●	●		●	●	●	●	●	
Digital LA12	R1		150	7 x 9	1k	●	●		●	●	8.5 in	●	●				●		●	
Digital LA50	R1		100	7 x 9	2k	●	●				8.5 in	●	●				●	●		
Digital LA100	R1		240	7 x 9	4k	●	●		●		15 in	●	●	●			●	●	●	
Digital LA120	R1		120	7 x 9	4k	●	●				15 in	●	●				●	●	●	
DM 5050	O1	480	100	9 x 7	4k		●	●	●		8.5 in	●	●		●		●	●	●	
DM 5100	O1	1030	140	9 x 7	4k		●				15 in	●	●	●	●	●	●	●	●	
DM 5200	O1	1190	200	9 x 7	4k		●				15 in	●	●	●	●	●	●	●	●	
Epson FX80	N3, D4, P5, D6, N1	438	160	11 x 9		●		●	●	●	10 in	●	●	●	●			●		
Epson MX100	N3, E1, P5, D4, D6	499	100	9 x 9		●		●	●	●	15 in	●	●	●	●		●	●		
Epson RX80	N3, D4, D6, E1, N1, P5	298	100	9 x 9	64k			●		●	10 in	●	●	●			●	●		
Facit 4510	A4, F1	470*	120	9 x 15	2k	●	●	●	●	●	10 in	●	●	●	●	●	●	●	●	●
Facit 4512	A4, F1	659*	140		2k	●	●	●	●	●	15 in	●	●	●	●	●	●	●	●	●
Facit 4526E	F1	1238	220		540chrs		●				15 in	●	●		●	●	●	●	●	
Facit 4542	A4, F1	2168	300	9 x 14	3.7k						15 in	●	●	●	●	●	●	●	●	
Facit 4570	F1	2400	250		2k	●		●		●	15 in	●	●		●	●	●	●	●	
FT 500	T1	325	80	7 x 8		●	●	●			9.5 in	●	●	●	●		●	●		
GE 3020	T1	1080	200	9 x 9	8k	●	●	●			15 in	●	●	●	●		●	●	●	
GE 3040	T1	1295	200	9 x 18	8k	●	●	●			15 in	●	●	●	●		●	●	●	
Getex 11CQ	G1, Z1	440	100	9 x 7	2k		●				10 in	●	●				●		●	
Getex 31CQ	G1, Z1	575	100	9 x 7	2k		●				15 in	●	●				●		●	
Getex GS/GL11	G1, Z1	395	100	7 x 9	1 line		●				10 in	●	●						●	
Getex GS/GL31	G1, Z1	545	100	7 x 9	1 line		●				15 in	●	●						●	
Getex GR/GL32	G1, Z1	695	150	9 x 9	256 chrs		●				15 in	●	●						●	
Getex GS/GL38	G1, Z1	1495	400	7 x 7	256 chrs		●				15 in	●	●					●	●	
Hermes 612B	N3	1900	200	9 x 9	2k		●			●	40 cm	●	●	●	●	●	●	●	●	●
Hermes 612C	D1, M2 N3	2250	400	9 x 9	2k	●	●			●	40 cm	●	●	●	●	●	●	●	●	●
ID-PC 80	N3	290	80	9 x 13		●	●				10 in	●	●				●		●	
IER	P1	3060	160	7 x 9		●	●			●	9.5 in	●	●		●		●	●		
Laser Grafix	P1	21256	N/A	N/A	2 Meg					●	21 cm	●	●	●	●		●	●		
Lowe EG3085	L2	357	120	7 x 9	3k	●		●	●	●	9.5 in	●				●	●	●	●	●
Lucas 80	N3	319	80	9 x 13		●	●				10 in	●	●		●		●	●	●	
Micromax	C4	69	50	7 x 5					●		2.5 in	●	●							
Microprism	N3, T1	475	110	9 x 18	1.4k	●	●	●	●	●	4.5 in	●	●		●		●	●	●	
NDR 8820	A4, G1, N2, N3	900*	150	9 x 7	2k		●				15 in	●	●	●			●	●	●	
NDR 8830	A4, G1, N2	1300*	180	9 x 7	2k		●				15 in	●	●	●			●	●	●	
NDR 8840	A4, G1, N2	1370*	240	9 x 7	2k		●				15 in	●	●	●			●	●	●	
NDR 8910	G1	1500	240	9 x 9	2k		●				15 in	●	●				●	●	●	
NDR 8925	G1	1660	240	12 x 9	2k		●				15 in	●	●				●	●	●	
NDR 8931	G1	1875	240	12 x 9	2k	●	●			●	15 in	●	●		●	●	●	●	●	
NEC PC 8023	T1, T2, P5	395	110	7 x 7		●	●	●			9.5 in	●	●	●	●	●	●	●	●	
Newbury Data 8850	N2	2200	480	9 x 7	2k		●				15 in	●	●				●	●	●	
OKI Microline 84	N3, P5	906	200	9 x 9	256 chrs	●	●	●			16 in	●	●				●	●	●	
OKI Microline 93	N3, P5	736	160	9 x 9	256 chrs	●	●	●			16 in	●	●				●	●	●	
OKI Microline 80	N3, P5	226	80	9 x 7	132 chrs	●	●	●			9.5 in	●	●				●	●	●	
OKI Microline 82A	N3, P5	396	120	9 x 9	132 chrs	●	●	●			9.5 in	●	●				●	●	●	
Olivetti DM505	M1	500	100	9 x 9	4k		●	●			8.5 in	●	●				●	●	●	
Olivetti DM5100	M1	900	140	9 x 7	4k		●				14 in	●	●	●	●	●	●	●	●	
Olivetti DM5150	M1	1000	140	9 x 9	4k	●	●	●	●	●	14 in	●	●		●	●	●	●	●	
Olivetti DM5200	M1	1600	200	9 x 9	4k	●	●	●	●	●	14 in	●	●		●	●	●	●	●	
Olivetti 1450	E1	540	100								8 in	●	●							
Olivetti 1460	E1	2500	180	9 x 7								●								
Olivetti 1471	E1	1100	140				●				13 in	●	●							
Olivetti PR2400	E1	730	300								8.5 in	●	●							
Printronix P150	P1	3567	200	9 x 9	1 line		●				16 in	●	●	●			●			

