A Database Publication

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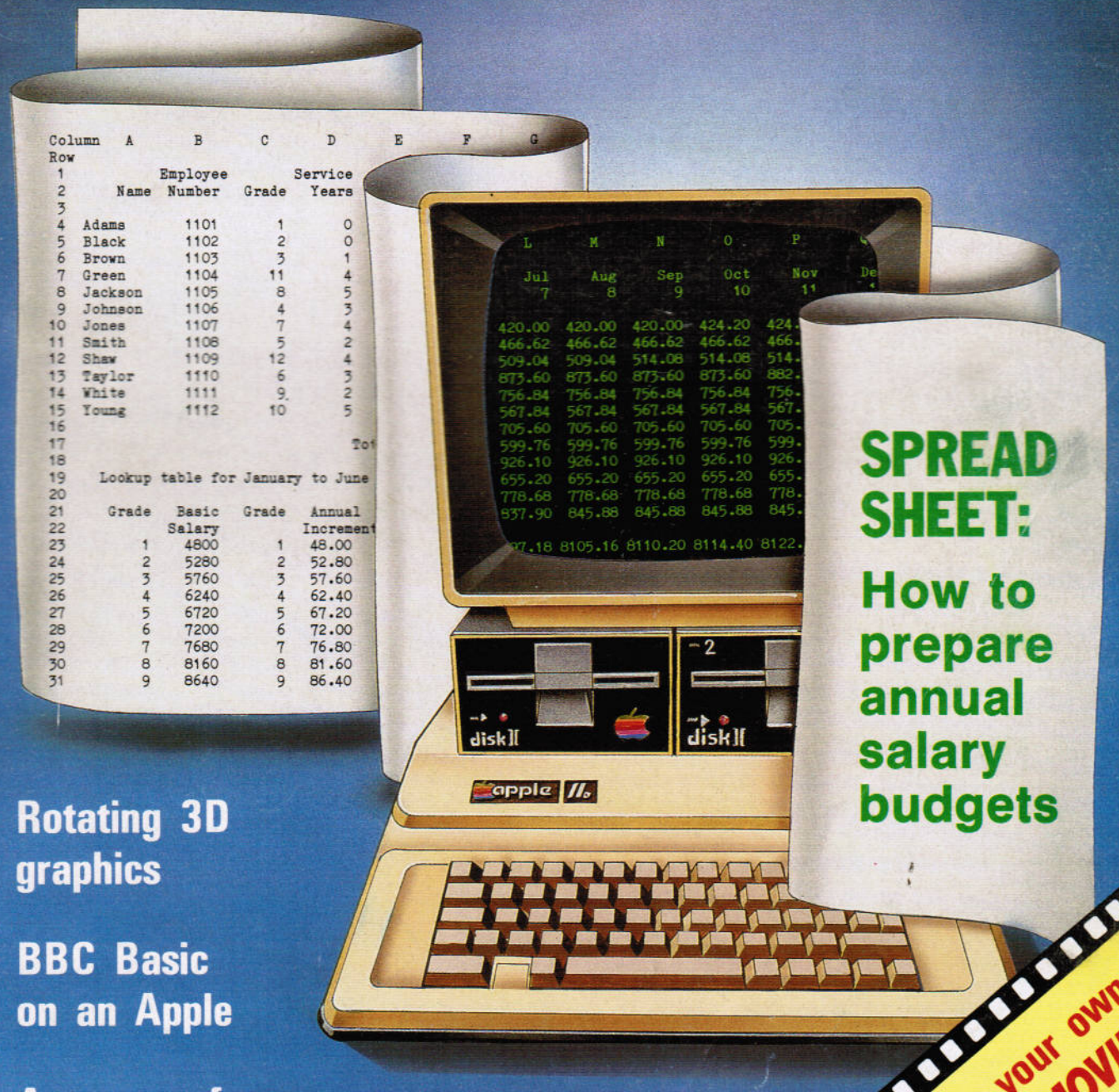

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Rotating 3D graphics

BBC Basic on an Apple

Anatomy of a ProDOS disc

Reviews: UniDisk Plus-Works

Make your own APPLE MOVIES

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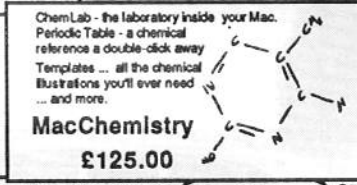

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News Flash hot from the MacWorld Expo
San Francisco - January 1986

We came, we saw, we conquered It was well worth visiting the greatest Mac show on Earth once again. Our faith in Apple and the greatest little computer has been completely vindicated by what we saw there. There is no doubt that the MacPlus is an important move that turns the Macintosh into a machine that's clearly superior to the best that Big Blue can offer, and already there was software on display at the show that can give us all access the full power of our favourite computer. So naturally we talked to the right people and came up with some insanely great deals for all you software-starved users:

Mac3D from Challenger Software £179.00
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M.C.A.D from VDE & EZ-Draft from Bridgeport 2 full - scale CAD systems that rival and surpass the best you'll find on other machines. Both are in the £2,000 price range, so they are meant for professional users , but we think you'll agree that's value for money when you see what they can do. Call now for more information.

ParaGenesis from AES is a fully professional electronic design system that can be used by an electronic engineer to take the process of logic circuit design all the way from initial schematics design on screen to final production drawing output to plotters. TTL, CMOS, and various other standard libraries are available, and we will be able to supply an evaluation disk to those of you interested at a nominal fee (refundable on purchase) very shortly. Call for information now.

We are now UK distributors for **SciFonts, ElecroFonts, LogiFonts, & QUED Editor** from **Paragon Courseware** We'll say more on this next month, but if you're in a hurry call !

Fluent Fonts & Fluent Laser Fonts from **Casady Company** are something else we're now distributing, so we think that together with FONTastic, Fontographer, and Instant Art's font collections we've got the font area pretty well covered!

It's rather difficult to explain **MacSpin** from **D² Software** in words. In fact, it's the most graphic, interactive, immediate way we've ever seen to present data, and it'll be here soon. In a similar vein, we think that **Cricket Graph** is the clear leader among the graph programs now available, and we'll have that one here for you any day now.

Last to be mentioned here, but certainly not least, is the **TML Pascal Compiler.** This is the first native code Pascal compiler for the Mac, and at only £90 is a real bargain. TML have created a complete development system, and when bought together with the **TML MacLanuage Series Development Tools** you have got youself a full commercial development system.

We are exclusive European distributor for many of the products listed on this page, and we're still looking for dealers and distributors throughout the UK and Western Europe. Interested? Then call now!

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It's getting harder and harder to squeeze all this stuff onto one page. Help!

apple user
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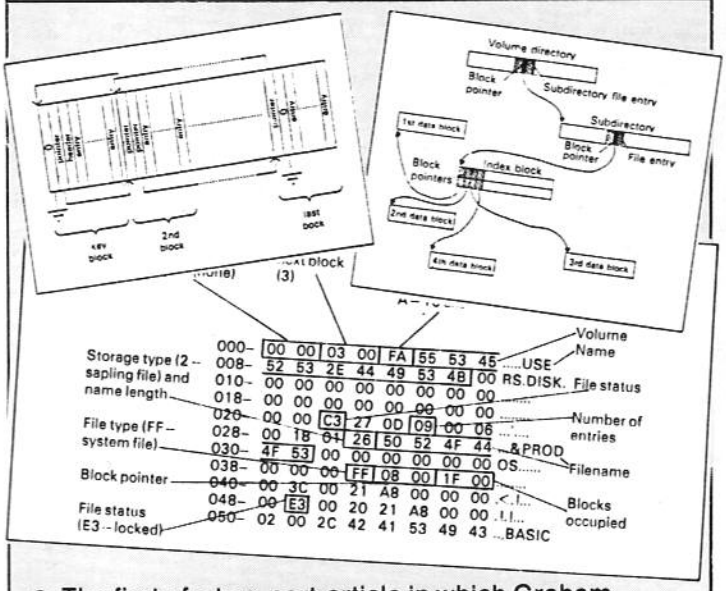

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Writing for Apple User: Articles and programs relating to the Apple are welcome. Articles should preferably be typed or computer-printed, using double spacing. Unsolicited manuscripts, discs etc, should be accompanied by a self addressed stamped envelope, otherwise their return cannot be guaranteed. Unless agreed, material is accepted on an all rights basis.

ABC 10,819 – JANUARY JUNE 1985

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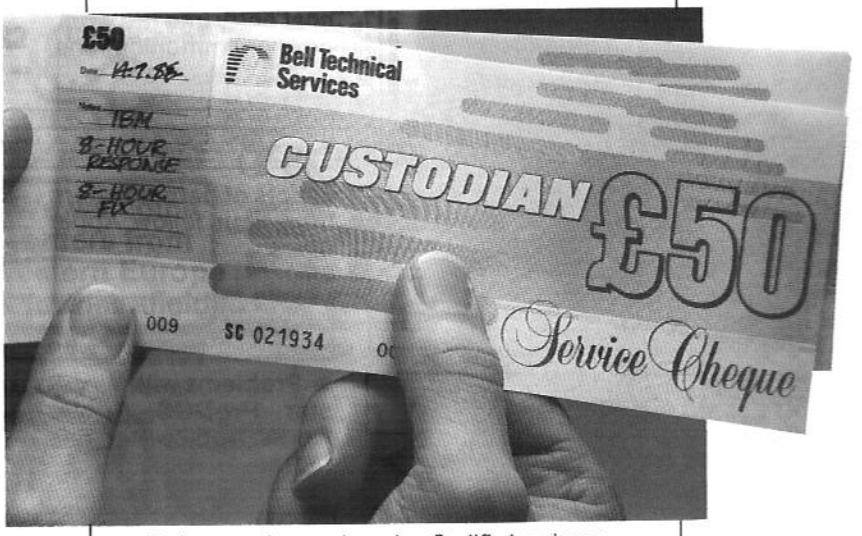

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New generation of Apple IIs reported on way

REPORTS from America give strength to rumours that the first of a new generation of Apple II machines will be brought out later this year.

Reliable sources close to Apple's development team say they expect the sophisticated new computer to appear on the market in late summer or early autumn.

Beside being an exciting new machine in its own right, it will confirm the revival in fortune of the Apple II, whose star seemed to be fading toward the end of the Steve Jobs era.

"It will put the Apple II up there in the same class as the Commodore Amiga and Atari 520ST, if not higher, in terms of performance", says *Apple User's* correspondent in the United States.

"And it will bridge the gap between the existing Apple II range and the Macintosh, not least because of its compatibility regarding peripherals like disc drives and printers.

"Apple watchers are confident it will have a 16 bit co-processor, a dedicated sound chip and graphics chip, and high resolution bit-mapped graphics capability like the Macintosh", he said.

"I also expect it to incorporate the SCSI high speed interface, making it easier to use faster modems.

"The new machine will definitely have complete downward compatibility with existing Apple II products, in line with Apple's stated policy.

"The main question mark concerns the changes in ROM that will be incorporated – so far Apple has successfully kept the lid on its plans in this area.

"Of course the machine's price is anyone's guess at the moment, but I expect that will be just about the last decision Apple will make in relation to the new computer".

Other reports reaching *Apple User* say that documentation for more than one Western Design 65C816 based machine has been supplied by Apple to several leading third party software developers.

This would seem to indicate that the new Apple II could be launched in two versions – one with a card-based modular system configuration and the other a closed box model like the Atari ST.

SHAPE OF THINGS TO COME ALL OVER THE UK

– SEE PAGE SEVEN

Apple under fire over Mac +

APPLE is increasingly coming under fire from its critics for the lack of compatibility of the new Macintosh Plus.

Latest reports from the States suggest that up to 50 per cent of the current Macintosh software will not work on the one megabyte model.

Such stories are being gleefully seized upon by Apple's rivals for propaganda purposes.

Atari's vice president Sig Hartmann has described the Apple situation as "a monumental development blunder".

In London to attend the launch of his own company's one megabyte machine, Hartmann told *Apple User:* "There are a lot of red faces at Apple with this one. Compatibility within a machine range must be the name of the game these days – or else.

"It means that all those Macintosh users will think twice before moving up to the Plus model".

Meanwhile Apple has conceded that its own field tests show that 15 per cent of Macintosh software will not run on the Plus.

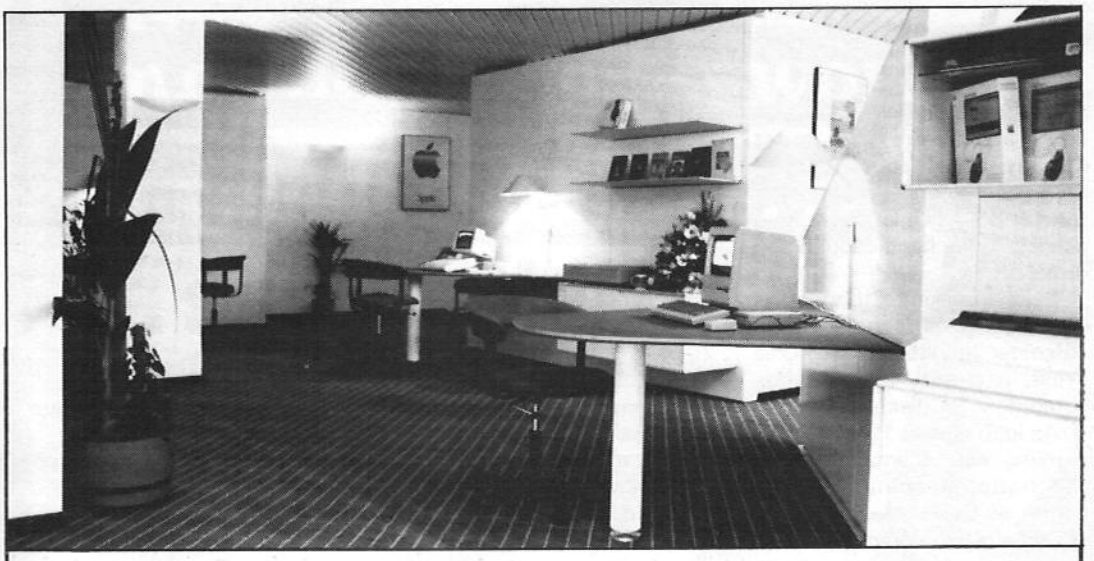
On the list of incompatible software is Apple's own Pascal, which cannot be run from a hard disc because of its copy protection.

As a result Apple is having to produce a new version for the Macintosh plus.

"The reason why some software doesn't run is because developers have broken the guidelines", claims Richard Bradley, Apple's product manager.

With tests having been conducted so far on 150 packages in the UK and 500 in the USA, the Apple technicians are sticking to their 15 per cent figure.

"You can be damn sure it will turn out to be a lot closer to that than 50 per cent", said a spokesman.



Apple's new image

THERE'S a new look in store for Apple dealers throughout the country. By the end of next year about 50 retail outlets across the UK will be sporting a distinctive, uniform image created by leading commercial interior designers ExpoCompetence.

Decorated from carpets to ceilings in shades of grey and white, with red accents, the new style shops will bear the name AppleCentre. Each will be a joint venture by Apple Computer and one of its most ambitious dealers.

The first two AppleCentres have already opened in London, one in Knightsbridge and the other at Swiss Cottage.

Apple's business development manager Peter Davies says: "They will offer much more than traditional computer shops.

"These are partnerships between Apple Computer and its dealers, allowing the already successful dealership to grow by extending its business into new, dedicated outlets.

"Apple will provide dealerships with their distinctive new interior and exterior design, furniture, and assistance with staff training.

"This will help dealerships upgrade themselves and offer customer services that would ordinarily be beyond their financial reach".

Venture capital on tap

HALF a million pounds is available for projects for the Apple II range. The man with the money awaiting investment is Barry Krite, managing director of DataStar Systems.

"I am prepared to invest in likely looking products, existing ones that may need a boost, or any which still may be at the idea stage", he says.

"As a nation we are notoriously good at ideas but terrible at putting them into practice – often through lack of capital".

DataStar Systems manufacture the Magic Modem. It was this project with its heavy development costs which set Barry Krite thinking about investing in his own personal venture capital fund.

Remembering the problems he had, he said: "We realise how easy it could be even for an exceptional product to flounder if you did not have enough capital behind it.

"That is why I decided to make the offer, not just for profit for myself, but to help the industry as a whole".

Conference postponed

THE conference for academic users of the Macintosh scheduled for this month has been postponed until mid-September.

John Barker, conference chairman and managing director of Ed-It explained: "A lot of pre-planning had been done but finally it was all too rushed. The postponement will give us a chance to attract American delegates. I am convinced it will be successful with the extra months available".

The weekend conference and exhibition, organised by Ed-It World with support from Apple UK and members of the Apple University Consortium, will keep the same venue, the Imperial College, London.

Unprotected package is paying off

A NEW integrated software package for the Apple II could herald a fresh approach to programming for the serious user market.

Homepak is a word processor, database and communications suite from Canadian publisher Batteries Included.

What sets it apart from the usual Apple II business-type package – other than the critical acclaim it has received both here and in North America – is the fact that it is unprotected.

This allows users to make backup copies.

The decision to dispense with protection was made by Homepak author Russ Wetmore.

The risk appears to have been justified in Canada, where sales of the package have lost nothing because of piracy according to Frank Brunger of UK distributor Ariolasoft.

"Batteries Included took a chance which paid off in three ways", Brunger told *Apple User*. "Firstly they dispensed with the complicated process of protecting the software, saving themselves a lot of time and effort.

"Secondly, sales of the package do not appear to have suffered because of the lack of protection.

"And thirdly users have no cause to complain that they are denied the peace of mind that comes from being able to make backup copies.

"I have a feeling that the success of the unprotected Homepak will cause producers of other business software to follow the lead of Batteries Included and decide that enough protection resides in the manual to deter pirates".

Homepak, described by a PCW magazine reviewer as "an excellent word processor, an unusually friendly yet fairly powerful database, and the best terminal program I've seen for a home micro" is featured as an *Apple User* special offer on Page 14.

Ormbeta changes hands again

ONE of the best known names in Apple II software, Ormbeta, has changed hands for the second time in a year.

The deal reunites the range of databases and accounting packages with its original developers whose financial difficulties led to the sale of the titles to TDI Software last summer.

The rights to Ormbeta have been bought by Datafile Software, which was set up by London applications publisher Applitek partly to harness the talents of the original Ormbeta team.

Datafile director Grant Martin told *Apple User:* "The Ormbeta name is well respected by Apple II owners and the packages have sold in the tens of thousands over the past five years.

"The deal makes sense for everybody because TDI are mainly hardware people while we can now offer a growth path for Ormbeta users into our new Datafile range of accounting software.

"While continuing to produce the popular Ormbeta database, management retrieval system and compact accounting system, we will also be offering more powerful hard-disc based accounting software that Apple II owners can upgrade to via a simple conversion".

SEQUEL TO ARCHON

ARCHON II, a sequel to the chart-hit Archon, named last year as the UK Strategy Game of the Year, has been released by Ariolasoft for Apple users.

Archon II has different battlegrounds and introduces 12 conjurable monsters, demons and the power of the elements. Price: £19.95.

Technology with loving care...

By DAVID CHESHIRE

AS regular readers of *Apple User* are aware, the most socially beneficial aspect of home computers – in particular the Apple – has been their value as aids to the handicapped and disabled.

In the forefront of this work is consultant and lecturer Roger Jefcoate, founder of the Aidis Trust, a charity which funds computers for disabled people.

As long ago as 1962 he was working with a small team at the national spinal injuries centre at Stoke Mandeville, in the days when computers were so big and expensive they were only within reach of large institutions and wealthy commercial concerns.

The Stoke Mandeville group was developing electronic aids to enable disabled people to operate typewriters, environmental controls and electrically propelled wheelchairs, using such components as telephone switchgear and manual or electro-manual switches.

Since then, miniaturisation and other sophisticated developments have enabled men like Jefcoate to incorporate computer technology into their work of helping the disabled to help themselves.

Today, as an independent assessor and adviser to various organisations, he first discovers what ability the disabled person has and then suggests the equipment best suited to realising that ability.

Frequently the residual ability upon which Jefcoate has to build is limited to say the least. Movement of one finger, toe or even eyebrow may be all he has to start from.

But fortunately nowadays even such slight movement can be harnessed to a wide range of electronic equipment, opening exciting possibilities for even severely disabled people.

Because of the limited nature of the marketplace there is no commercial incentive for manufacturers to develop aids for the disabled, and one of the major aspects of Jefcoate's work is to find or produce specialist equipment.

This means he has to take off the shelf components and adapt them so that the end result is a tailor-made package for an individual who has limited, often unique, abilities.

A package often recommended for a person with communication problems is a micro with word processor, disc drive, monitor and printer.

If the user is not dextrous a key guard can be fitted and in more extreme cases an enlarged keyboard or keyboard emulator is supplied.

Having pointed a disabled person toward a particular package, Jefcoate is often able to help find the finance for the equipment. His work brings him into contact with many charitable organisations and he is usually able to bring both parties together to their mutual advantage.

One of Jefcoate's continuing aims is to persuade statutory authorities like the DHSS and social services that they should widen the range of aids they provide, or be prepared to make the adaptations necessary to make them suitable for people with particular needs.

It is where such authorities are unable to help that he turns to charities.

Although he widely employs computer technology Jefcoate is not keen to include robotics in his armoury of aids. He feels machines that "do everything" dehumanise the care of the disabled.

The stories about Jefcoate's "clients" as he calls them are encyclopaedic. Many of them have been the subject of books and articles describing how help from some technological aid, plus guts and determination on the part of the patient and loving care from the helpers, can work miracles of liberation and achievement.

Henry Tunney is 23 years old, was born with cerebral palsy and can only control the movement of one foot. He cannot speak and needs constant attention, but an Apple Macintosh package with a rugged foot-operated control enables him to communicate.

Roger Jefcoate and others continue to maintain Britain's world leadership in the field of using micros to help the disabled – or, as Jefcoate himself aptly describes it, "technology with loving care".

JOHN SCULLEY TAKES OVER

APPLE'S new chairman is John Sculley, who takes over from Steve Jobs.

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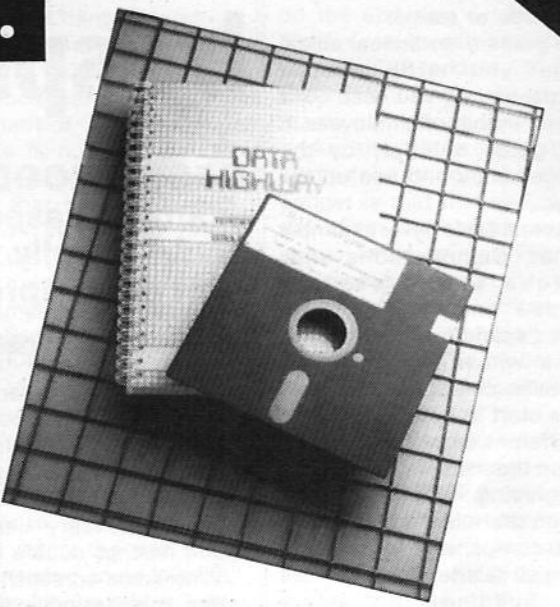

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Salary budgets by spreadsheet

GEOFF WOOD describes an example based on VisiCalc which could equally well be employed with other spreadsheet programs

MANY organisations such as central and local government and large companies have formal salary structures that reward employees according to their grade or status.

To prepare an annual salary budget you hardly need a spreadsheet. All you need do is list the number of employees in each grade, multiply by the average salary and add up the figures.

But real life is never as simple as that. Complications arise because employees are awarded annual increments which depend on the length of service within a given grade. Moreover, these annual increments start in different months for different employees depending on the date of appointment or upgrading.

Then there is the annual pay rise to compensate for inflation, raising all salaries for part of the year. Building up a salary budget that recognises these and other factors is not simple but it is well within the capacity of most spreadsheet programs.

The example described is based on VisiCalc but similar models can be built with FlashCalc, Multiplan, SuperCalc or the spreadsheet part of AppleWorks, Excel or Jazz. Some programs and computers limit the size of the model but Excel on a Macintosh Plus or AppleWorks on an Apple IIe with up to 1 megabyte of RAM should be more than enough for most people.

For ease of explanation and understanding, the example is limited to a dozen employees and twelve salary grades. However VisiCalc on a 128k Apple IIe copes quite easily with a similar model for 60 employees and 30 grades.

The model (see Figure I) makes use of the LOOKUP function in order to determine the exact salary of each employee in each month. Columns A and B show the name and payroll number of each employee. Column C shows the grade and column D shows the length of service in that grade. Column E shows the number of the month in which the employee is entitled to an additional increment.

In the example there are two sets of lookup tables. One set covers the months January to June, the other set covers July to December. In practice more than two sets of lookup tables could be used but this should not be necessary unless inflation reaches double figures.

With some spreadsheet programs it is desirable to locate the tables below and to the left of the cells which refer to them, otherwise you may get wrong answers if you change the data without forcing a recalculation.

The formulae in cells F4 to Q15 are identical in principle but vary according to position. The first part of the formula looks up the grade of the employee in column C, then refers to the first column of the relevant lookup table. When it finds a matching number it looks across to the next column of the lookup table to find the basic salary.

The remainder of the formula starts by comparing the number of the month shown in Row 2 at the top of the relevant column with the number of the month shown on the relevant row in column E. If the number at the top of the column is less than the number in column E the formula looks up the annual increment in the last two columns of the appropriate lookup table and multiplies it by the number of years of service – in that grade – shown in column D.

But if the number of the month shown on row 2 at the top of the relevant column is equal to or greater than the number shown in column E the formula adds one year to the figure in column D before multiplying by the annual increment found in the lookup table.

Finally the formula divides the annual salary, including increments, by 12 to give the monthly payment.

For example, the employee called Adams starts the year in Grade 1 so the basic salary is £4,800 per year. From January to June the monthly payment is £400. In July the five per cent salary increase raises the basic salary to £5,040, giving a monthly payment of £420. In October Adams qualifies for the annual increment of £48, giving a total payment of £424.20 a month.

Black starts the year in Grade 2 so the basic salary is £5,280. From January to April the monthly payment is £440. In May Black qualifies for the annual increment of £52.80 which raises the monthly payment to £444.40. In July the five per cent pay award brings the basic salary to £5,544 and the increment to £55.44, giving a monthly payment of £466.62.