DOT MATRIX

Model	Distributor	Price £	Speed max cps	Print Matrix	Buffer Size	Friction	Tractor	Pinfeed	Roll	Single Sheet	Paper Width	Serial	Parallel	Potential Graphics	Embolden	Super/subscript	Descenders	Underlining	Bi-directional	Platen up and down
Printronix P300	P1	4093	400	9 x 9	1 line		●				16 in	●	●		●			●	●	
Printronix P600	P1	5638	800	9 x 9	1 line		●				16 in	●	●		●			●	●	
Printronix MVP	P1	2792	260	13 x 9			●				16 in	●	●		●			●	●	
Prism 80SGF	T1	1230	200	9 x 24	3.4k	●	●	●		●	9.5 in	●	●	●	●	●	●	●	●	●
Prism 132 SGF	T1	1395	200	9 x 24	3.4k	●	●	●		●	15 in	●	●	●	●	●	●	●	●	●
Seikosha GP100A	D6	215	50	5 x 7			●				10 in		●	●						
Seikosha GP250X	D6	250	50	5 x 8			●				10 in	●	●	●				●		
Seikosha GP100AS	D6		50	5 x 7	4k		●				10 in		●	●						
Toshiba 2100H	D3, N3, T2	1550*	192	9 x 24	256 chrs	●	●			●	15 in	●	●	●	●	●	●	●	●	
Shinwa CT1 CP80	M2	333	80	13 x 9	64k	●	●		●		10 in	●	●	●	●	●	●	●	●	
Star DP 510	M2	333	120	9 x 9	2.3k	●	●				10 in	●	●	●	●	●	●	●	●	
Star DP 515	M2	459	120	9 x 9	2.3k	●	●		●		15 in	●	●	●	●	●	●	●	●	
Star STX 80†	M2	172	60	5 x 9	1 line	●			●		8.5 in	●	●	●	●			●		
Trilog T-150	D9	3990	200	Various	2k		●				16 in	●	●	●	●			●	●	
Trilog T-300	D9	4590	400	Various	2k		●				16 in	●	●	●	●			●	●	
Zip 30 RO	D10		30		80 chrs	●	●	●	●		10 in	●								
Zip 30 ASR	D10		30		80 chrs	●	●	●	●		10 in	●								
Zip 30 KSR	D10		30		80 chrs	●	●	●	●		10 in	●								
MT80	M3	285	80	9 x 8	2k		●	●			10 in	●	●	●	●			●	●	
Qantex 7000 Range	M3		180		4.7k		●		●	●	15 in	●	●	●	●			●	●	
WM 2000	W1		125	9 x 9	2k		●				10 in	●	●	●	●			●		
WM 4000	W1		150	9 x 9	2k		●				16 in	●	●	●	●			●	●	

TYPEWRITER PRINTERS

Model	Distributor	Price £	Speed max cps	Inter changeable Type Faces	No. of Characters per wheel	Two Ribbons Colour	Buffer Size	Graphics Potential	Friction	Tractor	Pinfeed	Roll	Single Sheet	Auto Single Sheet	Paper Width	Driver Software	Serial	Parallel	Interface Provided	Backspacing	Embolden	Super/subscript	Bi-directional	Underlining	Tab
Brother CE51	B1, D1	525	13	●	96		3k		●	●			●		13.5 in		●	●	●	●		●		●	●
Brother CE60	B1, D1, D2	533*	13	●	96		3k		●	●			●		13.5 in		●	●	●	●		●		●	●
Brother CE70	B1		13	●	96		3k		●	●			●		13.5 in		●	●	●	●		●		●	●
Brother EM100	B1		20	●	96		3k		●	●			●	●	16.5 in		●	●	●	●		●		●	●
Brother EM200	B1		20	●	96		3k		●	●			●	●	16.5 in		●	●	●	●		●		●	●
Brother 8300PSI	D1	375	11	●	96	4			●						12 in	●								●	
Brother EMI Crown	D1	795	15	●	96	4	1 line		●	●			●		16.5 in		●	●	●					●	●
Dataprinter 1200	P1	16626	1200	●									●		16 in										
Dataprinter 1210	P1	14847	1000	●									●		16 in										
Dataprinter 1260	P1	10304	600	●									●		16 in										
Dataprinter 3121	P1	11092	1200										●		16 in										
Dataprinter 3101	P1	9100	1000										●		16 in										
IBM Selectric	P2	860	15	●	96		100		●						15.5 in		●								
Olivetti Praxis 35	E1	495	12	●	100				●				●		12 in		●								
Olivetti Praxis 41	E1, Z2		14	●	96		48k		●						13 in		●	●			●			●	●
Olivetti TP35/L	Z2	350	10	●	73		48k		●				●		11 in									●	●
Olympia Compact	D1	498	15	●	96		1 line		●						13 in									●	●
Protronic 15	P3	375	13	●	100		80 chrs		●						13.5 in									●	●
Sintrom Laser																									
LBP-10MI	S1	9460	750				3 pages	●					●		B4		●	●	●						
Facit 8105	F1	1050	22		107		2k	●	●	●		●	●	●	15 in		●			●	●	●	●	●	●
Silver Reed EX43IF	S2	435	12	●	88		2k		●						12 in		●								
Silver Reed EX44IF	S2	450	12	●	96		2k		●						12 in		●								
Silver Reed EX55IF	S2	1150	16	●	96		256 chrs		●	●	●	●			15.5 in		●						●		
Silver Reed EX77FD	S2	2650	30	●	96		7.5k		●	●	●				15.5 in		●					●	●	●	●

COLOUR PRINTERS – DOT MATRIX

Model		Price £	Speed Max cps	Matrix	No. of Ribbon Colours	Graphics Potential	Print Characters	Buffer Size	Paper Feed: Friction	Tractor	Pinfeed	Roll	Single Sheet	Paper Width Max	Driver Software Provided	Serial	Parallel	Embolden	Super/subscript	Descenders	Underlining	Bi-directional
CX 80	D7	882*	125	5 x 7	3	●	●	3.7k	●					10 in	●	●	●					
DP 9725A	A3	TBA	200	26 x 18	4	●	●	5.5k	●	●				15 in	●	●	●	●	●	●	●	●
Envision 420	R1		300		4	●	●	12k	●	●				15 in		●	●					
Envision 430	R1		300		4	●	●	108k	●	●				15 in		●	●					
Facit 4544	A4, F1	2796	300		4	●	●	8k		●		●		15 in		●	●	●	●	●	●	●
Olivetti DM5150	M1, O1	1650*	140	9 x 7	4	●	●	4k	●	●		●	●	15 in		●	●	●	●	●	●	●
Prism 80SGFC	T1	1525	200	9 x 24	4	●	●	3.4k	●	●	●		●	9.5 in		●	●	●	●	●	●	●
Prism 132SGFC	T1	1695	200	9 x 24	4	●	●	3.4k	●	●	●		●	15 in		●	●	●	●	●	●	●
Seikosha GP700A	D6, N3	425	50	7 x 8	4	●	●			●		●		10 in		●						
Trilog Color Plot	P1	9658			3	●	●			●				16 in		●	●					