Brown starts the year in Grade 3 but with one year of service in that grade so the monthly payment is (£5,760 + £57.60)/12, that is £484.80. In July the monthly payment becomes (£6,048 + £60.48) /12, or £509.04. In September Brown receives another annual increment of £60.48 bringing the monthly payment up to £514.08.

Green starts the year in Grade II with four years of service in that grade so the monthly payment is (£9,600 + (4 × £96.00)/12, or £832. In July the monthly payment becomes (£10,080 + (4 × £100.80)/12 – £873.60. In November Green receives another annual increment of £100.80 bringing the monthly payment up to £882. And so on for the other employees.

The table can be adapted to suit different requirements. For example central and local government departments start their financial year in April so the names of the months could be altered accordingly. The pay award for inflation might start in a different month but the formulae could be changed to suit.

When setting up a table like this for the first time it is all too easy to make a mistake in entering or replicating formulae, so it is advisable to check the answers with some simple data in columns C, D and E for the grades, service years and change month.

Start with the number 1 in rows 3 to 15 of column C and zeros in these rows in columns D and E. Then try changing the numbers in the three columns to make sure that the results are correct. If not, check the entries.

A useful precaution to ensure that the summation of the columns and rows balance is to enter a check formula in cell R17 as follows:

```
@IF(@SUM(R3 . . . R15)=
@SUM(F17 . . . Q17),@SUM
(R3 . . . R15),@ERROR)
```

If mistakes were made in entering or replicating the summation formulae this cell shows ERROR, but if the summations of the vertical and horizontal totals are identical the cell displays the correct grand total.

Note that the summation formulae for the columns add in the blank rows at the top and bottom of the main table (rows 3 and 16). This makes it easier to insert extra rows at the apparent top and/or bottom of the table because the formulae will be automatically amended.

In the example above the annual basic salaries and increments were deliberately chosen to be divisible by 12 without fractions of a penny. In real life some of the annual salaries and/or increments may give fractions of a penny when divided by 12.

The screen appearance and print out can be tidied up by

formatting the cells to two decimal places (/F$ with VisiCalc), but this could mean that if you add up the displayed numbers in some rows or columns the answers do not match the displayed totals.

To overcome this problem you can use the @ROUND function available in some spreadsheet programs.

VisiCalc does not offer the @ROUND function but the same effect can be achieved with the @INT function by multiplying by 100, adding 0.5, taking the integer and then dividing by 100. This gives answers which are rounded to two decimal places for calculations. For display purposes you may still need to use /F$. The formula in F4 would read:

@INT(@LOOKUP(C4, A23 . . . A34)+@IF(F2< E4,(D4*@ LOOKUP(C4 ,C23 . . . C34)), ((D4+1)*@LOOKUP(C4,C23 . . . C34)))/12* 100+.5)/100

An alternative way of constructing the table would be to use monthly salary amounts in the lookup tables and omit the division by 12 in the formulae in the main table. The @ROUND or @INT formula could be used to convert the annual basic salary and increments into monthly amounts. Thus the lookup tables would be wider but the formulae in the main table would be simpler.

With Multiplan the formulae in the main table could be simplified by using the 'name' technique rather than absolute or relative cell references. For example, rows 3 to 15 of columns C, D and E could be named Grade, Years and Change respectively. Columns F to Q of row 2 could be named Month.

The lookup tables would need only three columns instead of four, omitting the third column headed Grade, so the first two columns could be named Basic and the three columns could be named Increment. The formula in cell F4 would be:

LOOKUP(Grade,Basic)+IF (Month< Change,Years* LOOKUP(Grade,Increment), (Years+1)*LOOKUP(Grade, Increment))/12

The merit of using the name technique is not just that the formula is easier to understand but also that it saves memory and loads and saves faster because the file occupies fewer sectors on the disc. Indeed, using names on a 128k Apple IIe which offers only 35k of RAM with Multiplan but 95k of RAM on VisiCalc, you can build a bigger model on Multiplan than on VisiCalc.

A big advantage of using a spreadsheet for this task is that it is easy to update the table from one year to the next. It only entails entering some new figures in the lookup tables, a few changes to columns C and D and perhaps a few deletions and insertions of rows for employees leaving and starting.

With SuperCalc you could use the EXECUTE command to do the updating automatically. Similar results can be achieved with VisiCalc by datagramming. Excel offers similar effects with macro commands.

Another plus of using a spreadsheet for the salary budget is that it is easy to see the effect of changes such as annual salary awards. These are not always known at the start of the year but, once known, the effect on the total budget can soon be seen. The model could also be used in wage bargaining.

I am indebted to Lars Unger of Sweden who wrote to *Apple User* asking if there was a way of solving this problem with VisiCalc or Multiplan on the Apple II. His request prompted me to devise the method outlined in this article.

Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Row																		
1		Employee		Service	Change	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2	Name	Number	Grade	Years	Month	1	2	3	4	5	6	7	8	9	10	11	12	Total
3																		
4	Adams	1101	1	0	10	400.00	400.00	400.00	400.00	400.00	400.00	420.00	420.00	420.00	424.20	424.20	424.20	4932.60
5	Black	1102	2	0	5	440.00	440.00	440.00	440.00	444.40	444.40	466.62	466.62	466.62	466.62	466.62	466.62	5448.52
6	Brown	1103	3	1	9	484.80	484.80	484.80	484.80	484.80	484.80	509.04	509.04	514.08	514.08	514.08	514.08	5983.20
7	Green	1104	11	4	11	832.00	832.00	832.00	832.00	832.00	832.00	873.60	873.60	873.60	873.60	882.00	882.00	10250.40
8	Jackson	1105	8	5	3	714.00	714.00	720.80	720.80	720.80	720.80	756.84	756.84	756.84	756.84	756.84	756.84	8852.24
9	Johnson	1106	4	3	7	535.60	535.60	535.60	535.60	535.60	535.60	567.84	567.84	567.84	567.84	567.84	567.84	6620.64
10	Jones	1107	7	4	2	665.60	672.00	672.00	672.00	672.00	672.00	705.60	705.60	705.60	705.60	705.60	705.60	8259.20
11	Smith	1108	5	2	12	571.20	571.20	571.20	571.20	571.20	571.20	599.76	599.76	599.76	599.76	599.76	605.64	7031.64
12	Shaw	1109	12	4	1	882.00	882.00	882.00	882.00	882.00	882.00	926.10	926.10	926.10	926.10	926.10	926.10	10848.60
13	Taylor	1110	6	3	6	618.00	618.00	618.00	618.00	618.00	624.00	655.20	655.20	655.20	655.20	655.20	655.20	7645.20
14	White	1111	9	2	4	734.40	734.40	734.40	741.60	741.60	741.60	778.68	778.68	778.68	778.68	778.68	778.68	9100.08
15	Young	1112	10	5	8	798.00	798.00	798.00	798.00	798.00	798.00	837.90	845.88	845.88	845.88	845.88	845.88	9855.30
16																		
17					Totals	7675.60	7682.00	7688.80	7696.00	7700.40	7706.40	8097.18	8105.16	8110.20	8114.40	8122.80	8128.68	94827.62
18																		
19	Lookup table for January to June								Lookup table for July to December									
20																		
21	Grade	Basic	Grade	Annual					Grade	Basic	Grade	Annual						
22		Salary		Increment						Salary		Increment						
23	1	4800	1	48.00					1	5040	1	50.40						
24	2	5280	2	52.80					2	5544	2	55.44						
25	3	5760	3	57.60					3	6048	3	60.48						
26	4	6240	4	62.40					4	6552	4	65.52						
27	5	6720	5	67.20					5	7056	5	70.56						
28	6	7200	6	72.00					6	7560	6	75.60						
29	7	7680	7	76.80					7	8064	7	80.64						
30	8	8160	8	81.60					8	8568	8	85.68						
31	9	8640	9	86.40					9	9072	9	90.72						
32	10	9120	10	91.20					10	9576	10	95.76						
33	11	9600	11	96.00					11	10080	11	100.80						
34	12	10080	12	100.80					12	10584	12	105.84						

The formula in cell F4 is: @LOOKUP(C4,A23...A34)+@IF(F2<E4,(D4*@LOOKUP(C4,C23...C34)),((D4+1)*@LOOKUP(C4,C23...C34)))/12

This formula should be replicated into Columns G to K using N,N,N,R,N,N,N,N,N,N,N,N.

The formula in cell L4 is: @LOOKUP(C4,G23...G34)+@IF(L2<E4,(D4*@LOOKUP(C4,I23...I34)),((D4+1)*@LOOKUP(C4,I23...I34)))/12

This formula should be replicated into Columns M to Q using N,N,N,R,N,N,N,N,N,N,N,N.

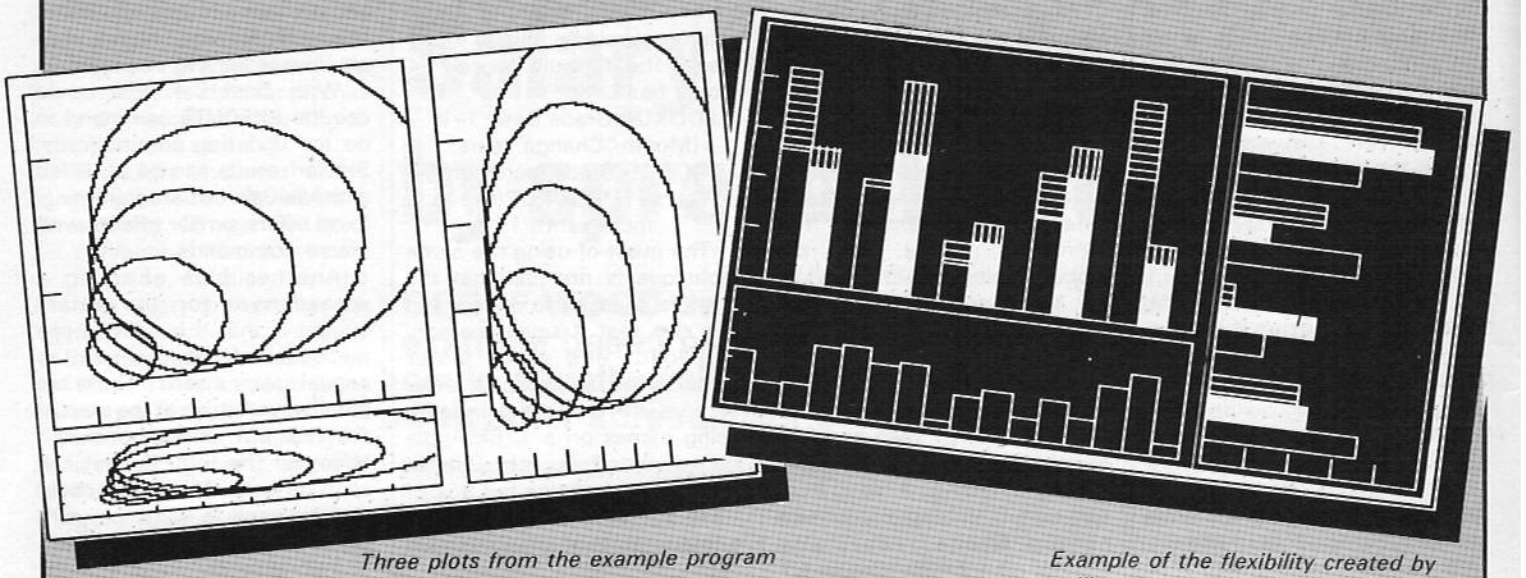
These formulae should be replicated downwards using R,N,N,N,R,R,R,N,N,R,R,N,N.

The formula in cell R4 is @SUM(F4...Q4), replicated down into rows 5 to 15

The formula in cell F17 is @SUM(F3...F16), replicated across into columns G to R

Figure I: A sample salary budget spreadsheet

apple user Graphics Library



Three plots from the example program

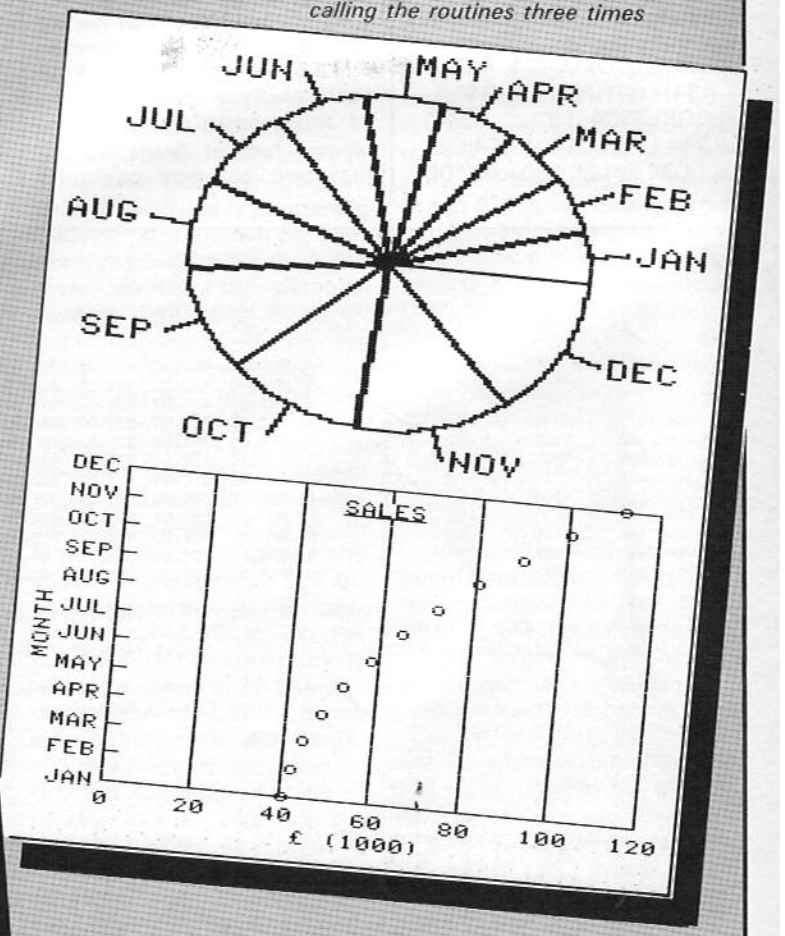
Example of the flexibility created by calling the routines three times

The November issue of *Apple User* saw the last in the Graphics Library series. For the benefit of those readers who missed some of the articles the complete list of issues that featured the Apple User Graphics Library are given in the panel below. Back numbers are still available, and these are listed on Page 60.

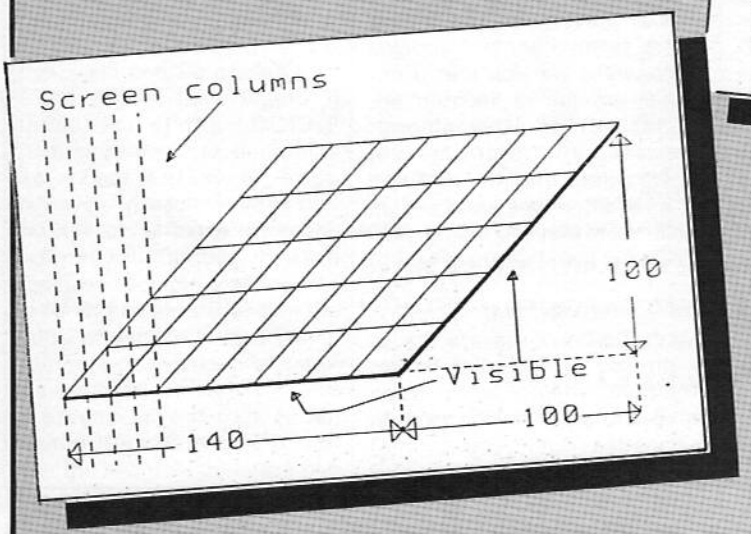
A disc has now been prepared containing all the routines presented in the series and this is available for £5.95.

The cost of the disc plus the photocopied articles is £9.95.

To order, use the form on Page 61.



Produced by the example program



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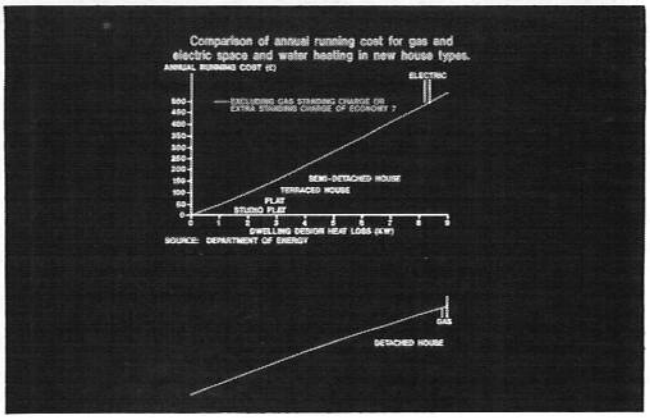

Apple IIe speeds 35mm slide service

MICRO Slides is a small company that thinks big. With only three people, limited funds and an Apple IIe they have created a business in 35mm slide production that offers a comprehensive service to an impressive client list, and aims to more than triple its profits in only the second year of operation.

It is based in London's Covent Garden, where dozens of companies produce 35mm presentation slides for a very hungry and fast-growing market. But here the similarity between these companies and Micro Slides ends as David Day, Micro Slides' Director, explains:

"Most companies doing our kind of work make slides from artwork, a process which takes up to three days and is consequently expensive. Using an Apple IIe running special Dicomed software we can produce artwork quality slides in 24 hours".

David Day first used an Apple IIe for producing slides before forming Micro Slides. He persuaded the company he worked for to buy an Apple IIe with the Dicomed software in June 1983. Two months later he bought the system from the company when he left to set up Micro Slides. He enthuses about the whole area of computer graphics, and speaks energetically about the benefits of the system he runs with the help of the Apple IIe.

"The graphics we produce don't resemble computer graphics. We offer a service that is faster, cheaper and, I believe, of a higher standard than the service offered by our competitors. Our success should be proof of that", he said.

Micro Slides' clients include companies like American Express, British Airways, Christian Dior and Marks & Spencer.

Although the equipment used by Micro Slides is highly sophisticated the process is simple. It begins on the Apple IIe configured with a dot matrix printer, Duodisk and Houston Instrument Digitiser. The text or graphics for each slide are typed into the Apple IIe, saved, printed and checked. A copy is then submitted to the client for approval and for filing – a hard copy saves the client from having to refer to the slides in the future.

Denise Hirst, who joined Micro Slides when it was first formed, described the scope of the program.

"We have a choice of 64 colours which are numbered on the black and white print-out according to the colour chart we provide for our clients. We can centre, justify and tabulate text; and a shadow effect can be produced by duplicating and off-setting text or graphics. A variety of charts are possible, and we have the choice of seven type sizes", she said.

When the slides have been approved by the client, the disc containing the information is taken to a mainframe Dicomed computer with a built-in camera. The camera interprets the work on the disc and the result is unprocessed 35mm film.

There are only three such systems in commercial use in London, and Micro Slides are fortunate in having access to one of them in their own building. It is owned by Ad Make-Up Holdings, an artwork company which uses three Apple IIes in the same way as Micro Slides.

They can also add enhancements such as cartoons to the original designs using a Dicomed 38 Digital Computer. Micro Slides make use of the Dicomed 38 when they require it, but 90 per cent of the slides they produce are designed entirely on an Apple IIe.

Denise, who had no previous experience of computers before using the Apple IIe praises its performance. "It is easy to use and has a good keyboard, which is obviously important for someone who spends a large portion of each day using it. It's also extremely flexible – there are so many programs you can use on the Apple IIe", she said.

The only program Denise uses at the moment is the Dicomed graphics package. "So much of my time is spent producing slides on the Apple that I don't use it for anything else at the moment. In fact, we recently bought another Apple IIe with exactly the same configuration and software just

At the end of 1984 Micro Slides opened a joint venture with Delta, the printing and processing company, and Denise currently handles the work from their new Bracknell office as well as the London clients. Eventually the office in Bracknell will be equipped with its own Apple IIe system to produce all its own slides.

There are still only three people working in Micro Slides' London office – David Day, Denise and Nigel Foster who joined in January 1984. Their exceptionally high productivity is closely linked with their use of Apple IIe systems, and this is why David Day is surprised that other companies are not looking at computers.

To give an idea of the quick turn-over, Micro Slides once typed up a set of slides late in the afternoon, and the following morning 13 colour slides were ready for the client, produced to his brief and approved at the editing stage. Editing is 10 times faster on the Apple IIe than for artwork, and a change in a finished slide can be turned around in about four hours.

Future plans for the Apple IIes might include word processing and accounts applications. However, at the moment both the machines are too busy, one designing slides and the other producing print-outs.

Bryan Williams

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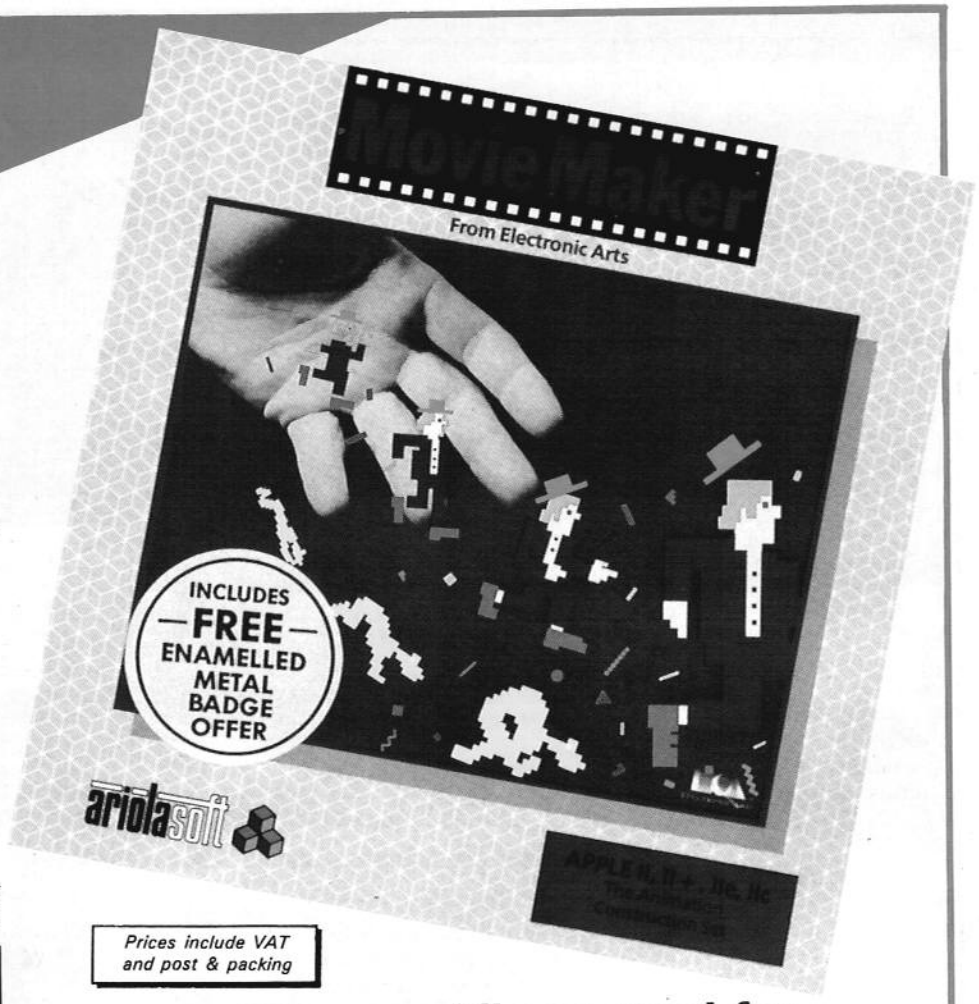

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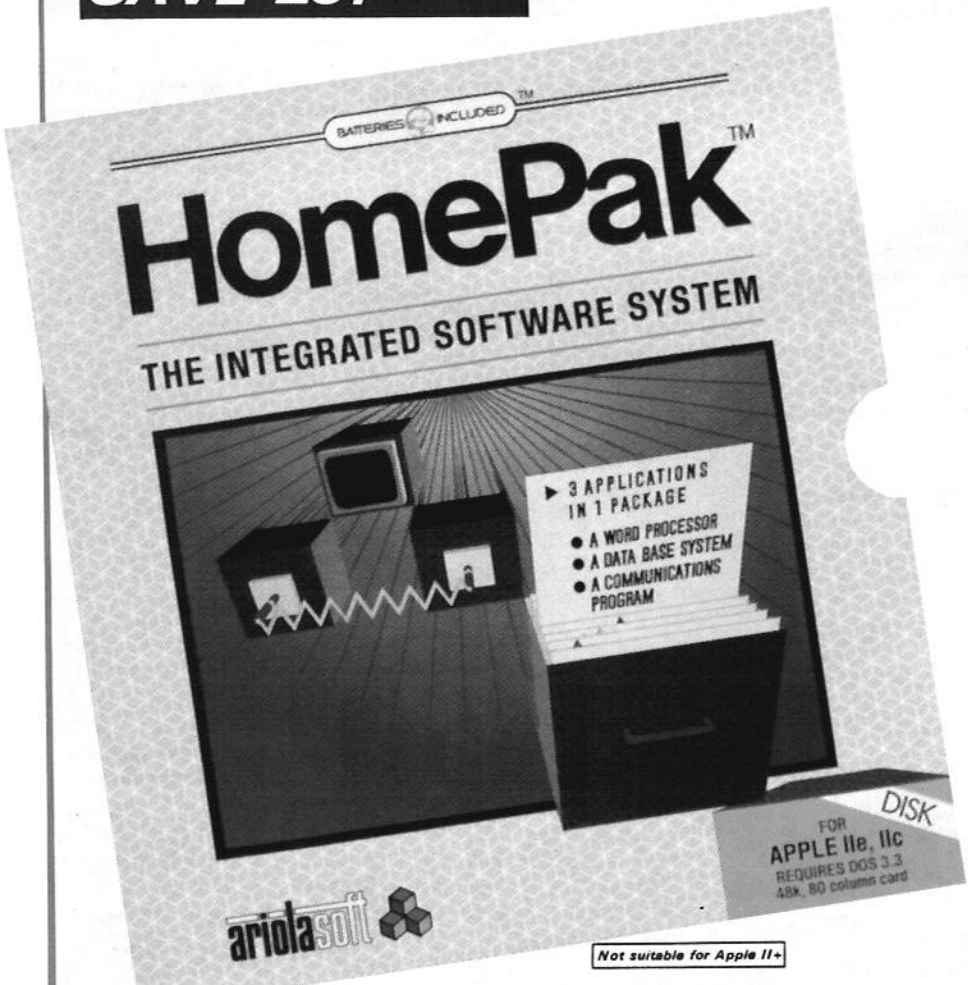

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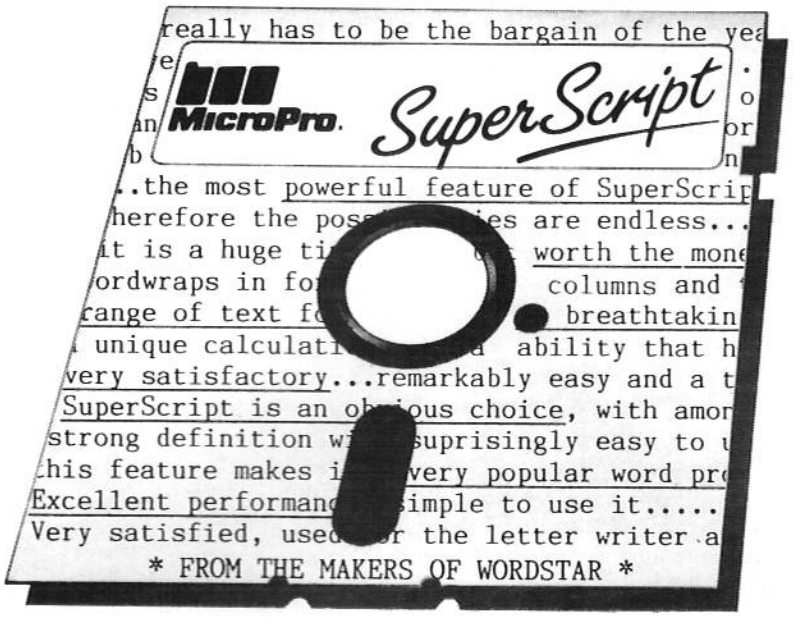

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Rotating 3D wire frame objects

By JOHN BLAIKLOCK

THIS machine code program will enable you to rotate and change the scale of wire frame objects (wire frame is when only the edges are shown) defined in three dimensions from within a Basic program or as a sub-routine inside a machine code program.

Program entry is through the monitor. Start by CALLing -151. Enter the address in the left most column, the colon and the numbers directly following.

Where no number directly follows, as in line 1, leave out that line. To save the program type BSAVE XXX,A$6000 L$2B7 where XXX is your name for the program.

Designing 3D shapes is not all that easy so care should be taken.

Each corner of the shape has to be defined in three dimensions. This is similar to 2-D shapes but with another axis (the z axis) coming out from the origin. Make a table with distance along x axis, y axis and z axis for each point.

Negative numbers are allowed and for best results the origin should be roughly in the middle of your shape.

Another table is needed for drawing the shapes. This contains information about which points are joined to which others.

Any point can be joined to any other in the shape.

To do this, number the points in the first table in the order they appear. Then if you want the first point joined to the fourth by a line the entry in this table would be 1,4.

If you want a dot to be plotted treat it as a line from a point to itself, for example 5,5.

A maximum of 255 points and 255 lines is allowed. Each point cannot be more than +127 or −128 units from the origin along an axis.

To every number in the first table below 0 add 256 that is −1 becomes 255, −2 becomes 254. An address has to be chosen for the start of the table, and a useful place is at 25300 just above the rotation program. See the memory maps in the Applesoft and DOS manuals.

To enter the data type POKE n,p : POKE n+1,q : POKE n+2,r where n is the chosen starting address and p,q,r are values from the tables.

It is easier to have the second table directly following the first as both can be saved and loaded in one step.

The tables can then be saved (this is assuming the second directly follows the first) by BSAVE YYY,An,L(np*3 + nl * 2) where n is the chosen starting address, YYY is your chosen filename, np is the number of points in the shape and nl is the number of lines.

The program is in two parts. The first does the calculations on the entered data for the rotations and scale factor required and the second plots the new data.

The rotation program and shape data have to be loaded. Type: BLOAD XXX, where XXX is your name for the program, and BLOAD YYY, where YYY is your name for the required shape.

Before use various values have to be poked into memory. They are:

SC: Scale factor. When SC is 64 the shape is left the same size as you designed it. When SC is 128 the size is doubled, when it is 32 the size is halved and so on. Range of SC: 1 to 255.

XP: Number of points along the screen the origin of the shape will be. Range of XP: 0 to 279.

YP: Number of points up the screen the origin will be. Range: 0 to 191.

XR: Amount of rotation about the x-axis needed. The full circle is divided into 20 rotation values, each of 18°. A value of 0 will leave the shape unrotated about the x axis, a value of 10 will rotate the shape 180° and so on. Range of XR: 0 to 19.

YR: Same as XR but for the y axis.

ZR: Same as XR but for the z axis.

NL: Number of lines in the shape. Range: 1 to 255.

NP: Number of points in the shape. Range: 2 to 255.

UA: Start address of the points table – see DOS manual if you've forgotten it.

JA: Start address of the second table. If the second table follows on from the first JA = (UA + NP*3).

RA: Start address of where the program will put the rotated points data once it has calculated it. See a memory map for a suitable location. This table will be NP*2 bytes long.

When the above values have been chosen enter them as follows:

```
POKE 24604,XR : POKE 24605,YR : POKE 24606,ZR
POKE 24617,NP : POKE 24618,NL
POKE 24623,YP :POKE 24622, (XP>255) :POKE 24621,XP−256*(XP>255)
POKE 24620,INT(JA/256) : POKE 24619,JA−(INT(JA/256)) *256
POKE 24616,INT(RA/256) : POKE 24615,RA=(INT (RA/256))*256
POKE 24614,INT(UA/256) : POKE 24613,UA−(INT (UA/256))*256 : POKE 24624,SC
```

Note that this program doesn't check for spurious values. Entering illegal values will cause some quite alarming results, almost certainly losing the contents of memory and perhaps writing over the disc. Do not plot the shape close to the edge so that some is being plotted off the edge, weird things will result.

When the above values have been entered the first step is to calculate the new values of the points. To do this the command is CALL 24576. This will work out the new positions, but will not plot anything, for the rotations and scale factor entered.

CALL 25104 will plot the shape as worked out before on the hi-res screen. Before doing

A good three dimensional shape table suitable for the demonstration program is produced from the shape making program using the following data:

Number of points: 4
Number of lines: 6
Coordinates:

point	x	y	z
1	0	43	0
2	64	−43	43
3	−50	−43	43
4	0	−43	−43

The connections are 1,2; 1,3; 1,4; 2,3; 3,4; 2,4. The table was started at 7680 ($1E00) and the second table was begun immediately after the first.

A hexadecimal dump of the table is:

```
1E00: 00 2B 00 40 D5 2B CE D5
1E08: 2B 00 D5 D5 01 02 01 03
1E10: 01 04 02 03 03 04 02 04
```

this it is therefore necessary to set the desired hi-res screen (HGR or HGR2) and the colour (HCOLOR=).

All normal graphics commands and procedures will still work normally provided there is no clash for memory space – like loading a shape table into the middle of this program.

Listing II is a simple shape-making program and listing III provides a demonstration program. You'll need to substitute the names of your files in lines 150 and 160 in the demo.

A full explanation of the maths involved would take too much space, but here is a brief outline. By using a unit cube and rotating it about one axis at a time by a known angle it is possible to build up a rotation matrix.

If this is done three times three rotation matrices are obtained, one for each axis. By multiplying these together a single 3 by 3 transformation matrix is obtained. However as this program uses an orthagonal projection this can be reduced to a 3 by 2.

This transformation matrix is then multiplied by the table of points and the scale factor to give the table at address RA above. The second part of the program plots the lines.

Perspective and translations need to be calculated using homogenous coordinates (4 by 4 trans matrix) which is too slow for decent animation for a micro. Hidden line removal involves the use of planes which is beyond this article and me!

The main speed limitation of this program is the time taken to plot the shape. The Applesoft plot routine is used which, although efficient in terms of memory used, is slow. To get really decent animation another line drawing routine is needed. Watch this space!

Listing I

```
SOURCE   FILE: LISTING1
----- NEXT OBJECT FILE NAME IS LISTING1.OBJ0
6000:          6000    1          ORG   $6000
6000:4C 31 60          2          JMP   START
6003:                  3 *
6003:                  4 *SIN/COS TABLE
6003:                  5 *
6003:00 27 4B 67       6 SCOS     DFB   $00,$27,$4B,$67,$79,$7F,$79,$67
600B:4B 27 00 D9       7          DFB   $4B,$27,$00,$D9,$B5,$99,$87,$81
6013:87 99 B5 D9       8          DFB   $87,$99,$B5,$D9,$00,$27,$4B,$67
601B:79                9          DFB   $79
601C:                  10 *
601C:          0006    11 B       EQU   $06          ;B TO NF  USED FOR TEMPORARY STORAGE
601C:          0007    12 C       EQU   $07          ;& WORKING VARIABLES THROUGH PROGRAM
601C:          0008    13 D       EQU   $08
601C:          0009    14 E       EQU   $09
601C:          00EE    15 F       EQU   $EE
601C:          00D7    16 G       EQU   $D7
601C:          00E3    17 H       EQU   $E3
601C:          00EB    18 NF      EQU   $EB
601C:          0001    19 XROT    DS    1            ;ROTATIONS ABOUT RELEVANT AXES
601D:          0001    20 YROT    DS    1
601E:          0001    21 ZROT    DS    1
601F:          0001    22 SINX    DS    1            ;SIN AND COS OF ENTERED ROTATIONS
6020:          0001    23 SINY    DS    1
6021:          0001    24 SINZ    DS    1
6022:          0001    25 COSX    DS    1
6023:          0001    26 COSY    DS    1
6024:          0001    27 COSZ    DS    1
6025:          00FA    28 MAT     EQU   $FA          ;TRANSFORMATION MATRIX (3 BY 2)
6025:          00EF    29 ANSH    EQU   $EF          ;RESULT OF MULTIPLICATION (MULT)
6025:          00F9    30 ANSL    EQU   $F9          ;ANSWER MIGHT BE 2'S COMPLEMENT
6025:          0001    31 COADRL  DS    1            ;UNROTATED POINTS START ADDRESS
6026:          0001    32 COADRH  DS    1
6027:          0001    33 LINADL  DS    1            ;ROTATED POINTS START ADDRESS
6028:          0001    34 LINADH  DS    1
6029:          0001    35 NPOI    DS    1            ;NUMBER OF POINTS   (MAX 255)
602A:          0001    36 NLIN    DS    1            ;NUMBER OF LINES    (MAX 255)
602B:          0001    37 JOINL   DS    1            ;START ADDRESS OF LINE JOINING TABLE
602C:          0001    38 JOINH   DS    1
602D:          0001    39 XCORL   DS    1            ;X POS ON SCREEN OF START OF SHAPE
602E:          0001    40 XCORH   DS    1
602F:          0001    41 YCOR    DS    1            ;Y POS ON SCREEN OF START OF SHAPE
6030:          0001    42 SCALE   DS    1            ;SCALE FACTOR TIMES 64
6031:          F457    43 HPLOT   EQU   $F457        ;HPLOT ROUTINE IN APPLESOFT
6031:          F53A    44 HLINE   EQU   $F53A        ;HLINE ROUTINE IN APPLESOFT
6031:                  45 *
6031:                  46 *FIND SINES AND COSINES OF ENTERED ANGLES
6031:                  47 *
6031:D8                48 START   CLD
6032:AD 1C 60          49         LDA   XROT
6035:AA                50         TAX                ;THIS CONVERTS SIN TO COS IN TABLE
6036:18                51         CLC                ;AS COS(X) = SIN(X+5) IN TABLE SCOS
6037:69 05             52         ADC   #$05
6039:A8                53         TAY
603A:BD 03 60          54         LDA   SCOS,X       ;LOAD AND STORE SIN(X) AND COS(X)
603D:8D 1F 60          55         STA   SINX
6040:B9 03 60          56         LDA   SCOS,Y
6043:8D 22 60          57         STA   COSX
6046:AD 1D 60          58         LDA   YROT         ;THIS DOES SAME FOR Y ROTATION-
6049:AA                59         TAX
604A:18                60         CLC
604B:69 05             61         ADC   #$05
604D:A8                62         TAY
604E:BD 03 60          63         LDA   SCOS,X
6051:8D 20 60          64         STA   SINY
6054:B9 03 60          65         LDA   SCOS,Y
6057:8D 23 60          66         STA   COSY
605A:AD 1E 60          67         LDA   ZROT         ;AND Z ROTATION
605D:AA                68         TAX
605E:18                69         CLC                ;NOTE VALUES OF TABLE SCOS ARE 128
605F:69 05             70         ADC   #$05         ;TIMES REAL VALUE.  THEREFORE AFTER
6061:A8                71         TAY                ;EACH MULTIPLIC DIVIDE BY 128 TO
6062:BD 03 60          72         LDA   SCOS,X       ;GET REAL VALUE
6065:8D 21 60          73         STA   SINZ
6068:B9 03 60          74         LDA   SCOS,Y
606B:8D 24 60          75         STA   COSZ
606E:                  76 *
606E:                  77 *MATRIX MAT(1,1)  THESE ROUTINES CALC THE TRANSFORM MATRIX
606E:                  78 *
606E:AD 23 60          79         LDA   COSY         ;THIS CALCS 1ST TERM IN TRANSFORM
6071:85 06             80         STA   B            ;MATRIX & DIVIDES IT BY 128 TO GET
6073:AD 24 60          81         LDA   COSZ         ;ANSWER BACK TO 1 BYTE.
6076:85 07             82         STA   C            ;FIRST TERM = COS(Y) * COS(Z)
6078:20 0F 61          83         JSR   MULT
607B:                  84 *
607B:85 FA             85         STA   MAT
607D:                  86 *
607D:                  87 *MAT(1,2)
607D:                  88 *
607D:AD 23 60          89         LDA   COSY         ;SAME AS ABOVE
6080:85 06             90         STA   B            ;SECOND TERM IS COS(Y) * SIN(Z)
6082:AD 21 60          91         LDA   SINZ
6085:85 07             92         STA   C
6087:20 0F 61          93         JSR   MULT
608A:85 FB             94         STA   MAT+1
608C:                  95 *
608C:                  96 *MAT(2,1)
608C:                  97 *
608C:AD 1F 60          98         LDA   SINX         ;FOR NEXT 4 TERMS THE MATHEMATICAL
608F:85 06             99         STA   B            ;ROUTINE IS SAME BUT THE TERMS ARE
6091:AD 20 60         100         LDA   SINY         ;MADE UP BY MULTIPLYING DIFFRNT TRIG
6094:85 07            101         STA   C            ;FUNCTIONS
6096:AD 24 60         102         LDA   COSZ
6099:85 08            103         STA   D            ;MAT(2,1)=-SINX*SINY*COSZ-COSX*SINZ
609B:AD 22 60         104         LDA   COSX
609E:85 09            105         STA   E            ;IF NF=1 2ND PRODUCT IS SUBTRACTED
60A0:AD 21 60         106         LDA   SINZ         ;IF NF = 0 SECOND PRODUCT IS ADDED
60A3:85 EE            107         STA   F
60A5:A9 01            108         LDA   #$01
60A7:85 EB            109         STA   NF
60A9:20 50 61         110         JSR   MATRIX
60AC:85 FC            111         STA   MAT+2
60AE:                 112 *
60AE:                 113 *MAT(3,2)
60AE:                 114 *
60AE:AD 22 60         115         LDA   COSX
60B1:85 06            116         STA   B
60B3:AD 20 60         117         LDA   SINY
60B6:85 07            118         STA   C
60B8:AD 21 60         119         LDA   SINZ
60BB:85 08            120         STA   D
60BD:AD 1F 60         121         LDA   SINX
60C0:85 09            122         STA   E
60C2:AD 24 60         123         LDA   COSZ
60C5:85 EE            124         STA   F
60C7:20 50 61         125         JSR   MATRIX       ;SIMILAR TO ABOVE   NF STILL = 1
60CA:85 FF            126         STA   MAT+5
```

```
60CC:           127 *
60CC:           128 *MAT(2,2)
60CC:           129 *
60CC:AD 1F 60   130         LDA  SINX
60CF:85 06      131         STA  B
60D1:AD 20 60   132         LDA  SINY
60D4:85 07      133         STA  C
60D6:AD 21 60   134         LDA  SINZ
60D9:85 08      135         STA  D
60DB:AD 22 60   136         LDA  COSX
60DE:85 09      137         STA  E
60E0:AD 24 60   138         LDA  COSZ
60E3:85 EE      139         STA  F
60E5:A9 00      140         LDA  #$00       ;NOW SECOND PRODUCT SUBTRACTED
60E7:85 EB      141         STA  NF
60E9:20 50 61   142         JSR  MATRIX
60EC:85 FD      143         STA  MAT+3
60EE:           144 *
60EE:           145 *MAT(3,1)
60EE:           146 *
60EE:AD 22 60   147         LDA  COSX       ;SAME AGAIN
60F1:85 06      148         STA  B
60F3:AD 20 60   149         LDA  SINY
60F6:85 07      150         STA  C
60F8:AD 24 60   151         LDA  COSZ
60FB:85 08      152         STA  D
60FD:AD 1F 60   153         LDA  SINX
6100:85 09      154         STA  E
6102:AD 21 60   155         LDA  SINZ
6105:85 EE      156         STA  F
6107:20 50 61   157         JSR  MATRIX
610A:85 FE      158         STA  MAT+4
610C:4C 7A 61   159         JMP  MATMLT
610F:           160 *
610F:           161 *
610F:           162 *
610F:A0 00      163 MULT    LDY  #$00       ;A REALLY AWFUL MULTIPLIC ROUTINE
6111:A6 06      164         LDX  B          ;THIS ROUTINE MIGHT HAVE TO MULTIPLY
6113:10 08  611D 165        BPL  NXTTST     ;NUMBERS WHERE NEITHER, ONE OR BOTH
6115:CA         166         DEX             ; ARE IN 2'S C.NUMBERS BEING MULTED
6116:8A         167         TXA             ;ARE B AND C    RESULT IN ANSH,ANSL
6117:49 FF      168         EOR  #$FF
6119:A0 01      169         LDY  #$01       ;IF NUMBERS ARE IN 2'S COMP THEY ARE
611B:85 06      170         STA  B          ;CONVERTED BACK TO POSITIVE
611D:A6 07      171 NXTTST  LDX  C          ;IF CONVERTED THEN Y IS SET
611F:10 0A  612B 172        BPL  MULT1      ;IF BOTH ARE CONVERTED THEN Y =0
6121:CA         173         DEX
6122:8A         174         TXA
6123:49 FF      175         EOR  #$FF
6125:85 07      176         STA  C
6127:98         177         TYA
6128:49 01      178         EOR  #$01
612A:A8         179         TAY
612B:           180 *
612B:           181 *
612B:           182 *
612B:A9 00      183 MULT1   LDA  #$00
612D:85 F9      184         STA  ANSL       ;THIS IS THE MULTIPLYING ROUTINE
612F:A2 08      185         LDX  #$08       ;CRIBBED FROM 'PROGRAMMING THE 6502'
6131:46 06      186 LOOP    LSR  B          ;BY R.ZAKS
6133:90 03  6138 187        BCC  NOADD      ;DIFFICULT TO EXPLAIN HOW IT WORKS
6135:18         188         CLC             ;SEE ABOVE BOOK P.84
6136:65 07      189         ADC  C
6138:6A         190 NOADD   ROR  A
6139:66 F9      191         ROR  ANSL
613B:CA         192         DEX
613C:D0 F3  6131 193        BNE  LOOP
613E:85 EF      194         STA  ANSH
6140:A5 F9      195         LDA  ANSL       ;THIS NEXT PIECE DIVIDES THE TWO
6142:0A         196         ASL  A          ;BYTE ANSWER BY 128 TO GET
6143:A5 EF      197         LDA  ANSH       ;RESULT BACK TO ONE BYTE
6145:2A         198         ROL  A
6146:C0 00      199         CPY  #$00
6148:F0 05  614F 200        BEQ  RTN1
614A:49 FF      201         EOR  #$FF       ;AND THEN RECONVERTS TO 2'S COMP
614C:18         202         CLC             ;IF NECESSARY (WHEN Y=1)
614D:69 01      203         ADC  #$01
614F:60         204 RTN1    RTS
6150:           205 *
6150:           206 *THIS ROUTINE CALCULATES -B*C*D - E*F
6150:20 0F 61   207 MATRIX  JSR  MULT
6153:85 06      208         STA  B
6155:A5 08      209         LDA  D
6157:85 07      210         STA  C
6159:20 0F 61   211         JSR  MULT
615C:           212 *
615C:49 FF      213         EOR  #$FF       ;CONVERTS TO 2'S C (NOTE MINUS SIGN
615E:AA         214         TAX             ;IN FRONT OF FIRST PRODUCT ABOVE)
615F:E8         215         INX
6160:86 E3      216         STX  H          ;AND STORE SUBTOTAL
6162:A5 09      217         LDA  E          ;CALCULATES SECOND PRODUCT
6164:85 06      218         STA  B
6166:A5 EE      219         LDA  F
6168:85 07      220         STA  C
616A:20 0F 61   221         JSR  MULT
616D:           222 *
616D:A6 EB      223         LDX  NF         ;IF NF=1 CHANGE SIGN OF 2ND PRODUCT
616F:F0 05  6176 224        BEQ  MATOUT     ;OTHERWISE LEAVE AS IS
6171:49 FF      225         EOR  #$FF
6173:AA         226         TAX
6174:E8         227         INX
6175:8A         228         TXA
6176:18         229 MATOUT  CLC
6177:65 E3      230         ADC  H          ;ADD FIRST PRODUCT TO SECOND
6179:60         231         RTS
617A:           232 *
617A:           233 *MULTIPLY MATPICES HERE
617A:           234 *
617A:A9 00      235 MATMLT  LDA  #$00
617C:85 E3      236         STA  H          ;NO OF POINTS ROTATED SO FAR
617E:85 EB      237         STA  NF         ;PARTIAL SUM OF FINAL ANSWER
6180:85 EE      238         STA  F          ;COUNTER UPTO 2
6182:85 D7      239         STA  G          ;COUNTER UPTO 3
6184:           240 *
6184:           241 *
6184:           242 *ALL SET? GO...
6184:           243 *
6184:AE 26 60   244 STMLT   LDX  COADRH     ;THIS ROUTINE MULTS H BY 3
6187:A5 E3      245         LDA  H
6189:0A         246         ASL  A          ;MULTS H BY 2
618A:6D 25 60   247         ADC  COADRL     ;THEN ADD TO START ADD
618D:90 02  6191 248        BCC  HERE       ;ANSWER MIGHT BE > 255
618F:E8         249         INX             ;SO CARRY 1 INTO HI BYTE (X)
6190:18         250         CLC
6191:65 E3      251 HERE    ADC  H          ;ADD AGAIN TO MULT BY 3
6193:85 EC      252         STA  $EC        ;STORE LO PART OF RESULT
6195:90 01  6198 253        BCC  HERE2      ;BUT ANSWER MIGHT BE > 511
6197:E8         254         INX             ;SO CARRY ANOTHER INTO X
6198:86 ED      255 HERE2   STX  $ED        ;STORE HIGH BYTE
619A:           256 *
619A:           257 *
619A:A4 D7      258         LDY  G
619C:B1 EC      259         LDA  ($EC),Y    ;LOAD TERM FROM UNROTATED POINTS
619E:85 06      260         STA  B
61A0:98         261         TYA
61A1:0A         262         ASL  A          ;MULT BY 2
61A2:65 EE      263         ADC  F
61A4:AA         264         TAX
61A5:B5 FA      265         LDA  MAT,X      ;LOAD TERM FROM TRANSFORM MATRIX
61A7:85 07      266         STA  C
61A9:20 0F 61   267         JSR  MULT       ;MULTIPLY B*C
61AC:           268 *
61AC:18         269         CLC
61AD:65 EB      270         ADC  NF         ;ADD TO SUBTOTAL
61AF:85 EB      271         STA  NF
61B1:E6 D7      272         INC  G          ;BEEN ROUND AGAIN SO INC COUNTER
61B3:A5 D7      273         LDA  G
61B5:C9 03      274         CMP  #$03       ;BEEN ROUND 3 TIMES?
61B7:D0 CB  6184 275 STJMP  BNE  STMLT      ;NO! BACK AGAIN
61B9:AE 28 60   276         LDX  LINADH     ;THIS ROUTINE MULTS H BY 2
61BC:A5 E3      277         LDA  H          ;THEN IS ADDED TO START ADDRESS
61BE:0A         278         ASL  A          ;OF ROTATED POINTS
61BF:90 02  61C3 279        BCC  HERE3
61C1:E8         280         INX
61C2:18         281         CLC
61C3:6D 27 60   282 HERE3   ADC  LINADL     ;SIMILAR TO MULT BY 3 ABOVE
61C6:85 EC      283         STA  $EC
61C8:86 ED      284         STX  $ED
61CA:A0 00      285         LDY  #$00
61CC:AD 30 60   286         LDA  SCALE      ;NOW MULTIPLY POINTS BY SCALE FACTOR
61CF:85 07      287         STA  C
61D1:A5 EB      288         LDA  NF         ;POINT AT THE MOMENT
61D3:AA         289         TAX
61D4:10 06  61DC 290        BPL  NOCH       ;IF POSITIVE LEAVE ALONE
61D6:CA         291         DEX             ;OTHERWISE CONVERT TO POSITIVE
61D7:8A         292         TXA
```

```
61D8:49 FF          293          EOR   #$FF
61DA:A0 01          294          LDY   #$01          ;AND SET FLAG
61DC:85 06          295 NOCH     STA   B
61DE:20 2B 61       296          JSR   MULT1         ;THEN MULTIPLY
61E1:06 F9          297          ASL   ANSL          ;ANSWER IN ANSH,ANSL IS 255 TIMES
61E3:26 EF          298          ROL   ANSH          ;TOO BIG SO DIVIDE BY 4
61E5:06 F9          299          ASL   ANSL
61E7:A5 EF          300          LDA   ANSH
61E9:2A             301          ROL   A
61EA:C0 00          302          CPY   #$00          ;SHOULD IT BE NEGATIVE?
61EC:F0 05   61F3   303          BEQ   NOCH2         ;NO
61EE:49 FF          304          EOR   #$FF          ;OTHERWISE CONVERT
61F0:18             305          CLC
61F1:69 01          306          ADC   #$01
61F3:A4 EE          307 NOCH2    LDY   F
61F5:91 EC          308          STA   ($EC),Y       ;STORE IN ROTATED POINTS TABLE
61F7:A9 00          309          LDA   #$00
61F9:85 EB          310          STA   NF            ;CLEAR FOR LOOPING AGAIN
61FB:85 D7          311          STA   G             ;DITTO
61FD:C8             312          INY
61FE:E6 EE          313          INC   F
6200:C0 02          314          CPY   #$02          ;BEEN ROUND TWICE YET?
6202:D0 B3   61B7   315          BNE   STJMP         ;NO! BACK AGAIN
6204:85 EE          316          STA   F
6206:E6 E3          317          INC   H             ;ANOTHER POINT DONE
6208:A5 E3          318          LDA   H
620A:CD 29 60       319          CMP   NPOI          ;DONE ALL POINTS YET?
620D:D0 A8   61B7   320          BNE   STJMP         ;NO! BACK AGAIN
620F:60             321          RTS                 ;END, EVERYTHING DONE.
6210:               322 *
6210:               323 *NOW ROTATED SHAPE HAS BEEN CALCULATED IT CAN BE PLOTTED
6210:               324 *THIS PROGRAM DOES NOT CHECK FOR POINTS OFF SCREEN
6210:               325 *
6210:D8             326          CLD
6211:A9 00          327          LDA   #$00          ;B IS NO OF LINES PLOTTED SO FAR
6213:85 06          328          STA   B             ;CLEAR B
6215:0A             329 LINES    ASL   A             ;MULTIPLY B BY 2
6216:08             330          PHP                 ;STORE ANY CARRY CREATED
6217:18             331          CLC
6218:6D 2B 60       332          ADC   JOINL         ;ADD TO LO PART OF START ADDRESS
621B:85 EC          333          STA   $EC
621D:A9 00          334          LDA   #$00
621F:6D 2C 60       335          ADC   JOINH
6222:28             336          PLP                 ;AND ADD CARRY FLAG
6223:69 00          337          ADC   #$00
6225:85 ED          338          STA   $ED
6227:A0 00          339          LDY   #$00
6229:B1 EC          340          LDA   ($EC),Y       ;LOAD POINT NUMBER FOR START OF LINE
622B:85 08          341          STA   D
622D:C8             342          INY
622E:B1 EC          343          LDA   ($EC),Y       ;LOAD POINT NUMBER FOR END OF LINE
6230:85 09          344          STA   E
6232:C6 09          345          DEC   E
6232:C6 09          345          DEC   E
6234:C6 08          346          DEC   D
6236:A5 08          347          LDA   D             ;POINT NUMBER FOR START OF LINE
6238:0A             348          ASL   A             ;TIMES BY 2
6239:08             349          PHP                 ;STORE CARRY
623A:18             350          CLC
623B:6D 27 60       351          ADC   LINADL        ;ADD TO START OF POINTS TABLE LO
623E:85 EC          352          STA   $EC
6240:A9 00          353          LDA   #$00
6242:6D 28 60       354          ADC   LINADH        ;RETRIEVE CARRY
6245:28             355          PLP                 ;ADD TO START OF POINTS TABLE HI
6246:69 00          356          ADC   #$00
6248:85 ED          357          STA   $ED
624A:B1 EC          358          LDA   ($EC),Y       ;NOTE HERE Y=1 SO Y COORD IS LOADED
624C:18             359          CLC
624D:6D 2F 60       360          ADC   YCOR
6250:85 D7          361          STA   G             ;POINT TO PLOT (Y)
6252:88             362          DEY                 ;Y NOW=0
6253:B1 EC          363          LDA   ($EC),Y       ;X COORD LOADED
6255:85 07          364          STA   C
6257:18             365          CLC
6258:6D 2D 60       366          ADC   XCORL
625B:85 E3          367          STA   H             ;POINT TO PLOT (XLO)
625D:A9 00          368          LDA   #$00
625F:6D 2E 60       369          ADC   XCORH         ;POINT TO PLOT (XHI)
6262:A8             370          TAY                 ;HPLOT NEEDS IT IN Y REG
6263:A6 07          371          LDX   C
6265:10 01   6268   372          BPL   NODEC1
6267:88             373          DEY
6268:A6 E3          374 NODEC1   LDX   H
626A:A5 D7          375          LDA   G             ;YPOS
626C:20 57 F4       376          JSR   HPLOT         ;START POINT PLOTTED
626F:               377 *
626F:               378 *
626F:A5 09          379          LDA   E             ;THIS ROUTINE DOES SAME AS LAST BUT
6271:0A             380          ASL   A             ;FOR THE END OF THE LINE BEING PLOTTED
6272:08             381          PHP                 ;SAVE ANY CARRY GENERATED
6273:18             382          CLC                 ;E IS THE POINT NO OF END OF LINE
6274:6D 27 60       383          ADC   LINADL
6277:85 EC          384          STA   $EC
6279:A9 00          385          LDA   #$00
627B:6D 28 60       386          ADC   LINADH
627E:28             387          PLP
627F:69 00          388          ADC   #$00
6281:85 ED          389          STA   $ED
6283:A0 01          390          LDY   #$01          ;Y=1 FIRST SO Y COORD LOADED
6285:B1 EC          391          LDA   ($EC),Y
6287:18             392          CLC
6288:6D 2F 60       393          ADC   YCOR
628B:85 D7          394          STA   G             ;POINT TO PLOT LINE TO
628D:88             395          DEY
628E:B1 EC          396          LDA   ($EC),Y
6290:85 EE          397          STA   F
6292:18             398          CLC
6293:6D 2D 60       399          ADC   XCORL
6296:85 E3          400          STA   H
6298:A9 00          401          LDA   #$00          ;POINT TO PLOT LINE TO (X LO)
629A:6D 2E 60       402          ADC   XCORH
629D:AA             403          TAX                 ;POINT TO PLOT LINE TO (X HI)
629E:A4 EE          404          LDY   F
62A0:10 01   62A3   405          BPL   NODEC2
62A2:CA             406          DEX
62A3:A4 D7          407 NODEC2   LDY   G
62A5:A5 E3          408          LDA   H
62A7:20 3A F5       409          JSR   HLINE         ;DRAW LINE
62AA:E6 06          410          INC   B             ;NEXT LINE
62AC:A5 06          411          LDA   B             ;DONE ALL YET?
62AE:CD 2A 60       412          CMP   NLIN          ;NO, BACK AGAIN
62B1:90 01   62B4   413          BLT   TOLNS
62B3:60             414          RTS
62B4:               415 *
62B4:4C 15 62       416 TOLNS    JMP   LINES
```