COLOUR PRINTERS – INK JET

Model		Price £	Speed Max cps	How many colours?	Graphics Potential	Paper Width	Paper Feed: Friction	Tractor	Pinfeed	Roll	Single Sheet	Buffer Size	Serial	Parallel	Embolden	Super/subscript	Descenders	Underlining	Bi-directional
ACT-1	P1	5837		125		15 in	●						●	●					
Diablo C20	D3, G1	912*	20	7+	●	10 in	●			●	●	6k	●	●	●	●	●	●	●
Siemens PT88	N3	595	150	1	●	16 in	●	●		●	●	4k	●	●	●	●	●	●	●

PLOTTERS

Model		Price £	How many colours	How many Pens	Rotary or Flatbed/other	Software Provided	Driver Software?	Paper Width	Does it print characters?	Paper Size	Buffer Size	Serial	Parallel
Amdex DXY-100	D5	650	1	3	F			16.5 in	●	A3			●
Axiom 420	T2		1			N/A	N/A	8.5 in	●	Roll			
Axiom 1650	T2		1			N/A	N/A	8.5 in	●	Roll	11.5k	●	●
CX 4800	D6	595	4	4	R			8.5 in	●			●	●
CX 6000	D6	745	6	6	F			8.5 in	●			●	●
Houston CPS 20	S1	3210	8	8	R	●	●	11 in	●	Roll	500 bytes	●	●
Houston CPS 30	S1	4818	1	1	R	●	●	22 in	●	Roll	500 bytes	●	●
Houston DMP 29	S1	1990	8	8	F	●	●	11 in	●	11 x 7	1.5k	●	
Houston DMP 40	S1	865	1	1	R	●	●	11 in	●	11 x 7	1.5k	●	
MCP 40	M2	172	4	4	R			4.5 in	●	4½ roll	1 line	●	●
PD 4	J1	596	1	1	F	●	●	8.5 in	●	A4			●
Strobe 100	D4	576	1	1	R		●	8.5 in	●	A4		●	●

INTELLIGENT PRINTER INTERFACES

Model	Distributor	Price £	Serial	Parallel	Buffer Size	Graphics
Apple II Par	C2	32		●		
ADC	A4		●	●	2k	●
Centronics	Q1			●		●
Digitek Printmaster	D6	78		●		●
DK Super Printmaster	D6	98		●		●
Epson Range	D6, N1		●	●		●
E/Buffer	A1	65	●		32k	●
E/Buffer	A1	95	●	●	16k	●
E/Buffer	A1	135	●	●	32k	●
EIPB 32k	G2	130			32k	
EIPB 64k	G2	178			64k	
Grappler	P5	110		●		
IPB 16k	G2	130			16k	●
IPB 64k	G2	218			64k	●
Keyzone P/P Card	K1	75		●		●
Keyzone S/P Card	K1	68	●			
Microbuffer/E	A1	155		●	32k	●
Octet 212	E1	275	●		2k	
Octet 412	E1	375	●		4k	
Olivetti Praxis 41	E1	150	●			
Olivetti STOL ET 221	E1	TBA	●		16k	

Model	Distributor	Price £	Serial	Parallel	Buffer Size	Graphics
Printer Buffer	D6	127	●	●	16k	
Printer Buffer	D6	158	●	●	16k	
QMS magnum 3000	P1	1661	●	●		●
Simon Aristrocard	D6, I1	60*	●	●		
Sprinter	A1		●	●	32k	●
Trippler 20	M2	57		●		
Trippler 64	M2	57		●		
Type Slave	G2	230			32k	
U-S232	U1	75	●			
U-Port	U1	195	●			●
U-Cent	U1	69		●		
U-Print 16	U1	129	●	●	16k	●
U-Print 64	U1	TBA	●	●	64k	●
Wizard IPI	C3	69		●		●
Wizard EBI	C3	121		●	64k	●
Wizard BPO	C3	153		●	32k	●
Wizard SBO	C3	184	●		32k	●
Wizard Spooler	C3	222		●	64k	●
Wizard Spooler	C3	268	●	●	64k	●
Zappler II	M2	98	●	●		
Zappler III	M2	98		●		

Your A to Z guide to printer suppliers

A1	A>Line	Willoughby Waterleys	053 758 486
A2	Aptec	London	01 328 7272
A3	Anadex	Basingstoke	025672 3401
A4	Access Data	Uxbridge	0895 59781
A5	Apple UK	Hemel Hempstead	0442 60244
B1	Brother	Manchester	061 330 6531
C1	Crown Business Machines	Eastbourne	0323 20496
C2	Cirtech	Dunfermline	0383 729770
C3	Computronix	Camberley	0276 682422
C4	Computopia	Leighton Buzzard	0525 376600
D1	Dataplus P.S.I.	Cheltenham	0242 30030
D2	Da Vinci Computers	London	01 202 2272
D3	Diablo Systems	Woking	04862 71991
D4	Data Efficiency	Hemel Hempstead	0442 41191
D5	DMS Electronics	Sheffield	0909 563978
D6	DRG Business Machines	Weston-Super-Mare	0934 415398
D7	DN Computer Services	Manchester	061 653 0777
D8	Dataproducts	Egham	0784 31161
D9	Datatrade	Northampton	0604 22289
D10	Data Dynamics	Hayes	01 848 9781
E1	East Central	London	01 790 9991
F1	Facit	Rochester	0634 401721
G1	Geveke Electronics	Woking	04862 26331
G2	Gram	Maidstone	0622 679595
I1	Intelligent Interfaces	Stratford-U-Avon	0789 296879
I2	Interquadram	Slough	06286 63865
J1	JJ Instruments	Southampton	04895 4221
K1	Keyzone Ltd	London	01 965 1684
L1	Lethaby Numbering	Andover	0264 65951
L2	Lowe Computers	Matlock	0629 4995
M1	Millbank Computers	Twickenham	01 891 4691
M2	Micro Peripherals	Basingstoke	0252 3232
M3	Mellordata	Colchester	0206 298181
N1	Norbain Micro	Reading	0734 752201
N2	Newbury Data	Staines	0784 61500
N3	Northamber	Esher	0372 68311
O1	Olivetti	London	01 785 6666
P1	Pragma Ltd	Rickmansworth	0923 720326
P2	Pontoppidan	Paisley	041 889 4359
P3	PMS Developments	Rotherwas	0432 265768
P4	Paragon	London	01 631 1008
P5	P&P Micro Distributors	Rossendale	0706 212321
Q1	Qume	Reading	0734 584646
R1	Rapid Recall	High Wycombe	0494 26271
R2	Ranmor Computing	Southend-on-Sea	0702 339262
S1	Sintrom Electronics	Reading	0734 875464
S2	Silver Reed	Watford	0923 35616
T1	Teleprinter Equipment	Tring	044282 4011
T2	Thame Systems	Thame	084421 4561
U1	U-Microcomputers	Warrington	0925 54117
W1	Walters Microsystems	High Wycombe	0494 445172
Z1	Zygal Dynamics	Bicester	08692 3361
Z2	ZE Systems	Leighton Buzzard	0525 378664
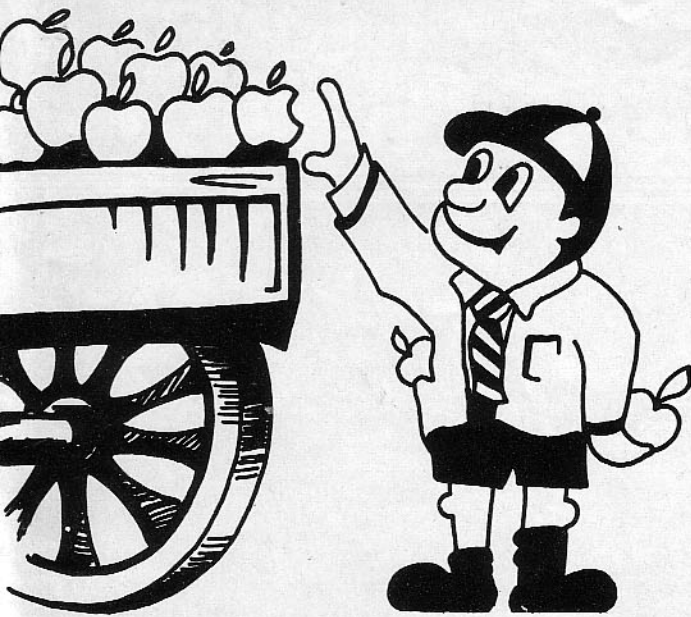
If you're stuck for words, this program will keep you guessing . . .