Listing II

```
10  TEXT : HOME
20  PRINT "THREE D ROTATION
    SHAPE INPUT"
30  VTAB 5
40  INPUT "START ADDRESS OF
    SHAPE...";SA
45 S = SA
50  PRINT
52  INPUT "DO YOU WANT THE
    LINE TABLE TO FOLLOW
    DIRECTLY ON FROM THE
    POINTS TABLE...";A$
53  IF  LEFT$ (A$,1) = "Y"
    THEN ZZ = 1: PRINT : GOTO
    70
60  INPUT "START ADDRESS OF
    LINES...";LA
65 L = LA
70  PRINT
80  INPUT "NUMBER OF
    POINTS...";NP
90  PRINT
100  INPUT "NUMBER OF
110  HOME
120  FOR A = 1 TO NP
130  VTAB 3: HTAB 30: PRINT
     A
135  VTAB 1
140  INPUT "X...";X
145  REM  CHARACTER BETWEEN
     QUOTES IN LINES 150, 170,
     190, 350, 380 IS CTRL-G
150  IF X > 127 OR X <  -
     128 THEN  PRINT "": GOTO
     130
152  IF X < 0 THEN X = X +
     256
155  POKE S,X:S = S + 1
160  INPUT "Y...";Y
170  IF Y > 127 OR Y <  -
     128 THEN  PRINT "": VTAB
     2: GOTO 160
172  IF Y < 0 THEN Y = Y +
     256
175  POKE S,Y:S = S + 1
180  INPUT "Z...";Z
190  IF Z > 127 OR Z <  -
     128 THEN  PRINT "": VTAB
     3: GOTO 180
192  IF Z < 0 THEN Z = Z +
     256
195  POKE S,Z:S = S + 1
200  VTAB 24: PRINT  TAB(
     10)X; TAB( 17);Y; TAB(
     24);Z
210  VTAB 1: PRINT "
```

```
    ": PRINT "       ": PRINT
    "      "
300  NEXT
305 A = A - 1: IF ZZ THEN LA
    = S:L = S
310  PRINT "PRESS A KEY TO
    CONTINUE...";: GET B$
320  HOME
330  FOR B = 1 TO NL
335  HOME : VTAB 3: HTAB 35:
    PRINT B: VTAB 1
340  INPUT "PLOT POINT...";C
350  IF C < 1 OR (C > A)
    THEN  PRINT "": GOTO 335
360  VTAB 2
370  INPUT "TO POINT...";D
380  IF D < 1 OR (D > A)
    THEN  PRINT "": GOTO 360
390  POKE L,C: POKE L +
    1,D:L = L + 2
400  NEXT
450  VTAB 24: PRINT "PRESS A
    KEY TO CONTINUE...";: GET
    A$
500  HOME : INPUT
    "SAVE?";B$: IF  LEFT$
    (B$,1) <  > "Y" THEN  END
510  PRINT : PRINT : INPUT
    "NAME OF POINTS
    TABLE...";B$
515  IF ZZ THEN 600
520  PRINT : INPUT "NAME OF
    LINES TABLE...";C$
530  PRINT  CHR$
    (4)"BSAVE"B$",A"SA",L"A *
    3
540  PRINT  CHR$
    (4)"BSAVE"C$",A"LA",L"(B
    - 1) * 2
550  END
600  PRINT  CHR$
    (4)"BSAVE";B$;",
    A";SA;",L"(A * 3) + (B -
    1) * 2
610  PRINT
620  PRINT "START ADDRESS OF
    POINTS...";SA
630  PRINT
640  PRINT "START ADDRESS OF
    LINES...";SA + (A * 3)
650  PRINT
660  PRINT "TOTAL
    LENGTH...";A * 3 + (B -
    1) * 2
```

Listing III

```
100  TEXT : HOME
110  PRINT "THREE
    DIMENSIONAL ROTATION AND
    SCALING
120  PRINT "PROGRAM
    DEMONSTRATION
130  PRINT
140  PRINT "WRITTEN BY
    J.BLAIKLOCK
145  VTAB 18: INPUT "PRESS
    RETURN TO CONTINUE ";A$
150  PRINT  CHR$ (4)"BLOAD
    ROTATION21.OBJ0
160  PRINT  CHR$
    (4)"BLOADPYRADATA,A$1E00
170  POKE 24617,4: REM
    NUMBER OF POINTS
180  POKE 24618,6: REM
    NUMBER OF LINES
190  POKE 24623,80: REM  Y
    POSITION
200  POKE 24622,0: REM  X
    POSITION HI
210  POKE 24621,140: REM  X
    POSITION LO
220  POKE 24616,30: POKE
    24615,64: REM  ROTATED
    POINTS DATA ADDR
230  POKE 24620,30: POKE
    24619,32: REM  SECOND
    TABLE STRT ADDR
240  POKE 24614,30: POKE
    24613,0: REM  FIRST TABLE
    START ADDR
250  POKE 24624,20: REM
    SCALE FACTOR
310  POKE 24604,3: REM X
    ROTATION
320  POKE 24606,3: REM Z
    ROTATION
330 X = 3:Y = 4
340  POKE 24605,Y
500  HGR2 : HGR : HCOLOR= 3
505  POKE  - 16302,0
520  POKE  - 16300,0
540  POKE 24605,X: CALL
    24576
550  HCOLOR= 0: POKE 230,64:
    CALL 25104
560 X = X + 2: IF X > 19
    THEN X = 1
570  POKE 24605,X: CALL
    24576: HCOLOR= 3
580  CALL 25104
590  POKE  - 16299,0
610  POKE 24605,Y
620  CALL 24576: HCOLOR= 0:
    POKE 230,32
630  CALL 25104
640 Y = Y + 2: IF Y > 19
    THEN Y = 0
650  POKE 24605,Y: CALL
    24576: HCOLOR= 3
660  CALL 25104: GOTO 520
```

appletip

GOTOs are a contentious feature of Basic. They are frequently used as a substitute for proper program planning, as a result of which the program may be difficult for a human to understand.

The IF...THEN GOTO (a previous line number) construction is often used to close a program loop, which in other languages and Basic dialects would be better achieved by a REPEAT ...UNTIL command.

This command may be simulated in Applesoft by a FOR...NEXT loop with modification of the loop variable as shown below.

Listing I is a program for a simple reaction tester. A sequence of letters is printed on the screen, and a counter is repeatedly incremented until the key corresponding to each letter is pressed. The run is ended by pressing the Esc key.

```
0  REM Reaction tester
100 KEYBOARD = 49152
110  HOME
120 N = 0
130 A$ =  CHR$ (65 +  INT (
    RND (N + 1) * 26))
140  PRINT A$;
150  IF  PEEK (KEYBOARD) > 127
    THEN  GET K$
160 N = N + 1
170  IF K$ <  > A$ AND K$ <  >
    CHR$ (27) THEN  GOTO 150
180  HTAB 10: PRINT N
190  IF K$ <  > CHR$ (27)
    THEN  GOTO 120
```

Listing I

Written with GOTOs the listing does not immediately reveal the program logic of the two loops, one within the other. When it is rewritten with FOR...NEXT loops as in Listing II, the logic is obvious.

```
0  REM Reaction tester
100 KEYBOARD = 49152
110  HOME
115  FOR L1 = 0 TO 1: REM
    Start of 1st REPEAT...UNTIL
120 N = 0
130 A$ =  CHR$ (65 +  INT (
    RND (N + 1) * 26))
140  PRINT A$;
145  FOR L2 = 0 TO 1: REM
    Start of 2nd REPEAT...UNTIL
150  IF  PEEK (KEYBOARD) > 127
    THEN  GET K$
160 N = N + 1
170 L2 = (K$ = A$ OR K$ =
    CHR$ (27)): NEXT
180  HTAB 10: PRINT N
190 L1 = (K$ =  CHR$ (27)):
    NEXT
```

Listing II

A second advantage is that FOR...NEXT loops are faster than repeated GOTOs, particularly near the end of long programs.

Line 170 and 190 may appear confusing at first sight. The expressions enclosed within the brackets are logical statements which Applesoft evaluates. If the statement is true, then the expression is assigned the arithmetical value 1, if false, the value 0.

The same result could have been achieved by writing:

```
170 LOOP=0:IF K$=A$ OR
    K$=CHR$(27) THEN LOOP=1
171 NEXT
```

But this is clumsier, and the NEXT has to be put on a separate line.

P.H.P. Harris

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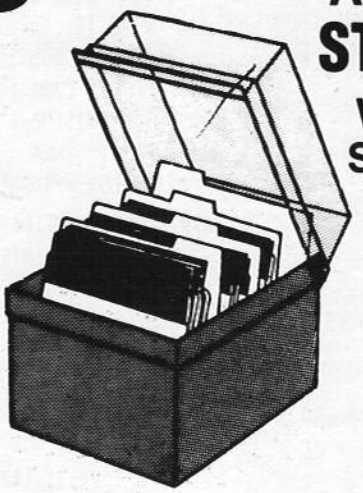

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No. 8 April 1986

NEWSLINK

Hot line for fishermen

ICELANDIC subscriber Ingiber Oskarsson is casting his net wide, hoping to catch MicroLink members and their friends who are involved in fishy business.

Ingiber works in the fish processing industry, based in Keflavik, and wants to contact other system users with connections in the trade.

His company supplies salted fish to customers in Spain, Portugal and Italy.

This takes care of all the cod that's brought ashore, but it leaves him with plenty of other species on the slab – and he'd like to find markets for them.

Haddock, catfish, halibut – and the exotically-named tusk and redfish – are available, fresh and unsalted, and Ingiber can be contacted on MAG20213.

LINK WITH THE ERA OF STEAM

THE British Rail booking service on MicroLink isn't all about high speed Inter City travel. It also caters for those who like to hark back to a more leisurely and stylish era.

Subscribers can turn back the clock by taking their reserved seats on one of a series of steam-hauled excursions running between Marylebone Station and Stratford-upon-Avon on Sundays during the spring and summer months.

These special trains will be pulled by historic steam locomotives such as LNER Pacific locos Flying Scotsman, Sir Nigel Gresley and Sir Lamiel.

The return fare of £35 per passenger includes First Class reserved seat, morning coffee and three-course roast beef luncheon on the outward journey, and afternoon tea complete with scones and clotted cream on the way back.

All the meals are served at your seat by BR waiters and there's also a fully licensed bar available throughout the day.

MicroLink plans to add more special train excursions to its British Rail booking service in the near future.

Ready for your order

HUNDREDS of items of computer hardware, software and peripherals are now within keyboard reach of MicroLink subscribers through OrderLink.

Like a shop that is open 24 hours a day, seven days a week, OrderLink is the convenient way to buy products from some of the biggest names in the industry.

And the list is growing as more major suppliers join this increasing popular electronic mail-order database for computer and communications equipment.

Guide to all the micro shows

THE most complete list of computer exhibitions held in the UK is now available via MicroLink. As new shows are announced they go straight onto the database – making it the most up-to-the-minute guide there is. Currently there are 37 shows on the list – an all-time record.

Satellite covers weather scene

A DRAMATIC breakthrough on the computer front now allows MicroLink subscribers to discover what the weather holds in store.

Whether they live in Turkey or Torquay, they can tap into the same information from outer space that enables the men from the Met Office to predict sunshine or showers.

The reason for this is WeatherLink, an exclusive new service on MicroLink.

Using an aerial based in Kent, signals from the NOAA9 weather satellite are intercepted and converted into electronic data.

The receiver works on circular polarisation to follow NOAA9 every time it appears on the horizon, faithfully monitoring it until it disappears from view some 15 minutes later.

And the same sequence is followed on average four times a day.

Live pictures produced by the satellite hovering 450 miles overhead – it takes two at a time, one in visible light, the other infra red – clearly show the part of the world from North Africa, through Europe and Great Britain up to Iceland.

All these are recorded on a micro linked to the receiving aerial. The next stage involves a converter which takes the image and readies it for transmission over standard telephone lines to the main MicroLink computer.

Once a MicroLink subscriber logs on, all he needs to do is pull down the information file in its expanded format, compress it using specially written software which is also on the MicroLink menu, and then display it.

Launched on February 12, WeatherLink generated such excitement that a team from Thames Television was on hand to cover the event.

At exactly 3.05pm, subscriber John Wallbridge achieved a world first by displaying the first weather satellite picture on his micro in his London home.

YOUR chance to join MicroLink – Page 51

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The Register

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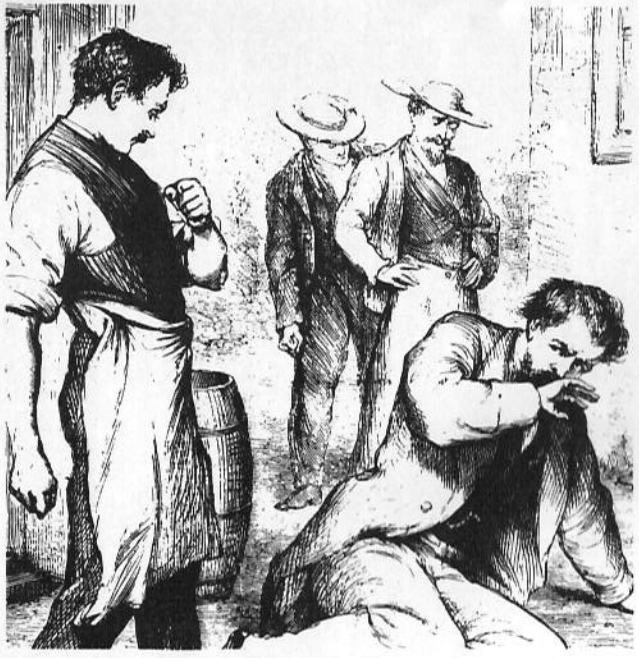

GRAPPLER WINS AGAIN

Once again Orange Micro's GRAPPLER+ has topped the monthly P&P Apple Hardware top 20 chart. In fact the Grappler has not been out of the chart since the product was first introduced to this country over 3 years ago! An amazing fact for any product in this fast moving business.

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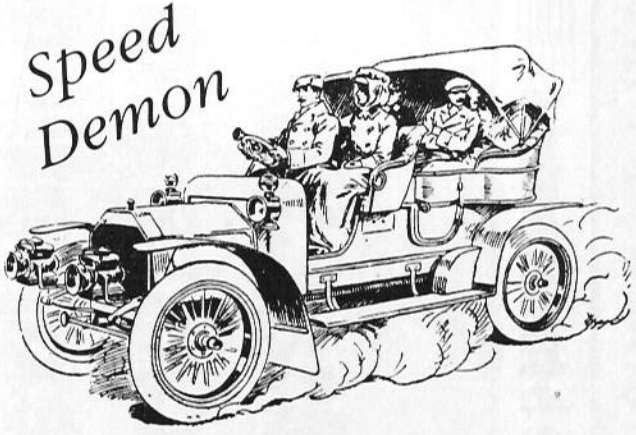

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MacGames

Mac Wizardry casts a quite exceptional spell

IN common with all other Mac owners, I naturally bought my computer solely for solidly practical business reasons. However, despite this intention, it is surprising just how many programs I have managed to accumulate which could be described, by an unkind critic, as "just games".

The Macintosh is certainly a very efficient work tool and business machine, but, in contrast to the serious image promoted in England by Apple UK, in the USA they also seem to look on the Mac as a very enjoyable fun computer.

The lack of colour and joystick are more than compensated for by superb graphics and ubiquitous mouse, and a whole swarm of games are now available from the US, ranging from the shoot-em-up arcade variety through developments of traditional adventure programs to complex simulations.

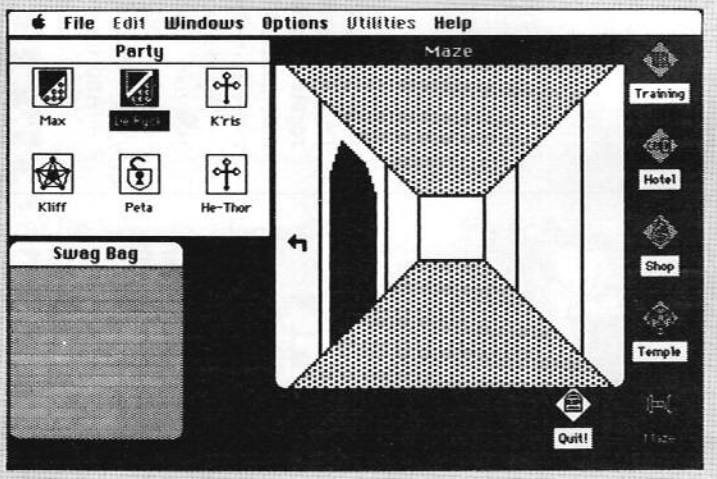
On the strict understanding that I was – of course – actually testing the business applications of the programs, I recently bought two adventures for the Mac – a new graphic adventure, Enchanted Scepters, from the Silicon Beach people who created stunning digitised sound on the Mac with the game Airborne!, and a re-creation of the much enjoyed Apple II+ and IIe game Wizardry, from Sir-Tech Software.

Wizardry is probably still the most popular game of its type, although the original was written in Pascal for the Apple as long ago as 1981. A combination text and (minimal) graphics adventure, in spirit a wonderful blend of Dungeons and Dragons gaming, with the bonus of Zork-like cave explorations.

For those unfamiliar with the original scenario, Proving Grounds of the Mad Overlord, which the new Mac version follows closely, it consists of several stages. First, adventurers are created from several possible races, each with different attributes – Elves, Hobbits, Dwarves, and so on.

Once race has been selected, characters are placed into different roles – fighter, priest, mage and thief being the usual starting ones, although experience gained by characters during the game allows progression to others, such as lord or bishop. Each role has an essential part to play in forming expeditions to the maze, a three-dimensional caves system of horrendous complexity which is the heart of the game.

Apart from fighters, whose role is obvious, mages are able to throw fighting spells against monsters from a distance (only the first three of a maximum sized party of six adventurers can engage in hand-to-hand combat – these maze tunnels are narrow).



Priests are able to cast healing spells, and a thief is useful when, after a battle, a treasure chest is captured – opening a captured chest is the only way to obtain valuable artifacts, magic potions, armour and weapons. Regretfully, booby-traps are common.

After assembling a party of adventurers, expeditions are mounted into the maze, where fearsome monsters guard gold and artifacts. Successful expeditions result in increased experience, hit points, or ability to withstand attack, and, for those characters able to use them, the learning of more spells.

The game itself takes months to fully play. The ostensible object, to find an amulet from the bottom level of the maze, is not actually possible until adventurers have built up sufficient strength and spells.

The maze consists of some 2,000 locations on 10 levels, and consequently takes some exploring, but even after I had fully mapped my Apple version of Wizardry, and found the amulet, I still enjoyed taking occasional parties into the maze. I never did get to the end of assorted monsters and artifacts. (Additional scenarios are planned for the Mac – there are two more Apple ones.)

For someone new to the genre, then, Wizardry is a game which may be enjoyed in several ways. The creation of personalised individuals is enjoyable, and encouraging the gradual increasing of their abilities and strengths, as expeditions move deeper and deeper into the maze, can become a fairly compulsive activity.

Exploration and mapping can add another dimension – the accumulation of charts you have mapped and drawn for yourself provides a feeling of real accomplishment. Finally, it is always pleasant to take on the forces of evil and win, and in Wizardry even getting killed may sometimes be overcome by priests in the Temple of Cant.

So much for the original Wizardry. What, then, does the new Mac version provide which is not already available on the original – is this perhaps another of those rapid conversions intended to cash in on the popularity of an Apple version of a program, and which don't allow the Mac full rein?

Not this time.

Although the maze itself has – as far as I can tell! – exactly the same layout as the original, the game has been re-written and fully converted for the Mac. it can be played with mouse alone, allows multiple windows, and is generally a delight to play. Exploration is still a challenge, and the Mac user interface really has been fully supported.

In addition there are extras which make playing even more enjoyable. The Desk Accessory Wizardry Statistics allows a dazzling compilation of everything from monsters killed to mouse clicks, and About Wizardry is also well worth selecting. Backing up characters is reasonably straightforward,

MacGames

although I would have liked the program to allow the use of two drives if they were available.

The ability to double click on icons speeds things up considerably over the original method of choosing letters from a menu. I also liked the ability to use either mouse or keyboard to navigate the maze. I developed a very rapid method of progression by using the mouse to go forward and the A and D keys to turn left and right (X allows a 180 degree turn.)

The 69 page manual manages to be comprehensive, readable and amusing (how does good game software so often manage to provide better documentation than most business software?)

I thoroughly enjoyed playing Wizardry again, and I am sure that I will continue to do so. Overall, I would strongly recommend Mac Wizardry to even the most jaded players of the original, and those who experience it for the first time on the Mac are in for a treat.

Enchanted Scepters' chief claim to fame – apart from its original spelling of sceptres – is its use of digitised sound. The first program to use this concept, Airborne!, used the sound of aircraft and explosions. Scepters has among many different sounds birds, water dripping and swords on armour – with authentic grunts and death rattles.

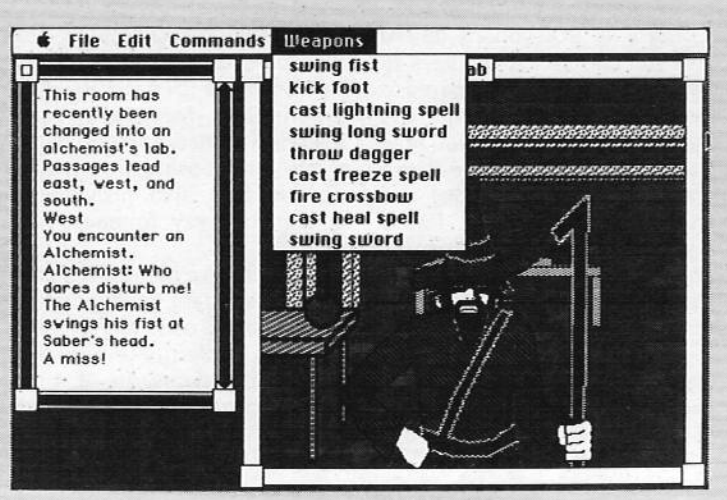
The game is a fairly standard adventure, rather on the lines of the old Wizard and Princess on the Apple, with the addition of a personal statistics element – the single character collects spells and weapons, while gaining and losing vitality and piety.

Exploration of an extensive series of locations – more than 200, according to the packaging – in an attempt to find four sceptres is the object. Each location has an illustration, with collectable articles visible on them.

A bonus is the ability to use the mouse to click and collect an object, as well as for various other control actions. Generally, though, more typing is needed than I would have hoped was necessary.

This was unfortunate, as the version I was testing had a specially reduced system file with American keyboard and it wouldn't convert. I had to eventually defeat the copy protection and remove the original system file from the disc before using it in drive 2, after first booting a UK system disc in the internal drive. This worked beautifully, but I still don't know how to manage on a single drive system.

The game took an incredibly long time to load, even in its unmodified version – I feel a 127 second wait really is excessive. Saving and restoring positions during games was well programmed, though, and much faster.



A year or so ago, Scepters would have pleased everyone. It is certainly a well crafted traditional adventure quite apart from its original use of sound effects.

Today, perhaps unfairly, the average user asks for more, and I do feel that the Mac could potentially provide an even better combination of graphics, sound and adventure, although perhaps this will have to wait for the new, larger memory machines to be readily available.

Although adults did enjoy playing this game, I found Scepters was very popular indeed with my daughter and her friends, who are in the eight to nine age range. They particularly enjoyed the sound effects, which were indeed realistic and frequently startling – I especially liked the cannibals' wardrums.

Overall Scepters is a game worth seeing demonstrated before you buy, but one well worth purchasing either for children or to display the Mac's digitised sound ability, which it does excellently.

Duncan Langford

BRATACCAS CAN BLOW YOUR MIND

IF you've got a Fat Mac and would like a game that takes advantage of its size, you should take a look at Brataccas.

In the game – or interactive video as Psygnosis prefer to call it – you play the part of Kyne, a former genetic engineer who has been convicted of a trumped-up charge of genetic fraud. As the graffiti constantly reminds you, Kyne is guilty.

The government, police and underworld would all like to get their hands on you, and you for your part would like to get hold of Koll Worpt, the architect of your downfall.

In case you're wondering, Brataccas is the name of the planet where the action takes place.

The other inhabitants have their own lives to lead and will continue to do so even if you choose to sit in a bar all day. This means that some of them might not *let* you sit in a bar all day!

The task you face in the role of Kyne obviously pushes the game towards the adventure category. However the range of

MacGames

actions available for Kyne calls for arcade-type control skills.

There is a keyboard option and you can define the keys to be used, but really the game is designed to be used with the mouse. For this reason you may have to spend some time learning how to control the character. Certainly I found myself jumping into walls more often than I might normally. Once you do get the hang of it the game is superb.

I'm not going to give you any clues about what you should do. Suffice to say that there's plenty to keep your mind and your mouse-hand active for quite some time.

Pressing Backspace at any time calls up an option screen. As well as providing the mechanism for saving and restoring games, entering demo mode or choosing the control device, this also provides a convenient way to pause the game.

After all, in a game where the other characters have independent lives you can't rely on them to wait patiently while you answer the phone.

The other time at which action freezes is when you're offered a choice. For example, if a Snitch asks: "Want to know anything?" a series of thought bubbles appear above Kyne's head, starting with "Mmm ... shall I ...".

The sequence might be something like "ask for information", "ask about evidence", "ask where I can get a drink", "say nothing".

These bubbles will continue to appear in sequence and you simply press the mouse button to choose the desired action. In this way you can take as long as you like to decide – for once, the inhabitants of Brataccas hang on your every word.

The game does suffer from the odd glitch – the thought bubbles seemed particularly bug-prone and Kyne's sword sometimes seems to be free-floating – but there's nothing which causes a crash.

From the Roger Dean illustration and poster to the end of the game, Brataccas sets a high standard.

What's more, it's British. If you want a challenging game that uses the machine and mouse to the full, buy Brataccas and blow your mind.

Cliff McKnight.

MICE TAKE QUITE KINDLY TO ARCADE ACTION...

AIRBORNE! is an arcade game for the Macintosh. It's the type of game you play when you've been sweating over your keyboard all day, it's nearly time to close down and you fancy a few minutes of enemy zapping.

Supplied on a copy protected disc, Airborne! boasts real sound. Apparently true sounds were recorded then digitised on a mainframe to be output by the Macintosh's polyphonic sound generator. It's very impressive and there's also either 8 or 20 seconds of music which begins the game, depending on the size of your Mac's memory.

In play you perform a Custer's Last Stand emulating a lone soldier in your bunker. A variety of helicopters, bombers and troop carriers fly across the horizon dropping parachutists.

The parachutists accumulate on the ground preparing to storm your bunker.

Armed with a mortar and an anti-aircraft gun you score points by shooting down all and sundry but lose a point for each shot fired – so indiscriminate zappers beware!

While you're busy tackling the air attack, troops are gathering on the ground ready to storm your bunker. Too slow and you'll find someone lobbing a grenade at you then jumping for joy as you're blown to smithereens.

It's worthwhile developing a favourite strategy. Spend too much time mortaring ground troops and you'll be wiped out by a screaming jet fighter sporting deadly missiles. Let off too many anti-aircraft missiles and you'll be sharing the bunker with a live grenade.

Airborne! is a good mouse-driven arcade game. Simple but smooth and effective graphics, impressive real sound and a high-score table make it worth the £25 you can expect to pay for it.

Piers Casimir-Mrowczynski

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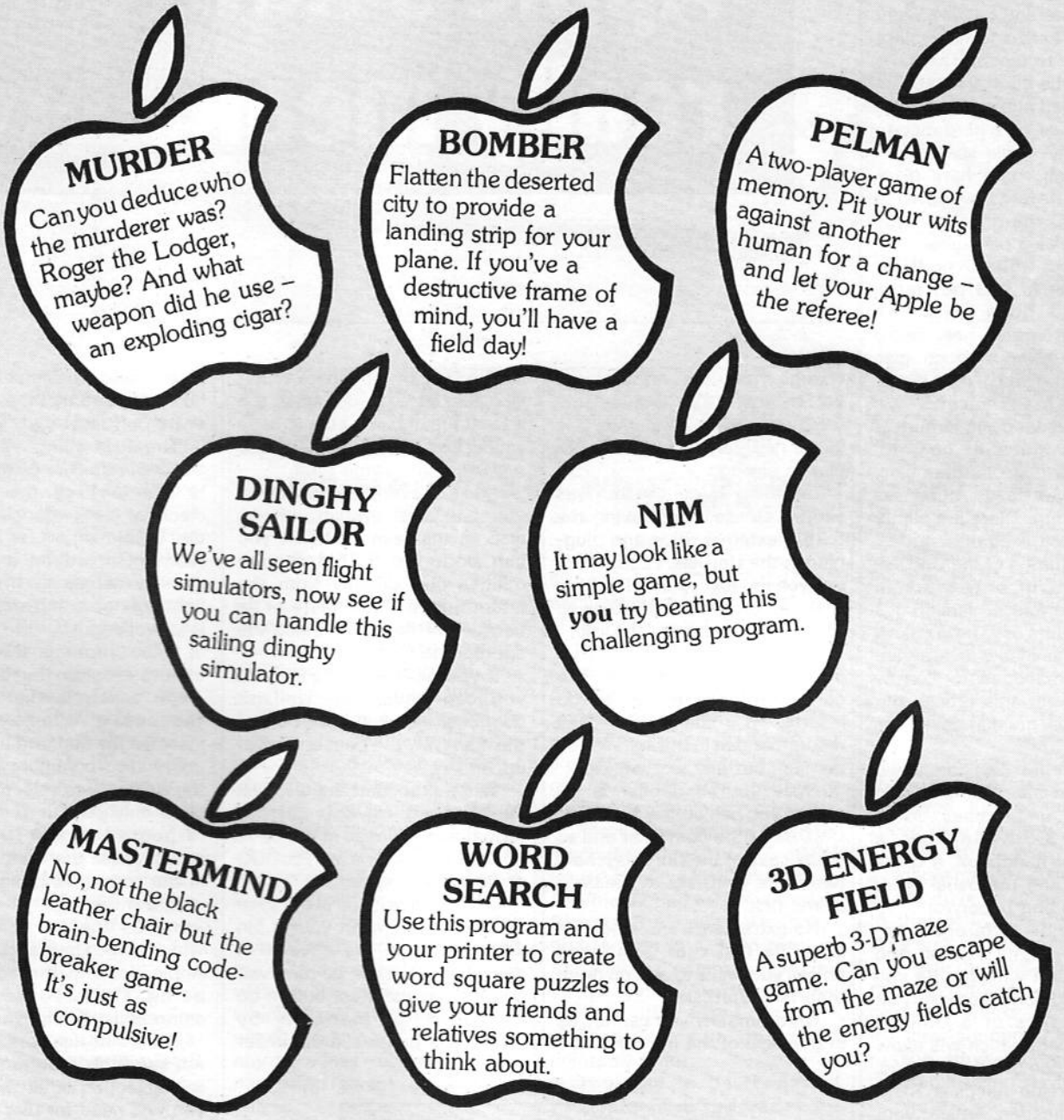

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To order, use the form on Page 61

Apple's new UniDis really means busin

THE release of the Apple 3.5in UniDisk as a relatively cheap mass storage device was overdue, but is still good news. If you, like me, have a business, a lot of discs and have thought of buying a hard disc, now might be the time to repent. The 3.5in disc could be your answer.

I have had numerous Apples and the price of a hard disc to enhance my Apple scared me. Even though some hard discs for a IIe or II+ are now down to under £900 the price for a IIc remains quite a bit higher.

Apple's 5.25in Disk II, or compatible, is just not large enough to cope with the business programs now being developed without much disc swapping and lots of data discs.

Programs such as AppleWorks need a minimum of three disc sides to operate, allowing for just one data disc. Supercalc 3a needs four discs as a minimum. There are plenty of other such examples.

One limitation of the UniDisk is that it will only work in ProDOS, or Pascal version 1.3 and at the time of writing Pascal 1.3 is only available to software houses. I managed to borrow Pascal 1.3 for this article, but Apple UK tell me that delivery is imminent.

The system I used comprised an Apple IIc and external 5.25in drive. The unit comes boxed with the 3.5in UniDisk, a multilingual handbook, a blank 3.5in disc and the usual other guarantees and paperwork.

The major difference between the II+/IIe version and the IIc is that with the IIe you need an additional accessory kit which consists of a UniDisk controller card which will allow the connection of four UniDisks. The IIc version needs a ROM chip modification which your dealer will do free of charge. Also included in both versions are a system utilities disc and a system utilities handbook. The IIc version contains a 5.25in disc and the II+/IIe a 3.5in disc.

On removing the drive from the box I was quite surprised by the neatness of the unit, a change from the rather large 5.25in drive. It is 8in long by 4.5in and a slim 2.2in high. It is in the now familiar Apple white plastic casing.

Installing it on the IIc was simply a case of removing my 5.25in external drive and plugging in the UniDisk. I could then daisychain my external 5.25in Disk IIc, or another UniDisk to the back of the first UniDisk.

However the IIe version needs a little more time. The controller card needs to be inserted in a spare slot – 4 is recommended in the installation manual, but any slot will do.

Once your controller is installed you can connect a single UniDisk to the controller and as in the case of the IIc, daisychain two more UniDisks to the back of the first.

No extra hardware is needed after the first card is installed unless you want to add on more than two UniDisks.

Unfortunately you cannot, as in the case of the IIc, connect a 5.25in Disk II to the back of the UniDisk, but you can have the advantage of being able to have your 5.25in Disk II drives on the system at the same time.

Once the drive is installed, you boot the system utilities disc. In the case of the IIc you can boot the 5.25in system utilities disc directly from the internal drive. With the II+ or IIe boot via PR#n with n being the appropriate slot number.

If you have an enhanced IIe you can have your UniDisk controller installed in slot 6 and the disc will auto boot on power up.

When first used the disc will be checked for the correct format and any disc in the drive on boot up which is not ProDOS or Pascal will eject.

Just remove it and in the case of a IIe or II+ insert your 3.5in utilities disc in the drive. If it doesn't eject, it can be removed by pressing the eject button on the front, or manually by inserting a paper clip or similar object into the manual eject hole at the front of the drive, but switch off first!

The first thing you notice about the UniDisk on booting up is the lack of the familiar clackety clack associated with the 5.25in drives. It is almost silent in operation and a few glances across at the In Use light are needed to reassure you it is working.

Once running the system utilities program, by means of a menu, asks you what language you speak. When you have selected the appropriate one the utility disc configures itself to the appropriate selection. It is a once only selection, and when re-booted again it will go straight into the main program in the correct language.

The main menu is much the same as the IIc utilities disc which comes packaged with the Apple IIc with the addition of being able to use all the commands on the UniDisk.

For II+ or IIe users who have not seen this program before it is a selection of all the utilities you will need for disc management – ProDOS Pascal and DOS 3.3 formatting, DOS >< ProDOS conversions, cataloging of all formats of discs including DOS 3.2, 3.3, ProDOS, Pascal and CP/M, file copying (not CP/M) and full disc duplication.

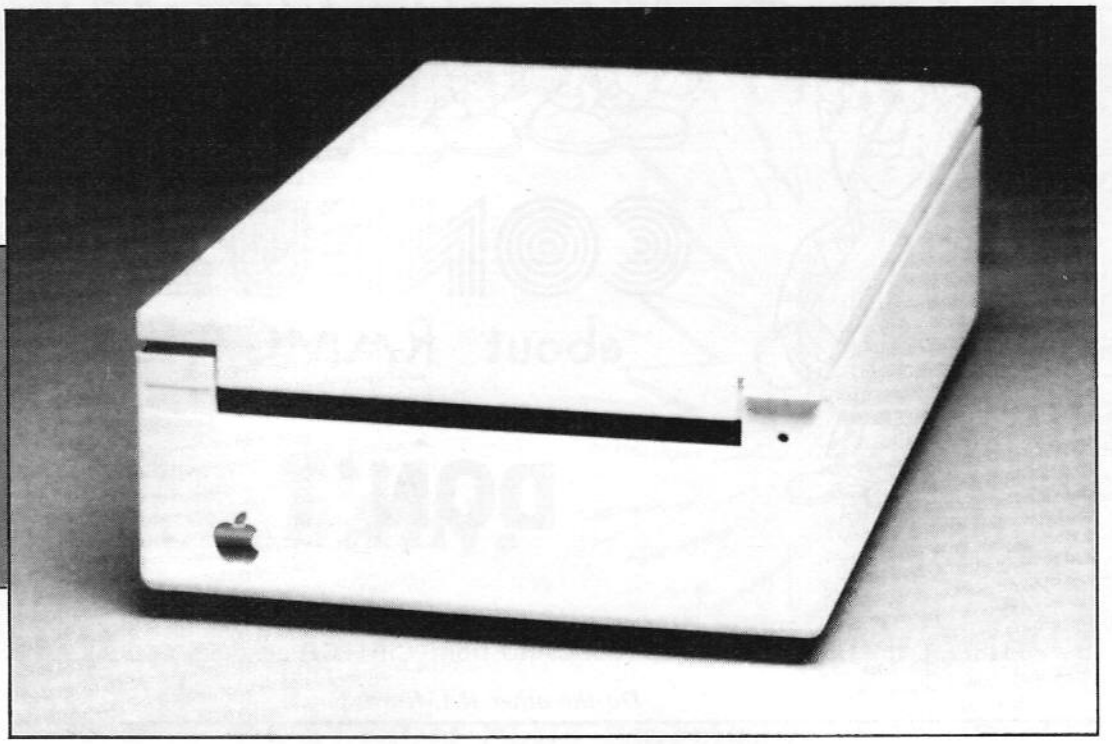
The menu of options is

	5.25 Disk II	3.5 UniDisk
25k File	14.5 secs	9 secs
90k File	47 secs	35 secs
165k File	85 secs	62 secs

The above time differences are reflected in file saves.
The files were loaded into a 640k IIc.

Figure I: File loading times

k ess



DAVID PALMER looks over Apple's latest mass storage device, and likes what he sees

slightly different on different machines as the program does an ID check before it runs, but it performs the same tasks.

At this stage is is advisable to take a copy of your system utilities disc. In the case of copying 3.5in UniDisk to 5.25in disc II you will have to select Copy files from the menu and follow the disc options slots, drives and ProDOS pathnames carefully. If you try Duplicate a disc as I did, it will inform you that this is not possible to copy with volumes of different sizes.

The 3.5in system utilities will fit on to one 5.25in floppy without problem. The copy of the 5.25in to 3.5in disc is done in the same way as above.

Once you have a copy of your system utilities you can format a 3.5in disc and after 50 seconds you will have 1539 blocks available (800k) or about 5.5 disc sides.

You can then copy your files across to the UniDisk, including ProDOS and the other necessary files. All the ProDOS commands remain the same as with the 5.25in discs and the first program to run on reboot in the case of BASIC.SYSTEM being on your disc, is STARTUP or any SYS file if BASIC SYSTEM is not present.

Rebooting the system on a IIc was just a matter of switching it on with the internal drive door open and having a suitable disc in the UniDisk. The IIc can also be warmbooted by the command PR#5, one not mentioned in the handbook. The II+/IIe can be booted by PR#n.

The first job I wanted to do was to put all my AppleWorks programs and data on one disc. I formatted a blank 3.5in disc with the utilities disc. Note that you cannot format a 3.5in disc from within AppleWorks as it only recognises drive 1 or drive 2 for formatting.

I then copied all the AppleWorks program files off the 5.25in disc and then started with my five sides of data discs which all ran smoothly until I ran out of room in the directory for any more files – something I had not come across on a floppy before.

I now find it essential to create a number of subdirectories when I have formatted a 3.5in disc. After I copied the data files across to a subdirectory it was just a matter of setting the prefix on AppleWorks. I could then use the AppleWorks program and data from one UniDisk with lots of room to spare.

Other ProDOS programs require more care, as a lot of packaged software contains prefixes preset from within the program which need to be altered to suit, as they will not run correctly from within a subdirectory unless modified.

Pascal files are handled in much the same way as ProDOS from within the UniDisk utilities. As I mentioned earlier you need Pascal 1.3 to use the UniDisk. I first formatted a 3.5in disc via the X)ecute command on the Pascal systems disc and copied over the other files I needed.

There are two important points to note:

- The disc to be formatted (3.5in or 5.25in) must be formatted from within the 1.3 Pascal system disc. It can't be formatted from within system utilities.
- The boot drive, irrespective of it being 3.5in or 5.25in is designated as volume #4, and the second drive of the same type as volume #5. The other disc system on line is started at vol #11 for the first drive and volume #12 for the second drive.

For practical use in a business a UniDisk, when compared to a 5.25in Disk II, is a must. As for games enthusiasts, I can't see any real practical use for the UniDisk until games software is sold unprotected – probably never – or they buy MicroSparc's UniDOS 3.3 in order to make use of their old DOS 3.3 games.

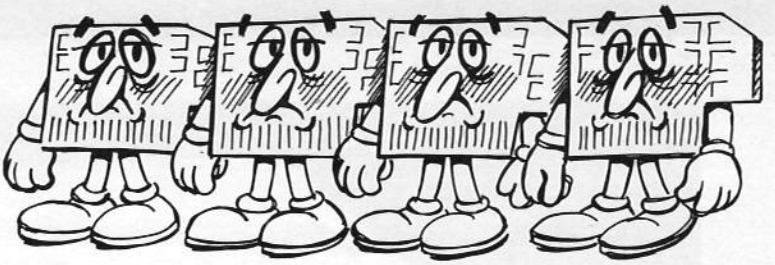
The drive performed faultlessly for the four weeks I used it and was well suited with the unit's quality and the improved loading and saving speed (see Figure I).

Best of all was the 800k available on each disc. The price of the drive must be compared to that of a hard disc and the pros and cons juggled with.

I will definitely be keeping mine and probably spending the next few weeks converting all my files, although I know most of the new Pascal/ProDOS programs being developed will be packaged with both disc versions in one pack.

Thanks to Steve Carter of Holdens Computers in Preston for the loan of the Pascal 1.3 and help in compiling this review.

The Apple 3.5in UniDisk costs £395 and the II+ or IIe accessory kit £55.



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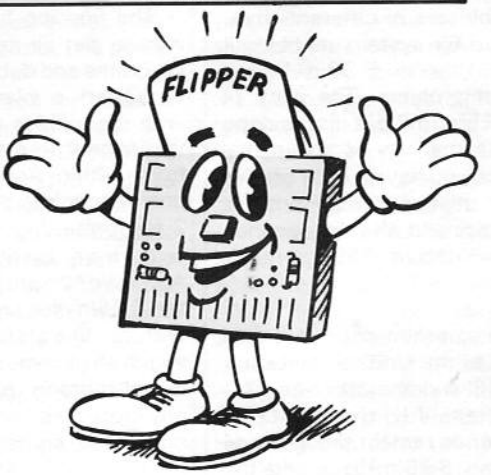

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PASCAL POINTERS

STUART BELL concludes his present series with some tips and suggestions on using Apple Pascal

IN the second *Apple User* Pascal Tutorial series we've looked at a wide variety of programming techniques, and I want to finish off with a collection of hints and suggestions about the use of Apple Pascal.

Firstly a couple of notes about the Filer – and a warning. Remember that you can use a second parameter in the L(ist Directory or E(xtended Directory options to get a directory listing to the printer. For example, responding *,#6: to the prompt "dir listing of what vol?" will produce a directory listing of the boot volume on the printer.

This can be useful. I keep a printed directory with each disc and you can also send one to a file, for example *,#5:dir.text. Using the .text suffix ensures that the file can be edited.

Now for the warning. Using *,#5: could send the directory listing not to a file but to a volume, overwriting the directory of the disc in drive 2. While on this topic, whereas * or #4: will produce a paged listing, that is asking for a space to continue at the end of each page, using #4:,#1: will produce a scrolling listing. This can be quite useful when a directory is slightly longer than a page and you wish to see the last few files listed.

One thing not documented about the L and E options is that you can exit from a listing by hitting Esc when prompted for a space and at the bottom of the screen. You can also do this during T(ransfer or R(emoves when you have used a ? in the file specification.

On to the Editor. Did you know that when you do a Q(uit W(rite you can send output to the printer? If you try #6: you get told that it is not a file. However try something like#6:silly, and it works.

Tell it that you DO want to delete the old file. You can then return to the editor. If you don't, your file will be lost. This can be great for addresses on envelopes and other little tasks.

There's not much to say about the compiler, except to remind you about the use of SYSTEM.SWAPDISK (see page 130 of the OS manual) to compile programs that might otherwise be too large. At times this can be extremely useful.

There can be a problem with the allocation of disc space when using the (*$L+ *) option to get a compilation listing on the same disc as that to which the codefile is being written.

My advice is simple – use a different disc for code and listing files. In the compiler the (*$S+ *) and (*$S++ *) options really do slow down compilations. If your program is only a bit too big to compile without S+, invoking swapping at the command level, that is typing S at the command prompt line, instead of using (*$S+ *) can make compilation much faster.

Documentation on the librarian shows you how to add new units to the SYSTEM.LIBRARY – the September 1985 Tutorial showed you how to do this step by step.

If you are short of disc space, you can also reduce the size of the library, freeing up valuable blocks on the system disc.

For example, I rarely use trigonometric functions – TRANSCEND – or high resolution graphics – TURTLEGRAPHICS – so I have made a library without them.

Warning: Other people's programs may expect the standard units to be in the library, and crash if they're not. I came unstuck in this way when testing p-Tral.

Never have two discs with the same name on-line at once. If this occurs after copying a whole disc open one disc drive while you change the name of the other volume.