By HUGH
DOBBS

*** *** ****** ****** ** ***** ***** ***** , *** **
***** ******* **** **** ******** ** ********?

ARE you clever enough to guess these words, all of whose letters have been replaced by asterisks?

Storyboard, by Christopher Jones, is a general purpose program for education. Although it is intended for language teaching I use it quite a lot in the teaching of chemistry.

The "author" types in a passage of text using both upper and lower case, with a choice of English, French or German character sets — no Irish/Spanish as yet.

The text may be up to 19 lines in length, and the input handler automatically left justifies it so that a word is not split between lines but is moved down to the following line if necessary.

A " is automatically replaced by ' (if you follow me), and you cannot use the characters * or / in the text, as * is used to signify a new line while / is used internally by the system to code a comma.

I object strongly to the latter, which is not mentioned in the manual, as I tend to use / as a line separator in free-form poetry:

> Here is a piece / of rather blank verse
> / how blank / I ask / can you get

and I don't like it being unexpectedly transmuted into a comma, especially as there is no provision for editing a completed text.

Fortunately the textwriter program is written in Basic, so you can change little details like this as long as you also change the main Storyboard program to match.

Once the text has been entered and checked it is saved on disc, and at this stage one of the main disadvantages of the system becomes apparent — if you have used the full 19 lines, go and have a cup of tea. It will save you the nervous strain of standing around for about a minute while nothing visible happens.

What is actually happening is a vast amount of string processing and associated garbage clearance as the text is analysed for individual words. These are converted into lower case and added to the text together with their line and row locations. The full text is also stored unchanged except that commas become /s, so that the whole file takes up twice the necessary disc space.

However, the texts are very short and you can only have 18 on a disc, so it does not matter. The time is saved at the far end, when the student RUNs Storyboard.

Your text file needs a name of course, but the program does not accept all legal DOS filenames. It must be exclusively UPPERCASE AND SPACES — and at that I have exceeded the limit of 16 characters. This leads one to use cryptic rather than explanatory names.

The student RUNs Storyboard (the disc does this automatically on booting, of course, but you can also do it from the menu on the master disc).

This gives you instructions if required, and then a menu showing all the texts on the disc — you choose one by number.

Again there is an inordinately long pause while the text is loaded, and students have been known to depart in despair or even hit RESET.

Eventually you are asked whether you want to see the text first — briefly or at your leisure — or whether you would rather try it immediately.

Taking my brief example above, this would be displayed as:

FILENAME
Here is a piece , of rather blank verse
, how blank , I ask , can you get

. . . if you ask for that; otherwise you get:

**** ** * ***** ** ***** ***** *****
*** ***** , * *** *** *** ***
GUESS A WORD:

and it's up to you. Incidentally if you used any strange punctuation marks such as £%&$, these

probably also become ****. The program is strictly for plain text, though numbers also appear as normal.

People quickly develop strategies for attacking the problem. In this example you would probably start by trying A or I, as the only common one letter words (in English).

When you press RETURN the program runs rapidly through the undisplayed words and locates any matching ones, which are then displayed and the bell rings. The number of the current word being checked is displayed so you can see that something is happening. By now you have:

```
**** ** a *****  ** ****** ***** *****
     *** ***** , | ***  *** *** ***
```

and you probably proceed to try various possible two and three letter words. When you hit on one

that does not exist you get a message — Bad luck — and there is a pause which is infuriating as most people have time to type the next three letter word before they notice that it isn't appearing on the screen.

They then press RETURN and wonder why OU or whatever is again a source of Bad Luck.

This is another point at which the Basic garbage collection problem appears with long pauses during the search. By now perhaps you have:

```
**** is a ***** , of ****** ***** *****
     *** ***** , | ask , *** you get
```

If you run out of inspiration — and it helps a lot if you have several people working together with different backgrounds and interests — you can type HHH and get a hint:

The next word begins with 'H'

Apples provide core skills for

By PAT
R. BAKER,

Tutor in
Computer
Applications,
South
Bedfordshire
Training
Centre

THIS month the government's new Youth Training Scheme gets under way across the country. Sixteen-year olds who do not choose to go to school or college can apply to join the scheme, which provides a year's training in various occupations.

Certain skills must be offered right across the scheme, and one "core" skill for all trainees will be computing and new technology. The scheme comprises planned work experience within local industry and also substantial periods of off-the-job training.

In June last year I was asked to join a team to run a year's pilot scheme at the South Bedfordshire Training Centre in Luton to see how things would work out. My brief was to provide "computing" for about 500 young people, in groups of about 16, as part of their off-the-job training.

Two groups were interested in careers in computing while the rest ranged from would-be lorry drivers to would-be nurses, secretaries and bricklayers.