If you continue with matching names directories may get written to the wrong disc, and all sorts of unpleasant things may happen. As one p-System guru described it, "You've just left the real world".

If you want to use strange peripherals on the Apple Pascal system there is a neat and elegant method of adding user-written device drivers. (MSDOS 2.0 has such a facility but Apple Pascal has had it for five years.)

As I didn't know about it early enough I ended up rewriting the whole BIOS. The proper way is to use a utility called ATTACHUD to build a library of your own drivers (or those supplied with, say, a hard disc) which have been written in assembly language and assembled, and are then loaded at boot time.

Several drivers can be used simultaneously, say for big discs and a clock and this is far better than a manufacturer supplying a patch to the BIOS, which results in mutually incompatible systems.

In fact, I would refuse to buy any hardware which is supplied with a BIOS patch rather than a proper ATTACH file. Details of the Attach system are published in p-Source (see below), and the disc is available through user groups such as BASUG and USUS (UK).

There are so many books written about Pascal that it is difficult for the beginner to know where to start.

Unfortunately many are simply a rehash of the same old material, plodding their way through the various features of Pascal without giving any real guidance about the process of developing well written programs, and without suggesting how particular Pascal constructs are best used.

These six books for the Apple Pascal programmer are the ones on which I have spent my own money and which I consult frequently.

A Practical Introduction to Pascal by Wilson and Addyman is one of the best introductory texts on the standard Pascal language.

It is concise and yet readable, accurate and not too expensive. However, it does not cover the differences between standard Pascal and Apple Pascal. The publisher is Macmillan and, unusually for a British book, it is widely recommended by a number of American texts.

The UCSD Pascal Handbook by Clark and Koehler and published by Prentice-Hall is the standard text which does address itself towards the UCSD Pascal family, of which Apple Pascal is a member. A plus is that it also covers all of the features of Pascal.

Note that it is a reference book, not a beginner's tutorial. It is a little biased towards Version IV, a later version of UCSD Pascal, but nevertheless I strongly recommend it to be kept in arm's reach of your Apple.

Advanced UCSD Pascal Programming Techniques by Willner and Demchak is also published by Prentice-Hall and takes over where the previous book finishes.

It explores all sorts of techniques, in particular those which are specific to the UCSD system – such as file handling, disc directories, data storage and accessing system internals.

The two authors are knowledgable about the p-System,

indeed Eli Willner recently formed the company which now owns and distributes Version IV of the system.

This book recognises the widespread use of Apple Pascal in the States and contains much Apple-specific information. It is not really a book for the inexperienced user, but old hands will find it fascinating.

All About Pascal, published by Call A.P.P.L.E., is a compilation of articles on Apple Pascal originally published in that magazine and it has been recently available in the UK through Boot-Out, a distributor which advertises in *Apple User.*

It concentrates on the internal workings of the system and contains a number of useful utilities, not least various disc format conversion programs, a p-code decoder, and a text formatter. It provides a good introduction to the way in which the p-System operates.

p-Source by Randall Hyde published by Reston, is a useful accompaniment to the previous book.

Section 1 covers various Apple Pascal programming techniques, concentrating on clever tricks with the variant Case statement, and program optimisation.

Section 2 goes into great depth discussing the internal operations of the p-System, describing in detail every operation code in the p-System.

That is, it describes each p-code obeyed by the hypothetical p-machine which a machine code program (called the p-code interpreter) simulates on every computer using the p-System.

It may not help you to write Pascal programs but it will show you what goes on inside the system.

Section 3 explains the modification of the Apple Pascal system, using the Attach process which I mentioned earlier. The author illustrates a neat technique of adapting the p-code interpreter to develop the system.

Algorithms + Data Structures = Programs is published by Prentice-Hall and was written by Niklaus Wirth, the originator of the Pascal language.

It is a superb guide to programming techniques – data structures, sorting, recursion, dynamic data structures and language analysis – using Pascal as the vehicle of demonstration.

A well written book, it is not beyond the grasp of any programmer who thrives on a little hard work. In 15 years in computing I have yet to find a better book on programming techniques. The only problem is the price – about £35.

With the exception of the last book, I have not given prices because they change so frequently. The prices that I paid for the others were about £8, £15, £20, £12 and £24 respectively, but check before ordering.

Finally, a reminder of the value of a couple of the user groups in helping the Apple user. BASUG is the main British user group covering all aspects of Apple systems.

My own involvement is with USUS (UK) which is the user group for the UCSD p-System – including Apple Pascal. If interested write to Toby Morris at PO Box 448, Chelmsford.

Many thanks to those who have written in about the Pascal Tutorial series. I hope that you've enjoyed reading it as much as I've enjoyed writing it.

● *Later this year Stuart Bell will start a new series, Pascal Building Blocks, in which he will present a whole library of useful Apple Pascal routines.*

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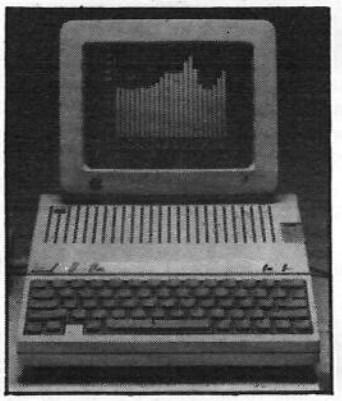

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ProDOS way to direct access to disc blocks

By GRAHAM KEELER

WITH ProDOS it is quite simple to write a Basic program to give direct access to the blocks of a disc. The program Zap, which will be printed next month, comes from my book "Apple ProDOS disk/file handling", published by Prentice/Hall International.

It uses the MLI calls to READ_BLOCK and WRITE_BLOCK to read a block into memory and from there display it on the screen for the user to examine, modify if necessary and write back to the disc.

With the aid of the Zap program it is possible to edit files directly on disc, and perhaps more valuably, to recover accidentally deleted files, or worse still, corrupted discs.

In order to make full use of the ZAP program it is necessary to have a good understanding of how files are stored on a disc, so this is explained first.

ProDOS organises its data into 512 byte blocks, each occupying two disc sectors, and uses a single block number instead of track and sector values. Thus on a normal floppy disc, the block numbers run from 0 to 279 ($117).

Since you may wish to use the Zap program to examine DOS 3.3 discs, it is useful to know the relationship between ProDOS blocks and DOS 3.3 sectors.

Apart from the first block on a track, successive halves of blocks correspond in descending order to the sectors. In Table I a and b are used to denote the first and second halves of a block, for example 1a and 1b are the two halves of block 1. The block numbers are written as n0 and so on in hexadecimal where the corresponding track is 2n.

Thus for instance track 8, sector B is block 42a, and block 5C is on track B, sectors 7 and 6.

The hiccup at the start to the general rule of descending DOS 3.3 sectors is at first sight odd, but if the relationship between DOS 3.3 sectors and the physical sectors on the disc is taken into account, the last column shows that successive blocks are on alternate physical sectors (in normal ascending order).

The key to a ProDOS disc lies in the first 7 blocks on track 0. the first two blocks contain the loader program for the second stage of the boot process.

The next four blocks (for ProDOS 1.0) contain the volume directory, and the seventh block contains the volume bit map. For large volumes, over 4096 blocks, further bit map blocks are used. Thus a ProFile 5 megabyte hard disc will have 3 volume bit map blocks.

The volume bit map is simple. Starting from the first byte in the block, each byte uses its 8 bits to denote the status of 8 blocks on the volume (bit 7 flags the first of the 8 blocks). A 1 in a bit means that the block is free, a zero means that it is in use. For a floppy disc the first 35 bytes will be significant. The rest will be set to zero.

DOS 3.3 afficionados will realise that the bit map serves the same purpose as the main part of the volume table of contents (VTOC) in DOS 3.3. However the extra information in the VTOC is contained in the ProDOS directory header entries.

The volume directory can occupy up to four blocks under ProDOS 1.0 (subdirectories can occupy any number of blocks). The start of each block consists of a block pointer to the previous block, if any, and the next block, if any.

If the block is the first, or last, in the directory, the corresponding pointer is a zero. For the volume directory, fixed on blocks 2 to 5, the pointers serve only to indicate how many blocks are in use, but subdirectory blocks could be scattered over the disc.

Each directory block can contain up to 13 entries, each of 39 ($27) bytes, plus the four bytes for the two pointers. (Block pointers are two byte numbers following the standard convention for 6502 addresses, that is low byte first.)

In the first, or key block, the first entry is a special header entry, which is the same length as the other entries but has details of the directory itself. The remaining entries contain details of the files in the

DOS 3.3 sector	Block		Physical sector
	Even tracks (2n)	Odd tracks (2n+1)	
0	n0a	n8a	0
E	n0b	n8b	2
D	n1a	n9a	4
C	n1b	n9b	6
B	n2a	nAa	8
A	n2b	nAb	A
9	n3a	nBa	C
8	n3b	nBb	E
7	n4a	nCa	1
6	n4b	nCb	3
5	n5a	nDa	5
4	n5b	nDb	7
3	n6a	nEa	9
2	n6b	nEb	B
1	n7a	nFa	D
F	n7b	nFb	F

Table I

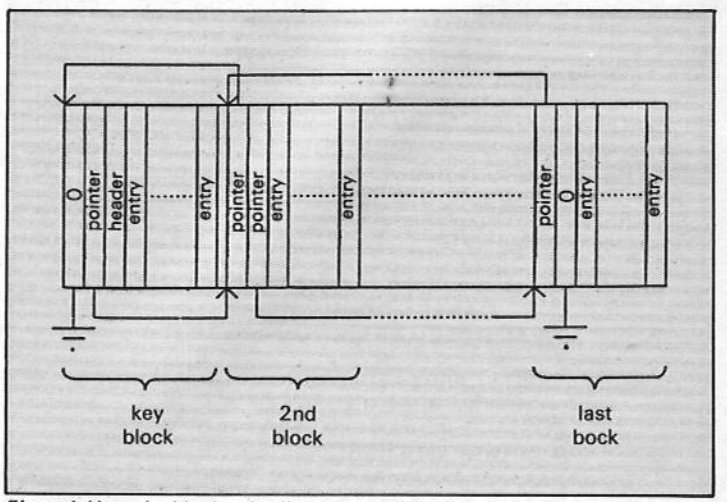

Figure I: How the blocks of a directory are linked

directory (for ProDOS 1.0, 4 x 13 −1 = 51 files maximum for the volume directory).

The header entries of the volume directory and a subdirectory are slightly different, and for the purposes of disc patching they are of less relevance than the normal file entries. The latter will therefore be described first.

The file entry contains all the information listed in a full CATALOG, and more besides, as well as holding the address of the start of the file itself. The file entry is much more comprehensive than in a DOS 3.3 CATALOG, and includes information that DOS 3.3 put in the actual file, which enables the structure of the files themselves to be simpler and more uniform.

The contents of each byte is given in Table II. The relative byte quoted is the offset from the start of the entry.

The first byte, containing storage type and file length, is one of the most important for patching purposes. The high nibble represents the storage type, and the low nibble the length of the filename.

The storage type can have one of six values: $1 – seedling file, $2 – sapling file, $3 – tree file, $D – subdirectory file, $E – subdirectory header (in header entries only), $F – volume directory header.

When a file is deleted this byte is set to zero. Therefore to restore the file, if it has not been partially or totally overwritten, one of the things that is necessary is to replace it with its original value.

The filename length is clearly simple to replace. Subdirectories cannot be deleted unless they are empty, so the only problem is in deciding whether the file is of type 1, 2 or 3. The differences will be explained later, but you will be able to determine the type from the number of blocks that the file occupies.

Bytes 1 to 15 contain the filename. If a short filename has overwritten an earlier directory entry for a longer one the remains may be left at the end. Otherwise it will be padded out with null bytes.

The file type is the same as the T parameter that can be used with the CREATE command. By changing this file type byte you could change the type of file if you wished.

The block pointer gives the block number of the key block of the actual file. The key block number is another very important value, enabling you to track down the file.

The next 9 bytes (19-27) give information presented in a CATALOG listing as do bytes 33 to 36. Bytes 28 and 29 are of no real interest, and at present will probably be zeros.

The SUBTYPE contains, for binary files and textfiles, the default load address and record length respectively, just as it does in a full CATALOG listing. But for other files, in particular Basic files and system files, it again contains the default load address, which is not given in the CATALOG. For Basic files the load address will usually be $801, and for system files it will be $2000.

The file status is the other parameter of interest. It normally has the value $E3 for a LOCKed file and $21 for an UNLOCKed file. However the byte actually carries five flags, as shown below.

7	6	5	4	3	2	1	0
D	RN	B	0	0	0	W	R

D, RN, W and R are respectively Delete, ReName, Write and Read enable flags. The first three are all set or cleared together by the LOCK and UNLOCK commands, but with the Zap program you could alter them selectively if you wished, say to Write enable a file for updating but with a lock against deleting. You could also zero the Read enable flag, which would protect files from prying eyes.

B is a backup flag that is set by ProDOS whenever a file is created or changed in any way. Its purpose is to enable machine code programs to clear the flag when a modified file has been backed up.

The format of volume directory and subdirectory headers are very similar, and have features in common with file entries. Their contents are outlined in Table III.

Note that a subdirectory has two entries on a volume. The entry for the directory file in the parent directory, and the header at the start of the subdirectory itself. The last three items in a subdirectory header enable ProDOS to calculate the precise position on the volume of the directory file corresponding to this subdirectory.

The only item that you are likely to want to change in a directory header is the number of undeleted entries, if you are permanently restoring a deleted file. You will then need to work out the changes in the volume

Relative byte		Use
$00	(0)	Storage type and name length (see below).
$01.0F	(1-15)	File name, up to 15 characters.
$10	(16)	File type (see below).
$11.12	(17-18)	Block pointer to the key block or only block of the file.
$13.14	(19-20)	Total number of blocks occupied by the file (usual lo-hi format).
$15.17	(21-23)	ENDFILE. Total number of bytes in the file (lo byte first).
$18.1B	(24-27)	Date and time of creation.
$1C	(28)	Version. 0 for ProDOS 1.0.
$1D	(29)	Min. version. 0 for ProDOS 1.0.
$1E	(30)	File status. Essentially indicates whether the file is locked.
$1F.20	(31-32)	SUBTYPE (see below).
$21.24	(33-36)	Date and time last modified.
$25.26	(37-38)	Pointer to the key block of this directory.

Table II

Relative byte		Use
$00	(0)	Storage type and name length (storage type is $F for a volume directory, $E for a subdirectory).
$01.0F	(1-15)	Directory name.
$10.17	(16-23)	Unused (but containing values in the case of subdirectories).
$18.1B	(24-27)	Date and time of creation.
$1C.1D	(28-29)	Version and Min. version.
$1E	(30)	File status (normally contains $C3).
$1F	(31)	Length in bytes of each entry ($27 for ProDOS 1.0).
$20	(32)	Number of entries per block ($0D (13) for ProDOS 1.0).
$21.22	(33-34)	Number of undeleted entries in the directory.
		Only the last four bytes differ between a volume directory and subdirectory. They are:
		Volume directory
$23.24	(35-36)	Pointer to bit map block ($06 for ProDOS 1.0).
$25.26	(37-38)	Total number of blocks on the volume. ($0118 for a floppy disc).
		Subdirectory
$23.24	(35-36)	Pointer to the block of the parent directory that contains the directory file for this subdirectory.
$25	(37)	The number of the directory file entry within the parent block.
$26	(38)	The length in bytes of an entry in the parent directory ($27 for ProDOS 1.0).

Table III

bit map to flag all the file's blocks as used.

Figure II shows part of the key block of the volume directory of the user's disc. It includes the pointers to the preceding and following directory blocks, the directory header entry and the first file entry.

ProDOS subdivides files into three categories, depending on the file size:

- Seedling files (1 block).
- Sapling files (3 to 257 blocks).
- Tree files (260 to 32,897 blocks).

The type of file is recorded in the storage type nibble of the file entry in the directory, being $1, $2 and $3 respectively. Thus ProDOS knows what format to expect when it reads the actual file.

Seedling files are very simple. They are files where all the data can fit into a single, 512 byte block. This block is then the key block pointed to by the directory, and no index to the file is necessary, which keeps to a minimum the disk storage overheads for small files, in contrast to DOS 3.3 where all files needed at least one track/sector list.

Sapling files will probably be your most common type of files, at least for floppy discs where one tree file would in most cases practically fill a disc. Once a file extends beyond a single block it is necessary to have a list of where every block is

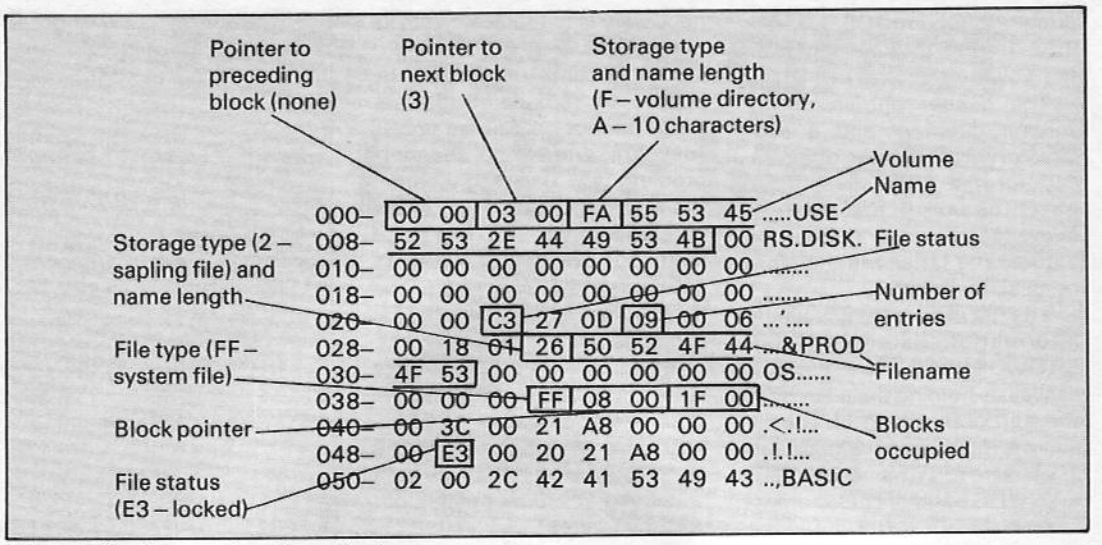

Figure II: The first part of a volume directory

situated on the disc, because the blocks may well not be sequential.

When ProDOS is writing to a file it always starts with the first free block it finds in the volume bit map, and fills up the free blocks in turn until writing is completed.

If a large file is written to disc after several small files have been deleted the file will be spread among all the "holes" in the bit map that the deletions have left behind.

ProDOS sets up one block for a sapling file called the index block which contains the addresses – block numbers – of all the blocks comprising the file.

This block becomes the key block referenced by the file entry in the directory, and all the data blocks are traced through their addresses in this index block. Thus the route taken to read in the blocks of a sapling file, for a file in a first level subdirectory, would follow the route shown in Figure III.

The format of the addresses, or block numbers, in the index file is non-standard. The first or low bytes of the addresses are stored in sequence in the first half of the block, and the high bytes are stored in the same sequence in the second half of the block.

A typical index block is shown below:

A minor feature to note is that ProDOS always starts off as if the file is a seedling file and allocates the first available block as a data block. If one block is insufficient it assigns the next available block as the index block, and then allocates further data blocks. Note that a seedling file occupies one block, but a sapling file occupies at least three blocks.

An index block can hold a maximum of 256 addresses (2 bytes per address), which fixes the maximum size of sapling file at 257 blocks, holding 256 × 512 = 131072 bytes or 128k of data.

The third level file is the tree file, which is implemented when a sapling file exceeds 256 blocks by introducing a second level of index block, the master index block. This latter becomes the key block of the file, and can contain addresses of up to 128 index blocks, which in turn contain the addresses of the actual data blocks.

Note again that, as with sapling files, the master index block is only allocated when it becomes necessary, and so it will come physically after the first index block and 256 data blocks.

The route taken to find the blocks of a tree file in the volume directory is shown in Figure IV.

The final point to note about file structures is that ProDOS only allocates a block to a file when data is written to that block. This is of significance to

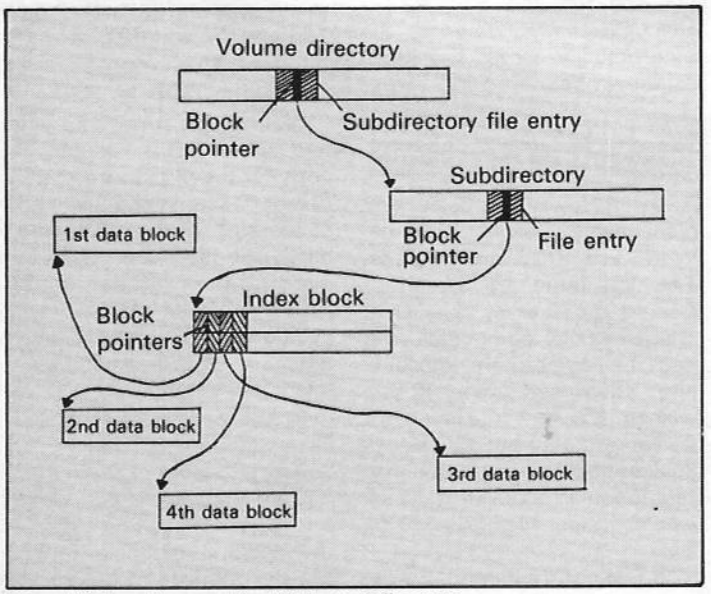

Figure III: Locating a sapling file in a subdirectory

00– E8 EA EB F4 F5 F6 F7 03
08– 04 05 06 00 00 00 00 00
.
.
.
100– 00 00 00 00 00 00 00 01
108– 01 01 01 00 00 00 00 00
.
.

Block $E9

the Basic programmer mainly in the case of random access textfiles.

If you open a random access file with a record length of 128, and then write a record to record number 20, it would go to the sixth data block of the file.

ProDOS would record the ENDFILE as 2688 (or a little less if the record was not filled), but only allocate the first block, the index block and the sixth block, that is three blocks in all.

The index block would have the form shown below, if it was the first file on the disc. Such files are referred to in the ProDOS Technical Reference Manual as sparse files.

● *Next month the Zap program will be printed and we'll look at ways of using it to examine and modify ProDOS discs.*

```
00–   07 00 00 00 00 09 00 00
08–   00 00 00 00 00 00 00 00
                .
                .
                .
100–  00 00 00 00 00 00 00 00
                .
                .
```

Block $08

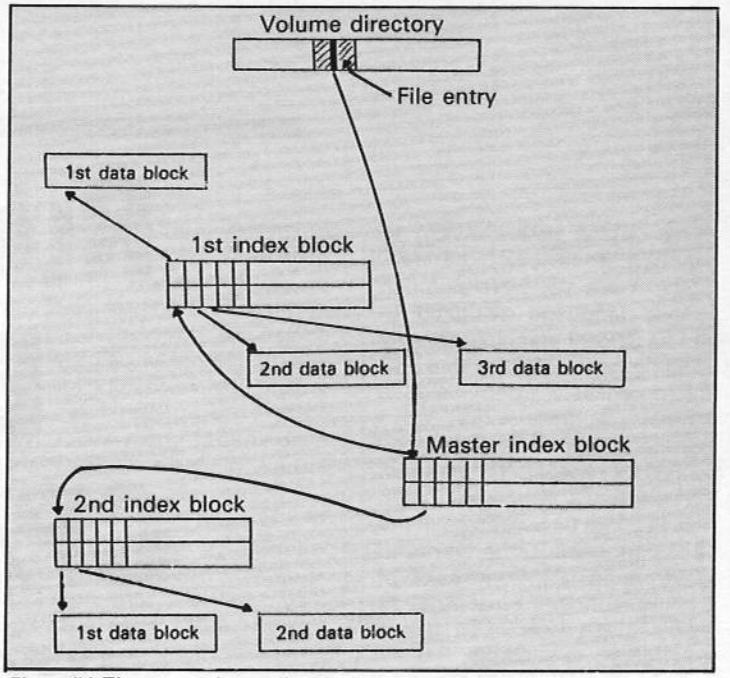

Figure IV: The route taken to find the blocks of a tree file

Running BBC Basic on CP/M Apples

MAX PARROTT reviews BBC Basic (Z80) Version 2.3 by M-Tecsoft

IT is difficult to know how to write a description of BBC Basic. Here we have a much lauded language designed to run on a 6502 machine, actually running under CP/M with a Z80 microprocessor fitted inside a 6502 machine. What do I compare with what?

Broadly speaking there must be two types of potential user. The first will be interested in the language because he wants to program in it for the sake of programming or he has an Apple and his children use a BBC Micro at school.

The second will be interested in it because he uses CP/M for "serious" things and he occasionally needs a language to mend a disc file or manipulate data.

The latter user will already have CP/M, the other may have it. If you do not have a Z80 card, acquiring CP/M can entail considerable expense. A card costs between £50 and £150 and the operating system with a card about £400. However many consider it worth having – recent reports say the greatest number of CP/M users on any one machine are using Apple IIs.

The vast majority of Apple people buy CP/M from Microsoft and hence have Microsoft Basic (MBasic) which is distributed with it. They also have a Microsoft Basic (GBasic) with graphics capabilities. It is also possible to buy other languages running under CP/M such as Fortran, C, and probably the most popular after Basic, Turbo Pascal.

Should I make the comparison between BBC Basic (Z80) and Applesoft Basic, or Microsoft Basic, or BBC Basic on a BBC Micro, or Turbo Pascal, or some other?

Some of you will be familiar with one or more of these languages but to others they will be unfamiliar, so what do I compare with what? I do not propose to give an exhaustive description of the merits or otherwise of each area of each language, just a hint of where each scores.

First let me declare my position. Contrary to the opinions expressed by 'experts' I think that Basic is a pleasant language to use.

It is easy to enter into the machine, easy to investigate the state of variables for debugging purposes, easy to test small pieces of code to later add to the main program, easy to interface with assembly language routines and peripherals, and on most machines it is easy to edit.

I am fully aware of its drawbacks, the worst of which is the ease with which a variable can be used twice for different purposes without realising it and two related problems, the rather short length of distinguishable variable names and the lack of structure.

Furthermore I like CP/M as an operating system – it is *not* difficult to use and it is *not* difficult to understand the messages as many would have you believe.