Not quite sure where to start, I turned to Apple — mainly because I had used the Apple II at my previous college. I felt that I needed a straightforward, robust machine with lots of software back-up. I thought we needed a business type computer, comparable to the micros which the trainees might face when they went out to local firms for their periods of work experience.

We bought nine Apple IIs, each with double disc

drive and 12in amber monitor.

The computer room was laid out so that two trainees shared each of eight of the workstations, leaving one system with a large 22in monitor for the tutor. We chose an Olivetti daisywheel printer and an Epson dot matrix printer so that trainees could gain experience in operating both sorts of printer. Also, if one broke down, we could still use the other one.

Working within a tight budget, we chose a very limited range of software to begin with: Applewriter for word processing, Visicalc for general and business calculations, Visidex for data storage and retrieval and a simple Apple stock control program.

The pilot scheme got under way last September. None of our trainees had used packaged software before, except for the inevitable few who were expert at Space Invaders! Those who had done some computing at school had begun a little Basic programming. At work, however, the trainees would probably not be expected to write programs — but they would be required to operate a terminal or micro using existing in-house or commercial programs.

They would need to be able to work through a menu, input data, obtain print-outs. They required thorough training in keyboarding, and the clear, simple layout of the Apple II keyboard was ideal.

The Applewriter program proved very successful with its clear menus, and some simple input/save/print exercises, ranging from business letters to CVs for future job applications, enabled everyone eventually to produce some impressive-looking printed documents.

Visicalc and Visidex proved more difficult to handle, as trainees quickly got stuck in "storage mode" on Visicalc or lost patience and pressed every key in sight on Visidex! If anyone can recommend some simple alternatives, I would be grateful.

I managed with most groups to use these two programs successfully in a very limited way but I could not really develop and use these excellent programs to their true potential.

Trainees used the stock control program plus data discs to keep their own records of goods which they might handle at work, and those hoping to find jobs in manufacturing industries felt this program was particularly relevant and fairly easy to use.

which probably gives you what you need to identify "Here". If you give up on the next one altogether, type ? and it is displayed wherever it occurs.

You can also see the whole text if you type SSS, or abandon the exercise by typing EEE.

Any word you guess can be typed in upper or lower case, or a mixture, and will match any case in the text since it is converted to lower case on input and matched against the lower case versions previously stored by the textwriter.

The special symbols in the French and German character sets have to be typed in correctly, which is asking a lot from the student, but anyone with the lower case version of Apfeldeutsch will be quite at home, as the same conventions are used, at least for the German set.

The EFG high resolution character generator is

YTS trainees

The two groups of trainees who had chosen computing as their main occupational skill quickly became familiar with Applesoft Basic and a few are now learning Pascal; though they may not be able to find jobs which require programming skills when they leave. They are skilful at choosing the right package for a particular task, and have created several data files for use by the staff of the training centre.

These computing trainees also keep their personal trainee profiles on disc, updating them and obtain printouts at regular intervals. Feedback from local employers indicates that their training on the Apple II has equipped them well, and they are coping admirably when they meet different micro or mainframe systems at work.

Over half of last September's intake of computing trainees have already received offers of permanent employment.

Trainees following other occupational courses have this year each received about 20 hours' computer training. They can safely and carefully handle the equipment, write a simple Basic program and have used three or four business/office type packages.

Next year I would like to expand further into robotics, graphics and sound if I can track down suitable hardware and software. I also need a business accounts program which is simple to explain and very user-friendly.

I would be very pleased to hear from any readers who can help me out with this, bearing in mind that it is one tutor to about 16 young trainees and not one supplier to an experienced businessman and his secretary!

For me, this year has seen a new approach to teaching computing. It is essentially a look at computer applications in industry and society in general and not the traditional programming syllabus. Those 16-year-old school leavers who joined our pilot scheme in Luton last year have demonstrated a great readiness to discover and be involved in the new technology. They will, I am sure, take their place in our increasingly computerised world.

I now look forward with enthusiasm to the start of the training scheme proper, and I am currently planning a second computer room — full, hopefully, of the new Apple IIe!

by Microsource Eurosoft and is available for other purposes.

Any word with an apostrophe in it, such as Can't must by typed in as a whole, apostrophe included. However a hyphen is treated as a word separator, so you have to type in "word" and "separator" separately.

If you discover a major error in a text you are expected to rewrite it from the start. It is *just* possible to edit a text file using the GraForth editor, but you have to be very careful not to insert any stray spaces, and to edit both instances of a word and if necessary change its line and row numbers (and perhaps those of words which come after it).

There is room here for another utility program. Programs are provided for transferring or deleting texts, and for rebuilding the index in case of a major disaster.

Considerable thought goes into the choice or creation of a suitable piece of text. The method is particularly useful for a short poem or other passage which is to be learnt verbatim, a topic with a large, well-defined specialised vocabulary or a passage where words are deducible from the context.

Given a larger screen area and the ability to add diagrams it would be applicable to theorems, but the limitation to a short passage of text and the mis-casting of mathematical signs spoil it for uses in that area.

I have used it for revision work in ionic and covalent bonding and in the rules for oxidation numbers, subjects which have specialised vocabularies and where particular considerations and concepts occur predictably.

The difficulty in the latter case was to avoid the repetitive use of certain words which are *always* used — because it spoils the game if you guess a word and 17 copies of it appear.

Two poems have also appeared on the disc. One, an alliterative allusive poem about a wild dog, is ideal for the medium. The other is a love poem full of pseudo-Shakespearian puns and references, and is felt to be too difficult altogether because of its unfamiliar vocabulary and its use of words outside their normal context.

Storyboard also has potential as a tool for remedial work in English, reinforcing the spelling of simple words and encouraging thought and discussion about the structure of sentences.

You can see this in the strategies which develop — they suddenly realise that the missing word must be a preposition, for instance, and some people even do a deliberate search for prepositions if "there aren't enough yet".

Its main drawback is the Basic garbage collection problem, and I would seriously consider rewriting the string input, processing and search routines in some language which doesn't have this problem.

Even Integer Basic would be better, since it operates with pre-dimensioned strings which don't move around in memory creating garbage in the first place. At the very least, the delay loop following the Bad Luck message should be replaced by an $XX = FRE (0)$ to make use of the pause.

In conclusion this is a useful and enjoyable package which provides a valuable new approach to teaching.