I was therefore looking forward to running BBC Basic (Z80) at the earliest moment. It came on a 56k v2.20 CP/M disc together with a host of other files. First I copied it to a 60k v2.23 CP/M disc and tried both discs on an Apple IIe fitted with an 80 column card. Both I then tried them on an Apple versions worked beautifully. II+ fitted with a Videx 80 column card and on a IIc fitted with a Cirtech CP/M Plus system. Again both worked perfectly.

However on an Apple II+ fitted with a Vision-80 card the cursor lagged behind where it ought to have been. Although it was easy enough to enter a program and run it like this, editing became a nightmare and certain keyboard functions would not work. I stopped using the language and spent some time investigating.

It soon became obvious that the fault lay not with the language implementation but with the interaction between CP/M and the Vision-80. I wanted to continue using the Apple II+/Vision-80 system with the BBC Basic so I was faced with patching CP/M or patching the language.

Fortunately this latter option is easy if you have some knowledge of Z80 code because the writers of the language have set aside the first 256 bytes of the code as a general interfacing area, and provide source listings for basic terminal handling code and for a more wide ranging interface – for example, using a real-time clock or a hardware counter.

One use of the latter is to interact with a keyboard function of BBC Basic which enables the keys to be tested for a keypress within a time limit set by the Basic programmer. Apple users without on-board clocks need not worry overmuch because the distributed language has a software timer in this interface code.

I managed to cobble together a patch which worked satisfactorily but I must stress that for the majority of potential users of the language this will be unnecessary because it will work perfectly as distributed.

On returning to examine BBC Basic Z80 I could not resist running test programs on both the Apple and a BBC Micro machine alongside each other.

I do not care for benchmark timings because real programs interact with software and hardware in many ways, and there are factors such as ease of use which can outweigh speed advantages. But this time my enthusiasm was fired and I started comparing Applesoft and MBasic timings as well.

A surprising result was that BBC Basic Z80 (ie on the Apple) did not gain speed by using integer variables as loop counters, and only gained a small

speed advantage by using integers in calculations. My approximate timings for this piece of code:

```
 5 PRINT CHR$(7)
10 FOR I = 1 TO 10000
20 NEXT
30 PRINT CHR$(7)
```

were;

	Real variable I	Integer variable I
BBC Basic (6502)	5	1.5
BBC Basic (Z80)	12	12
MBasic	16	8.5
Applesoft	11	—

and for this:

```
 5 PRINT CHR$(7)
10 FOR I = 1 TO 1000
15 J = I * 2
20 NEXT
30 PRINT CHR$(7)
```

were:

	Real variables I & J	Integer variables I & J
BBC Basic (6502)	28	10
BBC Basic (Z80)	57	54
MBasic	55	39
Applesoft	44	—

The reason for the slower integer handling in BBC Basic (Z80) is almost certainly that they are four bytes long as compared with two bytes length in MBasic. This means that integers can have values between ±2147483647 under BBC Basic Z80 and ±32767 with MBasic.

There did not seem to be much point in timing screen handling and disc I/O because the hardware was so different between the BBC Micro and the Apple with various 80 column cards and CP/M handles the input and output for BBC Basic Z80 and MBasic.

As I had the BBC Micro and the Apple alongside each other I decided to see how similar the two BBC Basics were. The most obvious difference is that the Z80 version has no graphics, whereas the 6502 version has glorious colour graphics in various screen resolutions.

MBasic, of course, has no graphics but it does have a sister language, GBasic, which has graphic capabilities roughly the same as Applesoft but with a lot less memory to play in. MBasic has approximately 26k available under CP/M v2.20 and 30k under v2.23. BBC Basic Z80 has approximately 36k under v2.20 and 40k under v2.23. GBasic has approximately 12k.

BBC Basic 6502 allows keywords to be entered in an abbreviated form and BBC Basic Z80 follows the same format which is very useful. The former can interact with the machine operating system by preceding an instruction with an asterisk. The latter has the same form (upper and lower-case accepted) but the actual instructions are different because it uses CP/M formats.

Both forms of BBC Basic, in common with Applesoft, do not allow keywords to be entered in lower-case, unlike MBasic. Variables in BBC Basic can have any length with upper and lower-case recognised as different.

Applesoft (in the old ROMs but not the latest for the IIe) can have any length, but only in upper-case and only the first two characters actually distinguish. MBasic can have any length with the first 40 characters significant, lower-case variables are changed to upper-case automatically.

Applesoft and MBasic both set numerical variables to zero when first invoked but BBC Basic prints an error message unless the variable is being assigned a value. This counteracts one of the criticisms of Basic. Applesoft and both BBC Basics are more accurate in their calculations than MBasic.

Care has to be excercised with MBasic which has double precision variables – suggesting more accuracy – but which carries out many intermediate calculations only in single precision.

BBC Basic has the REPEAT ... UNTIL structure, MBasic the WHILE ... WEND structure, Applesoft has neither. BBC Basic allows the use of procedures and functions with the possibility of variables local to the sub-program.

Parameters may be passed to these sub-programs and are re-entrant thus allowing recursive routines.

MBasic and Applesoft do not have these structures. All of the Basics support subroutines and ON ERROR GOTO and ON ERROR GOSUB structures.

Applesoft and MBasic both handle string variables in such a way that garbage collection can occur. This means that strings no longer being used by the program – for example the old version of a string if a string variable is reassigned – are left lying aroung in memory until there is no more available.

The system then does some housekeeping, clearing out the unwanted strings. This takes some time and is sometimes an annoyance.

Both BBC Basics take a different approach. If a string variable is reassigned two things can happen. If the new value is the same length or less – the old is overwritten. If it's longer the new value is written in another area of memory, and the old is left – the memory is never reclaimed.

This means that indiscriminate use of strings without paying attention to the maximum expected lengths can mean rapid loss of memory. On the other hand string handling is faster.

Output is poorest in Applesoft which has just about no inbuilt control. MBasic has the PRINT USING structure for formatting numbers and strings. For example:

```
PRINT USING "#.##";.779
```

will output 0.78.

BBC Basic uses an equally powerful pseudo integer variable to control number formats. This has four bytes, each of which controls an aspect of printing.

One feature of this is that control can be gained over the result of using the STR$ function to convert numerical variables to string variables. Integer values can be printed in hexadecimal by preceding them with a tilde ~.

Integer arithmetic – including division with remainder being calculated (MOD) – is supported by both MBasic and BBC Basic, but there is a big difference in the range supported. Both support bitwise logical manipulations (NOT, AND, OR, EOR), MBasic also supports IMP and EQV. Applesoft does not support bitwise operations.

BBC Basic Z80 has static integer variables which will not change their value when chaining between programs. These are the variables A% ... Z% and the format control variable @% already mentioned.

Some of these have another function. A%, B%, C%, D%, E%, H% and L% can be used to communicate with the corresponding registers of the Z80 microprocessor in CALL and USR routines, that is machine code routines.

These are easily implemented by the inbuit Z80 assembler which uses P% as the program counter and O% to set the origin. The assembler and disc operations are consistent with Basic II rather than Basic I. Code is easily embedded in the Basic text by means of the DIM statement.

Disc I/O is the area where Basics tend to differ the most. Applesoft takes a simplistic approach. A Ctrl-D signals to the disc operating system (DOS

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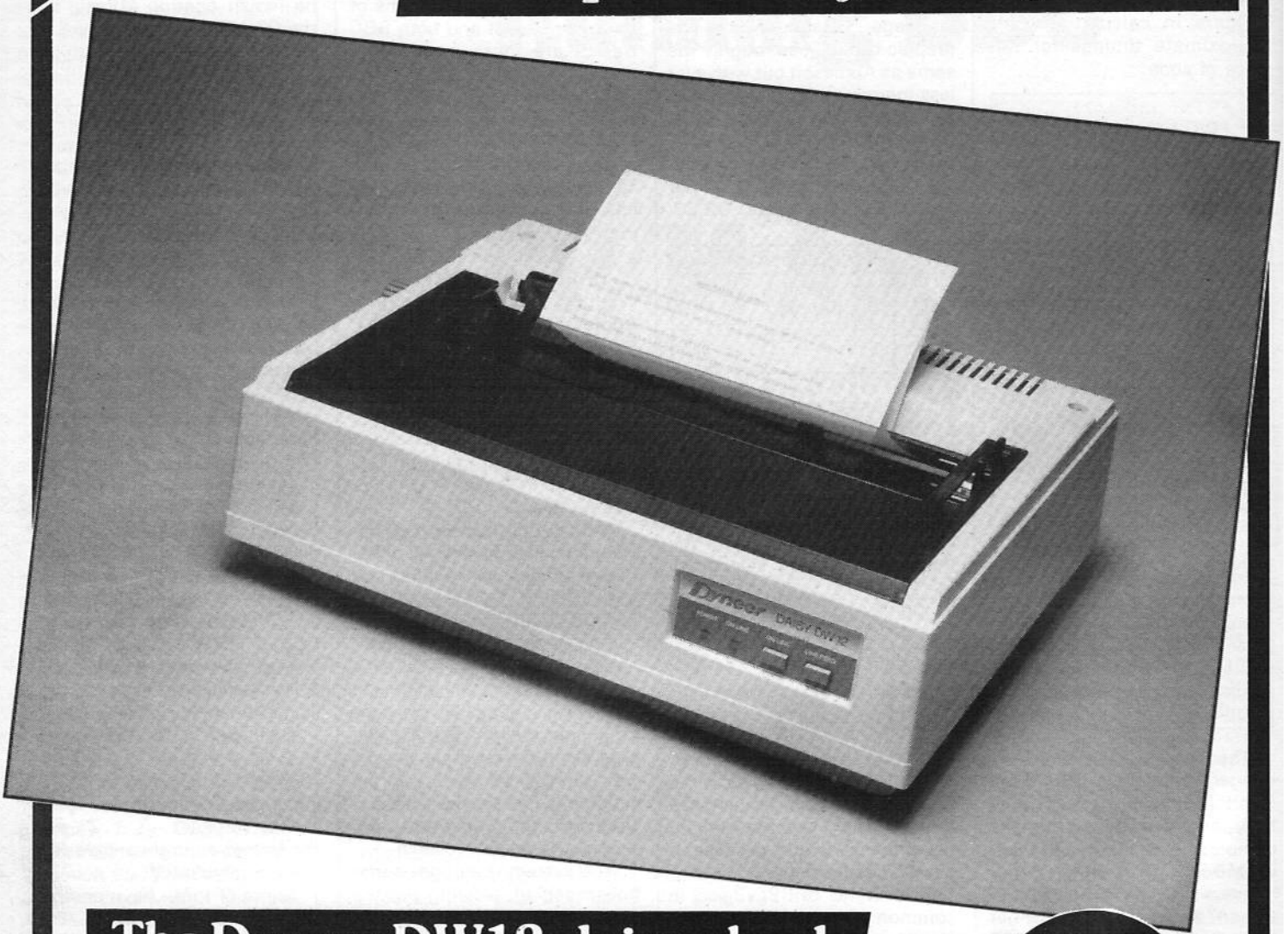

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3.3 or ProDOS) that disc I/O is expected rather than terminal I/O and the PRINT and INPUT deal with data in the internal storage form of the variable.

GET allows the input of one byte, but one byte output is not so easy. Sequential and random access files are signalled and controlled by the OPEN, WRITE and READ commands together with definitions of the record lengths where appropriate.

Files are lengthened with the APPEND command which is well known to give problems under DOS at least.

MBasic controls sequential files with an OPEN command which has two forms to signify writing or reading to a named file. Data is then written to disc with a PRINT#, PRINT#USING, or WRITE# command. The PRINT commands need care because delimiters between variables are not specifically written to disc.

Data input uses the statements INPUT#, and LINE INPUT#. Data is put on disc as Ascii characters, as if they were input or read at the keyboard. Sequential files cannot be simply lengthened, they must be copied to a new file with the new information and the old file deleted.

Random access files are more difficult to set up. They are opened for reading and writing with one command.

A field must be set up to control the records which follow and the data must be explicitly transferred between program variables and the file buffer by means of a set of statements and functions which make numbers into strings and vice-versa.

Finally the record is physically put on disc or read from it with a PUT or GET command.

BBC Basic Z80 is simpler and more flexible in its handling of files. The named file is opened for writing or reading by a statement which returns a channel number, then data can be put directly on disc as variables using PRINT# and read using INPUT#. Data can also be put and read one byte at a time using BPUT# and BGET#.

Associated with all file I/O is a pointer which advances automatically but which can be changed by the programmer. This allows the creation of easily accessed random files and the extension of serial files.

If data is to be transferred between different Basics, or between Basic and Turbo Pascal for example, by means of files, or files from, say, a word processor are to be investigated, care needs to be taken with the exact format of the data on disc with special attention to data separators and the storage format.

BBC Basic Z80 offers the more flexible approach. Variable names can be incorporated into disc commands by means of an OSCLI statement which contrasts with the more usual approach of using a string variable. Both CP/M Basics have a RESET command to get over CP/M's need to be informed of disc changes.

Both CP/M Basics offer more than Applesoft in terms of commands, statements and functions to manipulate strings, real arithmetic, interact with the keyboard and screen and so on.

Readers familiar with BBC Basic 6502 will know most of the commands for the Z80 version, but there are one or two extras. For example, direct I/O with Z80 ports is possible if the hardware exists.

BBC Basic Z80 programs can be renumbered by a direct command and merged with others using a program distributed on the disc. The other files which come on the disc are:

- CONVERT which converts program files between the normal, tokenised formats and an Ascii listing (suitable for word processors?).
- UNLIST will make a program file unlistable but still workable.
- HELP is a generally useful CP/M utility which offers help to the user – there is a condensed form of the manual on disc.

The disc has several examples of program code to illustrate various points and two working examples of assembly language routines to sort strings and real variable arrays.

The manual includes a full description of every statement with many examples, particularly of disc I/O. Unlike the manual supplied with the BBC machine it does not set out to be a tutor of BBC Basic as well.

Lastly, ease of programming and editing has to be considered together with any extensions and utilities available. For general input and editing BBC Basic Z80 scores well.

Unlike BBC Basic 6502 which has cursor moving keys and copying facilities, it uses a single line input with control character commands. The same commands edit a line or range of lines simply and effectively, unlike MBasic and Applesoft Basic editing which have been described as diabolical.

Because Microsoft and Applesoft Basic have been with us longer there are more utilities around. The most noted utility/extension for MBasic is the compiled version of the language known as CBasic. I think it unlikely that a compiled version of BBC Basic Z80 will appear.

Should you buy it? If you have CP/M and never use MBasic I doubt if BBC Basic Z80 will be of use. However, if you have CP/M and want a more flexible system without having to learn another language such as Pascal, or you want to get CP/M and one more language, then BBC Basic Z80 is a worthwhile considering.

It is pleasant and useful – I particularly like the idea of the inbuilt assembler – and it is flexible.

BBC Basic (Z80) Version 2.3 by M-Tecsoft. Available from Business Computer Centre, Unit 2, Paddock Mount, Dawley, Telford 0952 501754. Price: £95.

appletip

Pin down DDT

When using DDT, the CP/M dynamic debugging tool, it is automatically loaded into main memory in place of the console command processor and therefore conveniently resides below the Basic disc operating system.

The BDOS starting address, which is located in the address field of the jmp instruction at location 0005H, is altered to reflect the reduced transient program area – the area where your programs are run.

This is convenient for normal use, but if you want to look at the CCP or play with the BDOS it is very difficult if your debugger has relocated itself and changed parts of memory.

A way round this is to stop DDT from relocating to the area used by CCP, and you can do this as follows for version 2.2.

Load DDT as normal and then change the following address of DDT by the following method.

At the DDT prompt enter – **L0160** (to tell DDT you want to look from address 0160 onwards) and you will see at address 016C the instruction MOV A,M which we want to alter to MVI A,3D.

To do this enter **A016C** to tell DDT you are using the assembler mode and wish to alter address 016C, followed by a Return.

DDT will repeat 016C and you can now enter **MVI A,3D** followed by a Return, enter a full stop . followed by Return to tell DDT you have finished with the assembler and Ctrl-C to exit DDT.

Now enter **SAVE 20 A:BUG.COM** and you will now have a non-moving version of DDT which is called BUG.COM.

Peter F. Wilson

Software to simulate a simple teletype terminal

By STUART BELL

WE looked last month at the simple hardware needed to connect a Modem 2B to an Apple II or IIe. We now turn to the software required to simulate a simple teletype terminal.

The logic of the problem can be described thus: Whenever a character is typed on the keyboard send it to the modem without displaying it on the screen, and whenever a character is received from the modem display it on the screen. It is important that the program does not wait for either event, but continually loops checking for such occurrences. All this is shown in Figure I.

The hardest task is to check whether a character has been received from the modem. The precise way of doing this is very hardware-dependent.

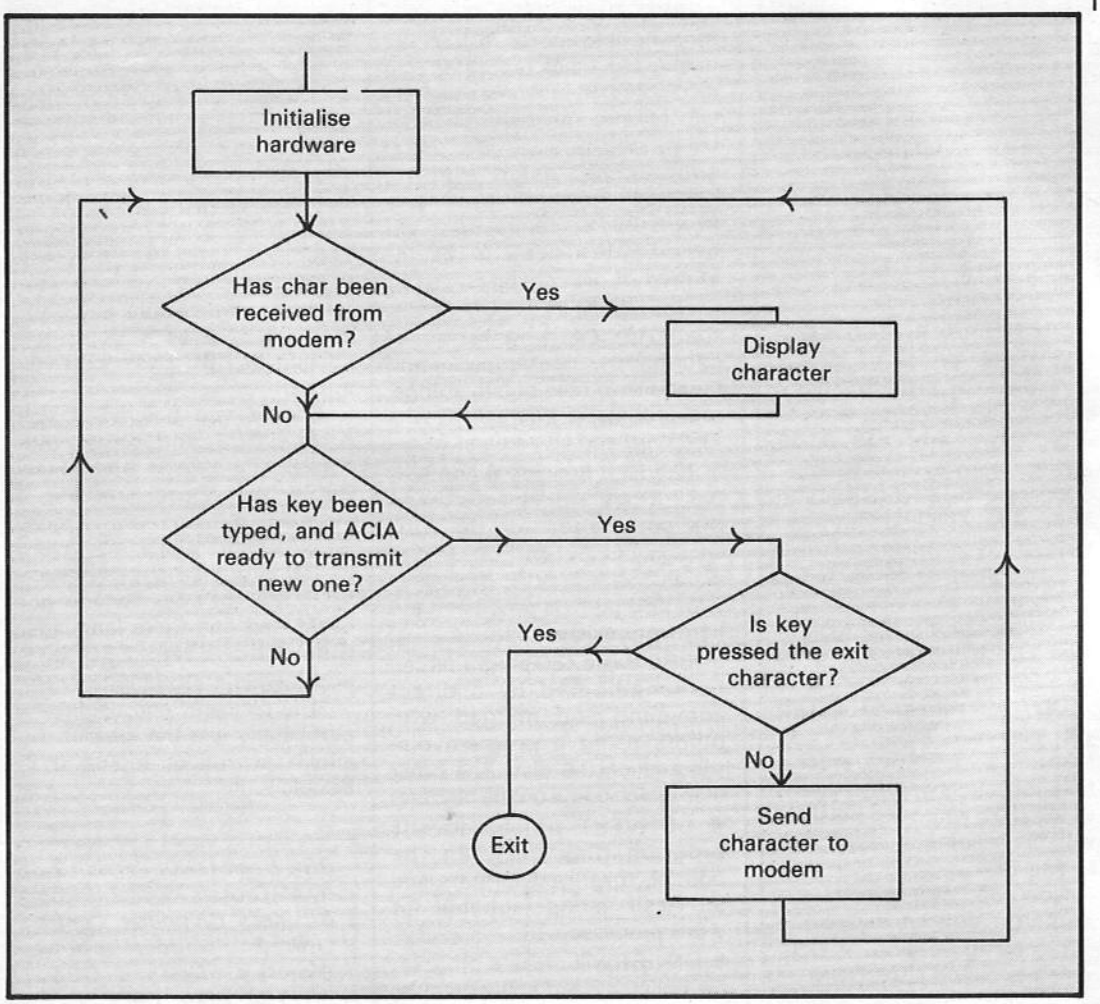


Figure I: Dumb terminal logic

However, users of Apple Pascal version 1.2 will find that it provides a function within Applestuff to check the status of any card in slot 2 that the Apple Pascal system recognises, irrespective of the actual card in use. See page 58 of the 1.2 Update Manual for the heart of a simple terminal program.

Users of Basic or Apple Pascal 1.1 will need to use a slightly less elegant approach and inspect the hardware status within their program. A full description of techniques of accessing the 6850 on the Apple Communications Card (and compatible cards) is given in the July 1982 issue of Apple Technical Notes, page 3300.008.01-03 – any good Apple dealer should have a copy.

Two listings are given here, for use under DOS and under Pascal. Use in the first case is very simple as, although the comms card has a very simple interface its ROM contains software for a 300 baud full duplex terminal emulator.

Listing II contains a longer, more complex Pascal program which produces a log of your on-line session on the file LOGFILE.

The session is stored in an array and then written to disc at the end of the session as writing to disc mid-session might cause some characters received from the modem to be lost during disc-writing.

Since the Apple Pascal system interprets some control

characters in a special way control characters to be sent to the modem are generated by typing Esc followed by the letter required. Remember to test your software by using the paper-clip technique.

I now use the Modem 2B, the Apple Communications Card and the software of Listing II to access bulletin boards across the country. It does not allow me to access Prestel (1200/75 baud) systems, nor those requiring complex terminal-emulation.

However my desire to access the USUS(UK) Bulletin Board has been satisfied at a cost of £80 – I commend the "trailing edge of technology" approach to all impecunious Apple users.

1: Type the line POKE 49241,0 but do not type Return.
2: Dial the required number and when the carrier is detected hit Return to assert DTR by means of the annunciator 0 signal, and hence connect the computer to the phone line.
3: Type IN#2 [RTN]CTRL-A CTRL-F to invoke the terminal software.
4: At the end of the session type CTRL-A CTRL-X to exit.
5: Type POKE 49240,0 [RTN] to disconnect the computer, and use the handset to check that the dialling tone is audible. This is essential if phone bills are not to be excessive.

Listing I: Use of the communications interface under DOS

```
program dumbterm;
(* for Apple Pascal 1.1 - use Remote Routines under 1.2 *)

uses applestuff;                        (* keypress & ttlout *)

const specchar =  27;                   (* ESCAPE  *)
      remstat = 49326.0;                (* status of 6850 *)

type  pa=packed array[0..1] of 0..255; (* copied from LINEFEED in Apple 3:*)
 twoface=record case boolean of
                  true:(int:integer);
                 false:(ptr:^pa);
                end;

var buf1,
    buf2:packed array[0..0] of 0..255;
      ch:char;
  logbuf:packed array[0..20000] of 0..255;
     log:file of char;
    p,b:integer;
  cheat:twoface;

function peek(addr:real):integer;       (* standard technique for peek *)
var addrint:integer;                    (* peek: don't worry if you    *)
                                        (* don't understand it!        *)
begin
  if addr <= 32767 then addrint:=trunc(addr)
                   else addrint:=trunc(addr-65536.0);
  cheat.int:=addrint;
  peek:=cheat.ptr^[0]
end;


function charrec:boolean;               (* checks if char received *)
var status:integer;

begin
  status:=peek(remstat);
  charrec:=((status mod 2) = 1)
end;


function charsent:boolean;              (* checks if char sent OK *)
var status:integer;

begin
  status:=peek(remstat) div 2;
  charsent:=((status mod 2) = 1)
end;


begin                                   (* main program *)
  p:=0;
  ttlout(0,false);                      (* clear DTR *)
  writeln('DUMB TERMINAL PROGRAM.');
  writeln;
  writeln('For control chars, enter <ESC>, letter');
  writeln('For <ESC>, enter <ESC> <ESC>.');
  writeln('To exit, enter <ESC> I ');
  writeln;
  writeln('When carrier received, hit <RTN>');
  read(ch);
  if ord(ch) = specchar then exit(program);
  ttlout(0,true);                       (* now raise DTR *)


  repeat
    if charrec then
    begin
      unitread(7,buf1[0],1,0,0);
      buf1[0]:=buf1[0] mod 128;         (* clear top bit *)
      unitwrite(1,buf1[0],1,0,12);
      logbuf[p]:=buf1[0];
      p:=p+1
    end;

    if keypress and charsent then
    begin
      unitread(2,buf1[0],1,0,0);
      (* make bs become del - only needed on some systems *)
      if buf1[0]=8 then buf1[0]:=127;
      if buf1[0] = specchar then
      begin
        unitread(2,buf2[0],1,0,0);      (* get char after <ESC> *)
        if buf2[0]= ord('1') then
        begin
          ttlout(0,false);              (* drop DTR *)
          writeln;
          writeln('NB replace receiver NOW!!');
          writeln;
          rewrite(log,'#LOGFILE.TEXT');
          for b:=0 to p do
            write(log,chr(logbuf[b])); (* lethargic, but it works! *)
          writeln(log);
          close(log,lock);
          exit(program)
        end;
        if buf2[0] > 96 then buf1[0]:=buf2[0]-96 (* make control code *)
                        else if buf2[0] > 64 then buf1[0]:=buf2[0]-65
      end;
      unitwrite(0,buf1[0],1,0,12)       (* send control code *)
    end
  until false                           (* ie never stop - exit used to quit *)
end.
```

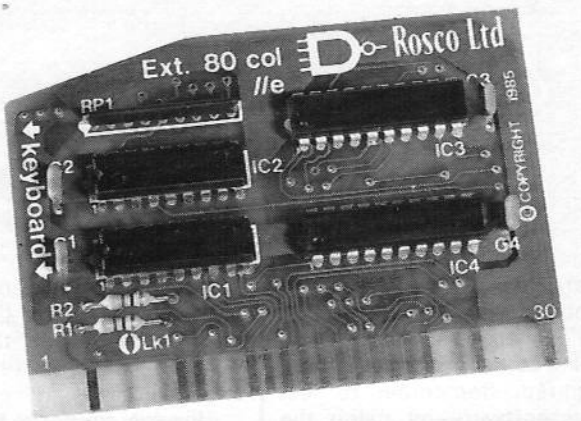
Listing II: Pascal program to use the communications interface

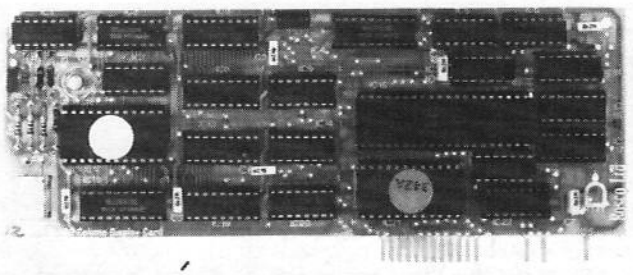
HIGH QUALITY . . .