While it is obviously relevant to languages in particular, the same method is applicable to any subject with a specialised vocabulary, and it can be used by students of any age or ability level if appropriate texts are chosen.
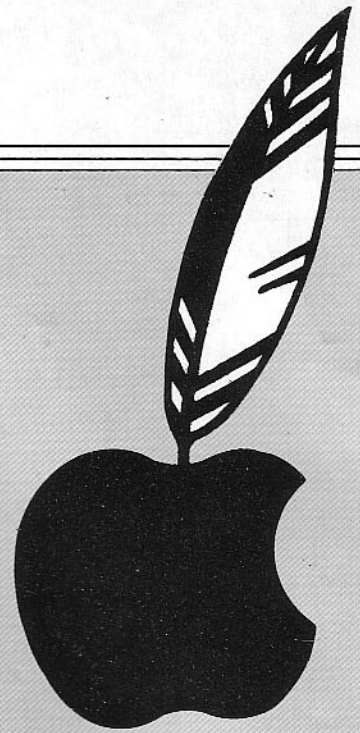
Eprom may get your Apple and FX-80 talking together

ANOTHER voice in the wilderness cries out to be heard. I have read the letter from L.H. Grant (Windfall, August) and I share like many others his frustrations about the incomprehensibility of many of the manuals which seek to enlighten me and which fail miserably.

I have this wonderful Epson FX-80 and the Apple-Epson interface. I have Applewriter II. All I need now is to be able to use the facilities that they offer.

Being a failed Mensa candidate I know that my IQ is about 140 yet the manuals are enough to convince one that only members of that esteemed society should be playing around with computers. Where then is the idiot's guide?

Let it not be said that I have learnt nothing from manuals. I "speak" Basic. (Would you like an idiot's guide to writing quizzes, for example? Yes, it took me a long time to work out how to select a random DATA statement.)

I can compose a letter using Applewriter (as you see). But — and it's a big BUT — how do I easily access the various fonts on my Epson without writing listable programs?

I have a feeling it ought to be possible. But how do I get Applewriter to do it?

I learnt a lot from The Apple II User's Guide. I have heard that somebody somewhere is writing its equivalent for the Epson. Where is it?

Some of my questions in the past have been answered with such retorts as, "Get The DOS Toolkit; Get Omnifont". Is it really the answer, because it seems to me that I end up with yet another manual that I cannot understand.

In desperation ... but I shall not give up. — **William G. Watson, Kingswinford, West Midlands.**

● Sending control characters from Applewriter II is easy once you recognise how to do it. First select upper case — CTRL–K — and then "verbatim characters" — CTRL–V. Next type the characters as needed.

For more details see Mike Glover's articles in the May and June issues of Windfall.

Note that to send ESC, the key has to be pressed twice. Finally switch off "verbatim characters" — CTRL–V — and carry on.

This may not solve all your problems, however, because of your interface card's inability to cope with control characters. It is worth asking Leicester Computer Centre if it has completed development of

its planned eprom which will make your Apple and your FX80 printer really talk to each other. **Max Parrott**

Sorry, wrong number

IN the April Appletips page you print a program by Gordon Watson, "Break that phone list pattern."

I wonder why all this extra program is required to make it accept GPO type phone numbers. All that is required to do this is to omit the less than sign < from line 4070. The program will then accept any numbers. — **Neville Hansell, Stalybridge, Cheshire.**

Bother in the buffers

I HAVE an Apple II and Epson MX100 printer and use the bit image method to draw flow diagrams on which are also printed flow values. The program accesses a disc to input previously stored values to an array prior to printing.

It appears that accessing the disc creates a problem in the buffers or somewhere. After printing has proceeded for a few lines some spurious commands are sent which cause momentary erratic printing of dots and additional line feeds.

Once this phase has passed the system works perfectly and if one then goes back to the beginning of the program again it prints the whole diagram without any trouble.

It is nothing to do with the printer

or interface as one can see it happen when printing commands to the screen. The program is now arranged first to print to the screen to pass the problem period and then to return to the start of the diagram in printer mode.

Is there some cure for this problem? My solution is a little untidy and takes time. – **J.D. Blanchard, Bromley, Kent.**

● This problem has us flummoxed — perhaps a reader will recognise the problem and know the solution. However, assuming the program is written in Basic, the following observations may be relevant:

1. Is the data received from disc the same as that sent to the screen or to the printer, or is this primary data transformed to secondary data for subsequent transfer?

2. If the flow diagram can be printed correctly then the data is not corrupted. If the data appears wrongly on the screen then the printer and interface would appear to be exonerated.

3. What happens if "printer initialise" (ESC @) is sent before the data? **Max Parrott**

All hands to the computers

I AM writing to enquire whether anyone has an interest in computing and coastal navigation, and whether there are any useful programs written for the computerised sailor. In my case, it is purely academic as my coastal navigation days are over.

I have just perused the latest Reeds Nautical Almanac and it occurs to me that

there is great scope for this type of information to be computerised.

My particular interest is a program to calculate the depth of water at any particular time/state of tide. The harbour master in Aberdovey is often asked the earliest time that safe entry to the estuary over the bar is permissable. A program enabling a printout for the week/month ahead with times and depths would be a very useful guide in these circumstances.

This is just one facet. There must be great possibilities in this field. – **P.J. Henderson, Sutton Coldfield, West Midlands.**

Disabling error

WITH reference to my article on disabling the autostart reset vector (Windfall, March 1983) I have just spotted an error in my code (and in some other pieces of code I have seen).

When the code is first BRUNed it resets the HIMEM vector to the start of the code, but the Applesoft start-of-free-string-space pointer is not reset. So strings will still begin at the original location in memory.

Often this will result in nothing untoward, but when this pointer points to locations now occupied by the code, use of strings will result in the program's corruption.

One remedy is to rewrite the code making it alter both HIMEM and the start-of-free-string-space pointer. But a simpler way is just to insert the statement 'X=FRE(0)' just after the code has been BRUNed. This will reset the free string space pointer to the same location as the HIMEM pointer.

This method is also needed for other pieces of code which do not completely reset the Applesoft memory management pointers when loaded. – **Dave Miller, London.**

. . two more

I REGRET to say that there were a couple of factual errors in my article on PEEKS, POKES and CALLS which appeared in the July issue of Windfall.

Firstly the colour byte for HGR and HGR2 is located at 228 ($E4), not at 804 ($324). Moreover HCOLORs cannot be POKEd straight to this address, as I may

have seemed to imply, but must first be coded, thus:

FOR		POKE
0 –	Black 1	0
1 –	Green	42
2 –	Violet	85
3 –	White 1	127
4 –	Black 2	128
5 –	Orange	170
6 –	Blue	213
7 –	White 2	255

Alternatively, any other value below 256 may be POKEd into 228 to produce the various broken line patterns demonstrated in the graphics routines in my article, but this time by using the HPLOT command instead of a loop.

Secondly, there is no overflow between bytes in the hi-res graphics screen areas. This conclusion was based upon an experiment conducted several months ago, the results of which even I have been unable to duplicate in a recent re-run.

My apologies for any confusion this may have caused to readers trying to implement some of these routines. – **A.J. Bradbury, Hove, Sussex.**

Plain English

I HAVE just read Roger Glanville's amusing and sad article in the May issue of Windfall and must agree with every point he made.

Apple manuals are written for nobody to understand. The funny thing is that Apple themselves don't seem to have realised this.

In addition to the Apple set-up which I have been using for nearly two years now, I have just bought myself a TRS 80 Model 100.

The manual is about the size of Windfall but like four Windfalls thick. Its 225 pages are full of plain English, and what a pleasure it is to read. The author never talks down, nor is he anything other than clear as daylight.

We – the buying public that is – must definitely look around for better alternatives. Apple is supposed to be so friendly but is not when you come to use it. You'd think that they made money by selling courses the way those expensive manuals are written. – **Bob de Boer, Port Elizabeth, South Africa.**

Watch those resistors

I WAS interested to read the article by P.F. Wilson, A switch in time saves two, in the July issue of Windfall.

However before drilling into my Apple disc drives I would appreciate confirmation on one point. The text reads: "Looking from the rear, solder the two 220 ohm resistors onto the upper right and lower right tags of the switch . . ."

I take this to mean that the two resistors are soldered in parallel (effectively 110 ohms) between tags 2 and 6, but I would be grateful for your confirmation as, being far from help, I cannot afford to risk blowing up my two disc drives. – **E.W. Douglas, Andorra La Vella.**

● No! The two resistors should not be soldered in parallel between tags 2 and 6!

One resistor (from pin 2) is connected to the green LED and the other (from pin 6) to the red LED. Then join the cathode leads from each LED and connect the resulting lead to TP3 on the main drive board.

The diagram below should make this clear.

Sidewise, the wide one . . . Mike Raine (seated) shows it to Visicalc enthusiast Tony Mechin
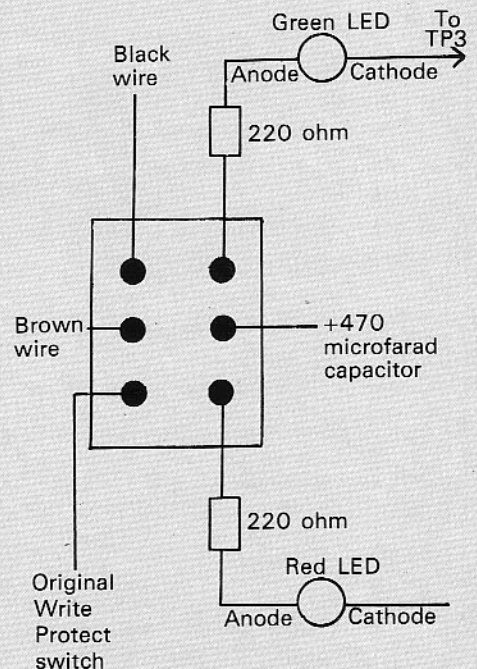
Trio for the Apple

THREE products for the Apple II and IIe have been released by Glanmire Electronics.

The 64k 80 column card (£129) extends the Apple IIe's memory to 128k and gives an 80 column text display. It is compatible with the Apple's own extended text card.

The eight channel analog to digital converter (£88) is a powerful but easy to use data acquisition system with eight bit resolution.

The eight channel input output card (£59) provides eight programmable TTL inputs and outputs for use in a wide range of control applications.

Tel: Cork, Ireland (021) 889209.

Guide for CP/M learners

A PROGRAM designed to guide the user through the complexities of learning CP/M is available from Microcomputer Products International.

Called CP/M Tutor, it is supplied as a single floppy disc which includes both the Tutor itself and the manual that goes with it.

It is menu driven and requires only the keying-in of the relevant number to move through the initial menu. Rather than let the user scroll through its pages the Tutor is sprinkled with strategically placed tests that have to be answered correctly before moving on.

These are good for teaching the uininitiated about the occasional pedantry to which computers are prone. Forget a full stop and the user is stuck until it is remembered.

It is not unkind however — there are comprehensive "HELP" messages, and the Tutor gives some heavy hints as to what has been done wrong.

The program, produced by Syntax Software, costs £55.

Tel: 01-591 6511

Test card

THE GPIB interface card allows the Apple to become an IEEE 4888 Controller for test, measurement and control.

The board will run up to 14 separate controllable devices with a transmission path of up to 20 metres.

The on-board software interfaces directly with Basic and Applesoft strings.

It costs £189 from Hawk Electronic Test Equipment.

Tel: 0622 686811.

Broad view of Visicalc

"THE widest spreadsheet in the world" is the claim for Sidevise, a program that will print Visicalc models — especially those which are too wide to fit on one piece of paper — sideways.

Financial projections, graphic presentations and even banners may be printed down the paper instead of across.

Developed by Mike Raine, an architect from Capetown, Sidevise runs on the Apple II range and is compatible with the Epson and other printers using the Apple parallel, Prometheus Graphitti and the Orange Micro Grappler cards.

It is marketed in the UK by Pace Software Supplies and costs £40.

Tel: 0274 575973.

Stock control pack

A STOCK control package designed for the Apple III called Infotory, has an item capacity of 26,600 utilising a configuration of Profile and one floppy drive.

Minimum RAM required is 128k.

It was designed for the auto parts/repair, food service retailing, and manu-

facturing type user.

Infotory is a stand-alone package incorporating a report generator (Anyreport) which enables the user to produce customised reports to satisfy individual management requirements.

Other features include a 15 alpha/numeric character item code field, a location code field, 99 possible categories, reorder/out-of-stock flags and stock valuation by category.

It is available from SSR International.

Tel: 01-402 6493.

With text in mind

A PARALLEL interface for the Apple II from Orange Micro, makers of the Grappler and the Bufferboard, is available from Pete and Pam.

The Orange Interface is Centronics compatible and has advanced text features. These include adjustable margins, line length and page length.

The text features are easily invoked using simple control commands.

The card costs £64, is compatible with Pascal and CP/M and plugs into any Apple slot except zero.

Tel: 0706 227011.

Lab unit

Another laboratory/industry unit from Xcalibur Computers is the XAD-3, a high speed multi-channel analogue to digital converter which plugs directly into the Apple backplate.

The unit has eight differential input

The Orange Interface . . . advanced text features

channels and a 25 microsec conversion time.

The gain of the analogue to digital converter is changed by program control over a range of 128.

The card is compatible with the Apple II and IIe and may be used both from high level languages and machine code.

It is supplied with a manual and an applications disc.

Tel: 0604 21051.

In the balance

AUTOMATED weighing is possible with the use of The Softweigh intelligent interface card, together with Mettler electronic analytical and precision balances and an Apple II.

The user plugs in the card and connects a cable between the back of the Apple and the balance — interface adapters or special cabling are not required.

On-board firmware eliminates assembly language programming and I/O driver software. Distributor Heyden Datasystems says the card is compatible with all Mettler data outputs.

Controls are balanced with single character commands in a Basic program and balance data is returned in standard Basic variables.

Typical applications for the Softweigh Interface card include quality control, checkweighing, toxicology, moisture determination, animal weighing, sample/bulk counting, filling and inventory.

Tel: 01-203 5171.

Joystick for the IIe

THE Suncom Starfighter is a joystick designed for the Apple IIe although an adapter is available for earlier Apple II models.

The joystick has left and right-handed fire buttons as well as an alternative fire button located on the bottom front edge of the unit for use on games which require a second type of activation or function, such as Choplifter.

Features include centring adjustment for both vertical and horizontal axes, which allows the user to fine tune the centre point of control. A joystick throw selector allows one to choose either a
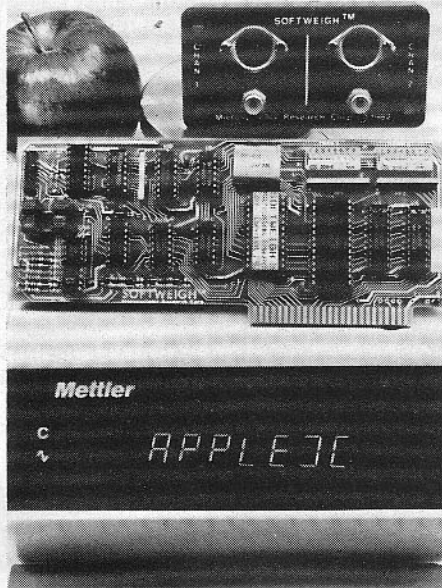
Mettler's The Softweigh

short or long movement.

The unit costs £39.95 from Consumer Electronics.

Tel: 061-682 2339.

Specially for WP

AN 18cps daisywheel printer designed for word processing use is the Juki 6100 which emulates Diablo 630 protocol and is fully compatible for use with Wordstar.

It costs £399 from Micro Peripherals.

Features include bi-directional logic seeking, subscripts and superscripts, bold and shadow printing, character pitches 10, 12, 15 and proportional, graphics mode, 1/120in minimum character spacing, 1/48in line spacing and a 2k buffer memory.

It has a 100 character Triumph Adler compatible "drop in" daisywheel, 13in platen with 11in print line, linear motor for accurate positioning and low noise, and IBM 82 compatible single/multistrike ribbons.

A centronics compatible interface is provided as standard with an RS232 serial and current loop interface as an optional.

Paper handling is either by friction feed or optional tractor feed.

In business with Apple III

THE complete suite of business and accounting packages from Systematics International has been released on the Apple III with Profile.

"The III is a good machine", said Britt Marie Young, of Systematics, "and it is a

logical step in our development to release our software for it".

"All our packages are now up and running on the III and are available with SOS drivers, together with a training and demonstration manual that takes users through a complete case study simulation".

Daisywheel deployed

A NEW two colour daisywheel represents the first assault on the low end of the UK daisywheel printer market by Brother.

The HR-15's specification includes a 3k buffer with single button off-line text reprint, two colour — red and black — printing, super and sub scripts and proportional spacing.

Tractor feed and a £220 automatic cut sheet feeder are available, as is a keyboard priced at £150 which allows the HR-15 to be used as a conventional typewriter.

The HR-15, which costs £500, emulates Diablo 630 control protocol, allowing shadow printing, underlining, proportional spacing and colour selection to be accessed easily, even via standard packages such as Wordstar.

It uses a standard cassette loaded daisywheel and a cassette ribbon.

Maths on disc

THE arrival in the UK of a new series of maths learning games for children aged five to nine plus has been announced by Pete & Pam Computers. The packages, which come from the Edufun Division of Milliken Publishing of St. Louis, are avail-
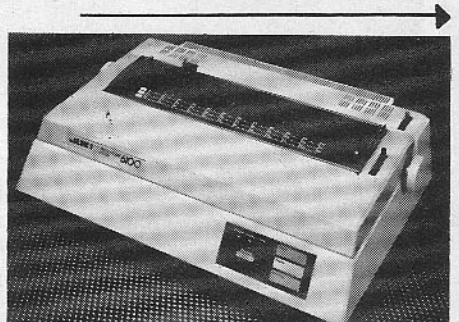
Juki 6100 — aimed at the word processing market

able for the Apple II plus.

All the packages cost £19.95 — with two games on each disc.

Golf Classic is designed to develop the geometric skills of children aged nine upwards. It encourages a child to estimate angles and distances and comes with re-usable score cards and a record keeping system. Compubar helps children learn to read graphs, and to construct arithmetic expressions.
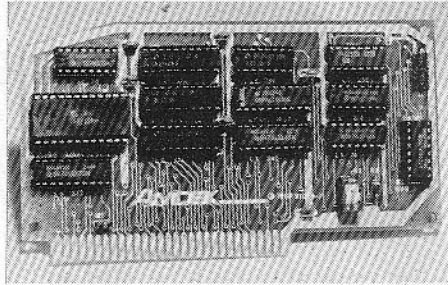
Others deal with subtraction and division, geometry and counting.
Tel: 0706 212321.

New colour modes

THE M-80E video card, introduced by the Amdek Corporation in the US, is designed for the Apple IIe to give 80 column text and a wide selection of new colour modes.

The card links the IIe to an NTSC or RGB monitor and is compatible with the Apple

Amdek M-80E interface card

80 column card when used in this configuration.

Video for both 40 or 80 columns generated by the M-80E card for an NTSC or RGB monitor include white text (text colour switch selectable for RGB monitors), 16 colour lo-res with option of mixing text, and 6 colour hi-res with option of mixing text.

Additional video modes when used with an RGB monitor include 40 column text with choice of 16 colours in foreground and 16 colours in background, 16 colour lo-res with option of mixing 40 column foreground/background text, 16 colour

me-res with option of mixing 80 column text.

The M-80E utilises the Apple IIe 80 column firmware, and so is software compatible with existing Apple IIe software such as Apple Writer IIe and Quick File.
Tel: (0101) 312-364 1180.

Access to Telex

FANCY accessing the national and international telex network with your Apple?

Microtelex allows the Apple to take on the role of a sophisticated telex machine while it is simultaneously performing its usual tasks.

The unit provides automatic dialling and redialling of telex numbers and allows the Apple to prepare, send, receive and store telex messages.

The need for a separate telex terminal is eliminated, as are the delays and frustra-