RESOLUTION 64

The RESOLUTION 64 is the latest release from ROSCO, giving an 80 column screen and full 64K memory expansion. It doubles the resolution of the hi-res page and is compatible with DOS, ProDOS, CP/M and PASCAL. The RESOLUTION 64 is a direct replacement for the Apple Extended 80 Column Card at a quarter of the price. A standard RESOLUTION card is also available with 1K of static RAM. For use on the Apple IIe only.

RESOLUTION .. ROS 104 ..... **£28**
RESOLUTION 64 .. ROS 103 ..... **£55**





80 COLUMN II

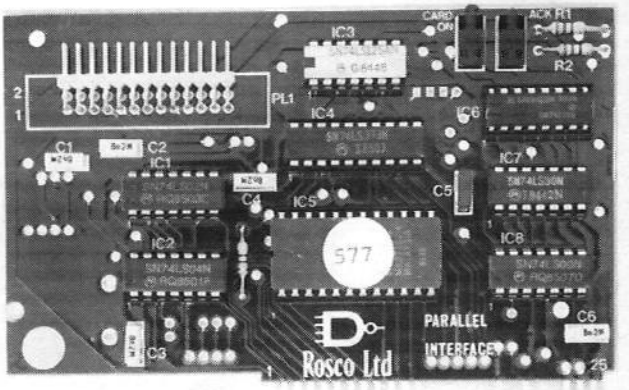
For the user with the older Apple II, II+ or EUROPLUS models, the 80 COLUMN II card is essential for many applications. The card gives a full 80 column display with upper and lower case characters (from a standard keyboard!) and many text editing features. The on-board firmware gives all standard characters as well as special graphic symbols in normal or inverse display. The card is supplied with the appropriate monitor lead and optional video-changeover slot switches are available.

80 COLUMN II ..... ROS 105 ..... **£54**
SLOT 40/80 SWITCH ROS 101 ..... **£12**

PARAGRAPH

The PARAGRAPH is the tried and trusted printer interface from ROSCO. It conforms to the Centronics parallel standard giving compatibility with the majority of printers. The on-board firmware gives many text and graphic printing features such as INVERSE, ROTATE, BOLD IMAGE, ENLARGE, etc. The PARAGRAPH is compatible with DOS, ProDOS, CP/M and PASCAL and is supplied with a printer lead and full manual. Buffered versions are also available with 16 or 64K of RAM.

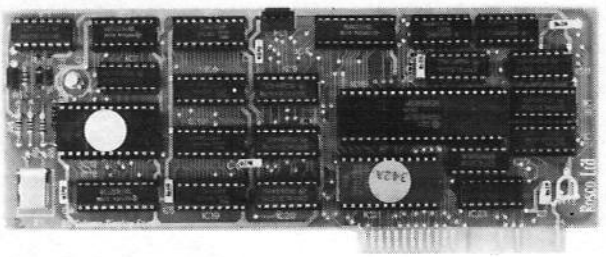
PARAGRAPH .... ROS 107 ..... **£44**
PARAGRAPH 16 .. ROS 110 ..... **£90**
PARAGRAPH 64 .. ROS 111 ..... **£120**



SER-COM

The SER-COM is a serial communications and printer card which conforms to the RS 232C standard but which gives extra functions such as switchable on-board firmware for custom applications. LED input/output indicators and minimum mode operation for three wire communication. The SER-COM supports all common baud rates between 50 and 19,200 and is supplied with the appropriate connector lead.

SER-COM ..... ROS 106 ..... **£48**



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64K to 1 Mega-byte of RAM for II, II+, europlus, IIe and III. DOS, SOS, ProDOS, CP/M and PASCAL compatible. Disk emulation, Visicalc expansion, increase desktop memory of AppleWorks to 735K. From **£179**

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64K upto 2.5 mega-byte plus 80 column. DOS, ProDOS and PASCAL compatible. Can increase AppleWorks desktop memory to 1837K. From **£189**

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EPROM writer up to 27128's	**£75**
EPROM writer up to 27256's	**£99**

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I/O Card (4 ports + 2 timers)	**£59**

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Apple IIe	**£469**

IIc

Apple IIc + carry case	**£475**
Mouse IIc + software	**£49**
Monitor + stand	**£79**

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Brother HR-35	**£695**
Facit 4509	**£299**

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AppleWorks	**£149**
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Systematics Business Software	**POA**
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Access

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apple user SPECIAL OFFER

It's the most outstanding chess program ever written for the Apple II!

SAVE £5
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Why it's tops – for power, speed, size and flexibility:

Power: In a series of 16 game matches, Colossus Chess 4 has defeated 24 other chess programs – the results varying from 10-6 to 16-0 in Colossus' favour.

Speed: The average number of moves examined per second is 300 with the program working from 2 to 17 ply ahead.

Size: There is 22k of machine code program driving Colossus 4, with 5k of data and a "book" of over 3,000 opening moves on the disk.

Flexibility: Besides having an infinite number of levels, to suit both the beginner and the expert, Colossus 4 is far more flexible than any credit card! The program can play one or both sides of a game, swopping at any point in the game. It can display the board in two or three dimensions or even invisibly – if you so desire. It will give you a hint at anytime – just ask. You can even backtrack to correct your mistakes. Two full feature chess clocks are available with tournament and five other modes. So many features that it takes the programs author, Martin Bryant, 28 densely packed pages to explain them all.

Order form on Page 61

What it offers the Apple user . . .

Electronic mail is much cheaper than the post

Sending mailbox messages to other subscribers, whose numbers are rapidly growing, is the cheapest form of communication possible. You can send a message of any length to another mailbox for less than the cost of a first-class stamp. And it doesn't cost a penny more to send the same message to 500 different mailboxes! Even a message sent to a mailbox on the other side of the world only costs 30p.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe.

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are . . . home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

We're only a local phone call away

The majority of MicroLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for direct access via MicroLink to all the other countries belonging to the international Dialcom system.

Telemessages – at a third off

The modern equivalent of the telegram is the telemessage. Send it before 10pm and delivery is guaranteed by first post the following day (except Sunday). The service was intended for people phoning their message to the operator, which costs £3.50 for 50 words. But you can now use it via MicroLink, for only £1.25 for up to 350 words! For an extra 65p your message can be delivered in an attractive greetings card.

Go teleshopping on your micro

With MicroLink you can study the British Rail timetable – and then buy your ticket in advance. You can book theatre tickets. And even order a bouquet of flowers. It's all part of the tele-shopping revolution!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1¼ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 11p a minute during office hours. There is an additional 2.5p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, telemessages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 11p per minute or part – standard rate.
Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.
Applicable for storage of information, such as telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.
Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2.5p per minute or part (300 baud); 3p per minute or part (1200/75 baud).
Only applies to users outside the 01-London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 18p per 100 (N. America); £1.25 per 400 (Rest of world); £2.75 per 400 (Ships at sea).
Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.
It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.
Telemessages can be sent with an illustrated greetings card for 65p extra.

Radiopaging: No charge.
If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.
These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

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Signature _____ Date _____

C. Please invoice the company/authority.

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Plus-Works... or how to use AppleWorks without a IIe or IIc

GEOFF WOOD reviews a product that widens the AppleWorks audience

APPLEWORKS is one of the best programs ever invented. It offers three integrated programs – word processor, database and spreadsheet – for less than the price of three separate programs.

It can hold up to 12 files in RAM and easily switch between them. Data can be transferred easily from one file to another. Above all, AppleWorks is almost foolproof. It is a superb program both for beginners and experienced users.

But AppleWorks has limitations. It will not run on an Apple II or II+ or similar machines because it makes use of the Open Apple key found only on the Apple IIe and IIc. Moreover, in a 64k Apple IIe it offers only 10k of RAM for the 'Desktop' files.

In an Apple IIc or a 128k Apple IIe it offers 55k of RAM for files, enough for some people but not for others. Earlier versions of AppleWorks do not recognise extra RAM beyond 128k. Version 1.3 recognises Apple Memory Expansion cards but not necessarily other makes of ramcard.

But now Plus-Works helps to overcome all these problems. It is a program that adapts AppleWorks so that it will run on almost any Apple II or clone provided that the machine has at least 64k of RAM and an 80 column card. And the more RAM you have, the bigger the files you can create.

Plus-Works XM can also adapt AppleWorks so that it will use extra memory in an Apple IIe. This could be handy if you have an 80 column card which is not an extended 80 column card. Of course, you could buy an extended 80 column card, but a better solution may be to buy Plus-Works XM and almost any make of large ramcard. Then you can build much larger files with AppleWorks.

Moreover, in any model of Apple II if you have 256k or more of RAM, the Plus-Works XM adaptation of AppleWorks can hold most of the program in RAM. This gives faster operation, especially when switching from the word processor to the database or spreadsheet or vice versa.

The Plus-Works program is easy to install. You simply boot up the disc and follow the instructions which appear on the screen. However, it is a good idea to read the 10 page manual first so that you know what to expect.

First you are asked to remove the Plus-Works disc and insert a copy of the AppleWorks startup disc. After pressing Return you are asked to replace the Plus-Works disc and press Return again.

You then choose from a menu of 80 column cards – Videoterm, Ultraterm, Franklin, Viewmax 80, Viewmaster 80, Smarterm 80, Magnum 80, Wizard 80 and Apple IIe. If your card is not one of these it may still work with one of these selections.

When you have made your selection the appropriate display driver is loaded and the 80 column screen is activated. You may then need to switch manually to your 80 column display. You are then asked to re-insert the copy of the AppleWorks startup disc.

Depending on your machine, you may then be asked to specify the keyboard type (some Apple II clones have a full Ascii upper and lower case keyboard). You will be asked whether you want a printer patch which sets the 8th bit of each character – this is needed for some interfaces for proper formatting.

Finally you are asked to specify which slot holds your ramcard. Although slot 0 is acceptable, the 16k needed by ProDOS is not available to AppleWorks. If 256k or more of RAM is found you will be asked to decide on the permanent ram disc option. If you intend to run AppleWorks on a hard disc, answer No.

When configuration is complete press any key to boot the disc, then insert the AppleWorks program disc in the normal way. From then on boot up with the modified AppleWorks startup disc. If you wish to change the configuration repeat Plus-Works installation with a new copy of the AppleWorks startup disc.

Using the modified AppleWorks on an Apple II+ involves some special key combinations to replace the four cursor keys and the Open Apple key found on the Apple IIe and IIc.

The cursor keys are emulated by holding down the Control key and pressing either E, S, D or X to give up, left, right and down respectively. However, the two arrow keys on the Apple II can still be used for left and right cursor movement.

On an Apple II or II+ the Esc key acts as a lead-in key for the Open Apple key functions. You press the Esc key once and an inverse + appears at the cursor position. You can then press the appropriate letter or number for an Open Apple code – A for Arrange, F for Find, P for Print, and so on. To generate a real Esc, press the Esc key twice.

Alternatively, since the Open Apple key is the equivalent of pressing a game paddle button, you can use a game paddle or joystick instead of the Esc key. Just hold down the button and then press the appropriate letter or number.

To generate the Open Apple cursor movements – page up, word left, word right, page down – you do not use the Esc key but instead hold down both the Control key and the Shift key before pressing E, S, D or X.

The Delete key is emulated by holding down the Shift key and pressing the left arrow key. Capitals lock is emulated by holding down the Control key and pressing the A key. This action toggles the capitals lock on or off.

The extra characters found on an Apple IIe or IIc keyboard can be generated by first pressing the Esc key, then pressing another key. For example, Esc followed by > gives], Esc followed by) gives }, Esc followed by / gives \.

Full Ascii keyboards on some Apple clones offer different key combinations to generate the cursor movements and Open

Apple key functions, but these are all documented in the Plus-Works manual.

Plus-Works is a boon to frustrated Apple II owners who could not otherwise use AppleWorks. Of course, it is easier to use AppleWorks on an Apple IIe or IIc because the cursor movements and Open Apple functions are easier than using the Control and Esc key emulations on an Apple II+ or similar machine.

But Plus-Works XM is not just for owners of Apple II and II+ and clones. It can also benefit Apple IIe owners who want more RAM with their AppleWorks. Perhaps its most useful feature is the ability to mount the AppleWorks program in a RAM disc on any machine with more than 256k. The speed of operation has to be seen to be believed. You get instant switching between word processor, database and spreadsheet, no more waiting for disc access.

Plus-Works XM can also benefit Apple IIe owners who want more RAM with their AppleWorks

There is also an XMP version for owners of ACE 80 column extended cards. Ramcards recognised by the XM and XMP versions include Titurn/Saturn, Legend, Abacus, Prometheus and their equivalent. It recognised a Vergecourt Ramex 128 in my Apple II+.

Another way of enlarging or speeding up AppleWorks is Ramworks (reviewed in *Apple User*, October 1985), an extended 80 column card available in sizes from 128k to 2.5 megabytes. However Ramworks is no use to Apple II or II+ owners. And if you already have an Apple IIe with extended 80 column card it may be cheaper to buy Plus-Works and a ramcard than the equivalent Ramworks.

Another AppleWorks adaptation is offered in the USA by Southern California Research Group, P.O. Box 593-L, Moorpark, CA 93020 for $269 plus carriage.

You send them your copy of AppleWorks configured to suit your equipment. They copy your version on to a chip on a card which fits into any slot of your Apple IIe. AppleWorks is then available within two seconds of switching on your machine.

The chips are re-programmable so updates are said to be no problem. I have no personal aquaintance with this adaptation so I cannot comment on its performance, but the use of ROM-based software seems to be increasing in the States. It will be interesting to see if the trend catches on over here.

Product: Plus-Works XM
Price: £49.95
Distributor: MGA Micro-Systems, 140 High Street, Tenterden, Kent TN30 6HT. Tel: 05806 4278

apple classifieds

THINK TANK by Living Videotext for Apple IIe, £80 ono. Tel: 01-937 1184.

APPLE II, 64k language card, CP/M card, 80 column, monitor, variety of games and utilities including Wordstar, Pascal, GRForth, Pinball, Appleworks and more!! A snip at £550. Tel: Mike 0383 416688.

TITAN ACCELERATOR II, £200. Microsoft Z80 card with CP/M, utilities, MBasic, £175. CIS-Cobol with Forms II, £200. All items ono. Phone 021-358 7572 between 7.30 and 10.30.

APPLE EUROPLUS 80 col 64k. Two drives, display printer, software, £500. Alton 82739.

APPLE II+ PASCAL: Source programs with documentation including personal accounting names and addresses etc. using tree structures and other search and sort techniques. Source library unit for full graphics etc. on Epson printer. Also build your own powerful text formatter and word processor around UCSD editor. SAE for full details, 6 Worthing Road, East Preston, West Sussex BN16 1AZ.

SURPLUS APPLE IIe 80 column card, £30. Tel: Jon 031-667 4833.

APPLE II+ Koala Touch Tablet and software, £33. Visifile, £35. Visicalc, £30. Zork I, £18. Zork III, £18. Ulysses & the Golden Fleece, £13. Flight Simulator II, £27. Hitch Hikers Guide to the Galaxy, £32, plus many more titles. For details call 038081 3529.

APPLE II+ 64k. Twin Apple drives, monitor, 80 column Z80 cards, software, £550 ono. Chester 382292.

APPLE III 1 x 128k, Profile and 1 x 256k Plus Profile for sale. Second disc drive also available. Visicalc, Applewriter, PFS Report and File. Offers please. Tel: Epsom (03727) 25664.

APPLE IIe 128k. Disc drive, monitor, 80 column, HR35 daisywheel printer, Applewriter, Format 80 software, plus extras, £1,300 ono. Phone (0783) 655639.

GAMES: Karateka, Skyfox, Lode Runner, Summer Games, Flight Simulator II, Pinball. All £12-£20. Many more. Phone for list. Mouse IIe new only £70. Tel: 01-367 6621.

PRINTER, Centronics 737, 100cps, various print modes including graphics, three spare ribbons, £85 including carriage. Tel: 0204 (Bolton) 41459.

APPLE IIe, four disc drives, monitor, Epson MX100, Ultraterm 80 col card, two Z80 cards, Asynch comms card, lots of software, £1,250. Tel: 021-421 5372.

WANTED RGB CARD II+, will swop for D/drive I/face card. Tel: Alan (091) 4786500 (evenings).

ORIGINAL SOFTWARE for the Apple IIe-2c. Supercalc3a, £100. MouseWrite Wordprocessor in a "Mac" type environment fully Mouse Driven, £75. Pinpoint, adds 9 transparent accessories to AppleWorks or ProDOS Basic including Calculator, Communications, Graphmerge, NotePad, Appointment Diary etc., £50. UniDos, Install 800k of DOS 3.3 on the unidrive, £40. Ultima III, £35. Ultima 4, £40. AppleWorks printer utility for printing AppleWorks spreadsheets sideways, works with most dot matrix printers, £20. Tel: Blackpool (0253) 56361.

APPLE II+ accessories. Microsoft Z80 Softcard, £35. Smarterm 80 column card, £39. Mountain Clock card, £45. Task compiler, £45. DBase II, £85. For the lot £225. Tel: 06723 337.

HALF HEIGHT disc drives (two), £60 each. Apple drive 18 months old, £125. Some misc. cards o.n.o. or exchange. Dave 061-747 8383.

APPLE PARALLEL CARD, £20. Communication Card, £20. IEEE-488, £120. IEEE cable, £35. ROM card, £20. Paddles, £15. U-Talk card, £25. ITT2020 case, £20. Tel: 02407 3557 evenings.

WANTED Apple IIe, hardware, drives and software. Tel: 0865 724802.

APPLE II+, twin drives, Z80, 80 col, 16k cards, fan, paddles, monitor, manuals, software, cover, £550. Stamford 0780 57114.

CHEAP SOFTWARE. PFS File, £25. Report, £25. Wizardry, £10. Typing Tutor, £5. Sargon, £10. Flight Simulator, £15. Homeword, £15. Applepanic, £5. Falcons, £5. Threshold, £5. Genuine sale. Tel: 0634 (Medway). 575626 Daytime, Chris Andrews.

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POST TO: Apple Classifieds, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

In search of a Pascal programmed mouse

AS a IIc user, I have a couple of questions I'd like to see answered through your pages.

Firstly, can you tell me how to program the mouse in Pascal 1.1?

Secondly, I've been getting strange crashes in AppleWorks, often when I use the page checking function Apple-K.

Sometimes it freezes, other times it will affect the filing system, getting errors saving or reading files or directories. On reboot all works but unsaved files are naturally lost.

Is there any way to save files in memory either from within the frozen AppleWorks or when (hitting Ctrl-Reset without an Apple key) the screen changes to garbage and the star prompt shows I'm in the monitor?

One other request – more on Logo, especially the list processing capability, please. – **Adam Gilinsky, Edinburgh.**

● We'd love to see your questions answered through our pages too – can any of our readers help? We've certainly not encountered such problems with AppleWorks.

Interface manual

RECENTLY I bought a second hand interface card, however without a description or a manual. The card works as an extended 80 column text card and has RGB function.

The manufacturer is Dynamic Office Systems, and the card is called Ultimate Graphics RGB Interface.

Could you please give me the address of Dynamic Office Systems (I assume it is a British company), so that I can contact them in order to obtain a manual. – **J. Soeters, Papendrecht.**

● We cannot find details of any such company – can any reader help?

Embedded codes

I WAS delighted to find that the "fixed" version of Applewriter 1.1, which you recently offered as an adjunct to the lower case chip for the Apple II+, works just as well with my new IIe, giving a perfect upper and lower case display with no garbage.

I find simple, inexpensive Applewriter 1.1 a joy to work with but am frustrated by the inability to embed printer control codes in the text.

Thus I cannot, for example, underline words or use italics, compressed or expanded type and so forth.

Can anyone come up with a simple patch to enable this to be done? – **Charles Janneaud, Teddington.**

● Has anyone done it?

Bombed version

I HAVE tried recently to get my version of Wordstar to print subscript and superscript on my Epson RX80 printer.

I have followed Max Parrott's instructions in the Appletip concerning PSINIT and PSFINI. However I seem to encounter problems with the corrected version – the whole program bombed.

Perhaps I am doing something wrong during the last stage of saving the corrected version. I have used the command:

SAVE 67 B:NWS.COM

to save the corrected version on drive B: and later transferring and renaming the file to "WS" on the full version.

The whole screen messed up after booting WS. I am in urgent need of having this function corrected as I have an engineering thesis to write up which will involve the use of subscript and superscript extensively.

I hope that you can advise me step by step so that I can have this irritating problem solved once and for all.

Another problem I have is that I can't get my AppleWorks to print out. I have consulted the manual, changed the printer options but nothing seems to work.

I have an Epson APL B parallel interface card. It worked all right on the Silentype but it doesn't seem to respond to the print command. I wonder if you know what's wrong. – **Edmund Long, Glasgow.**

● You say the screen messed up on booting Wordstar. This suggests that your version has a screen driver installed (presumably for an 80 column card) which is not being saved. Have you calculated correctly the length of the program?

Also did you carefully check that the addresses of ROLUP, PSINIT and so on were correct? I assume you used DDT for patching purposes.

Appleworks will not recognise an Epson printer card as a printer interface card because it does not carry the correct identification codes. It is possible to patch AppleWorks to bypass the checking but alternatively a more modern card, which is recognised by Pascal and CP/M (yours must be patched), could be used.

Max Parrott

Hung discs

IN the article on ProDOS in the November 1985 Apple User *it is stated the discs run on Apple II+ with language card and CP/M. They do not!*

I have an 80 column Videx card and am told it is the culprit. The system utilities disc of the three ProDOS discs gives a message asking for an 80 column card.

The other discs just hang – which I thought was due to lack of memory. Can you enlighten me? – **A.G. Heaney, Sutton Coldfield.**

● We were a bit surprised by your letter so we put a Videx 80 column card in a II+ with language card and it worked fine with ProDOS.

One thing to remember is that ProDOS, unlike CP/M which we see you also use, does not automatically switch in the 80 column card. Hence when you say the system hangs, are you sure you're not looking at the 80 column screen while ProDOS is writing to the 40 column screen?

Try typing PR#3 (Return) to turn the 80 column card on when the system appears to have hung.

Also try removing the Videx card to see if it is the culprit. ProDOS itself should work fine in 40 columns unless your disc has been modified in some way.

Irish contact

WOULD there be any chance of a mention sometime that there is an Irish Apple Users' Group and anyone interested should contact me: Stephen Kearon, 22 Westminster Lawns, Leopardstown Road, Foxrock, Dublin 18. Tel: Dublin 885634 between 4.30 and 8pm or Gold 72:MAG20176. – **Stephen Kearon, Sysop, Irish Apple Users' Group.**

Paper problems

WHEN I bought the Apple IIc a utilities disc version 1.0.1 was included. However although one of the menus says it can transfer files from DOS 3.3 to ProDOS, this doesn't work when you have only one disc drive. With two disc drives it seems to be OK.

Have you ever heard of this and is there a newer version of this utilities disc?

Another problem concerns my Imagewriter printer. I have used either 11 or 12 inch paper and I never encountered a problem.

Last week I bought a box of plain paper from W.H. Smith and this appeared to be 11.7 inch, don't ask me why they've done that.

Initially I didn't see a reason to take it back since AppleWorks has many printer

options to change the length of paper (PL in the printer options).

However for word processor files and table style database reports the printer options don't seem to work at all.

The Imagewriter itself can be set at either 11 or 12 inch, at six lines per inch, and it doesn't accept AppleWorks 11.7 inch or any other length than its own standard setting.

Any idea what goes wrong here and what to do about it, apart from not buying paper from W.H. Smith? My AppleWorks version is 1.1.

Thanks for helping me with this and keep up the good work with Apple User. – **Ben Marselis, Woking.**

● You can convert files from DOS 3.3 to /RAM and then use the Filer to transfer from /RAM to your disc.

Sorry but we don't know the answers to your paper problems.

Interface mod

IS the Silentype printer interface a standard RS232 interface and is it compatible with other printers? If not, is it possible to modify it?

Your January 1986 issue had an article on programming concerning Heapsort. This article compared the sort time of 5 min 50 secs in Heapsort with a time of 3 mins 20 secs in Quicksort.

I use a machine code version of Quicksort which will sort and index 1,000 random integers in about 2.5 seconds – fast enough not to notice the sort time. – **T.L. Knight, Pentraeth.**

● Unless we're very much mistaken, the Silentype is a parallel interface. It may be possible to use it in conjunction with a parallel-to-serial converter, but we have no experience of doing this.

PlusWorks innocent

IN answer to K.J. Ashton's AppleWorks snags on II+ letter in Feedback of March 1986 we have the following observations:

The problems with the Epson 8132 card are directly related to the AppleWorks software, not Plusworks. Mr Ashton would find the same printer problems with the card and Appleworks on an Apple IIe. It is not reasonable to blame the Plusworks software.

Problems with obtaining @ and ^ are only a result of not following the instructions properly. There are now over 4,000 users of AppleWorks on the II+ using Plusworks and they did not have to buy an Enhancer!

The only hardware required to run AppleWorks on the II+, beyond the obvious 16k RAM card and 80 column card with inverse, is a simple game port shift key modification which consists of one carefully soldered 0.5mm single wire or a £4.95 + VAT non-solder kit from MGA Microsystems.

So the total cost would be £54.90 + VAT, and not the misleading £206.95 as Mr Ashton suggests. – **Jonathan M. Gurr, MGA Microsystems.**

Toolkit tip

LETTERS about the Toolkit's HRCG seem to occur fairly regularly, so may I pass on a small tip, picked up from a Beagle Bros Tip Book?

Most people ask how to use DOS when the HRCG is installed and running, since the HRCG uses control-D (Ascii 4) for its own purposes.

Well the answer is to POKE 43698, 192 and use the @ instead of Ctrl-D, for example PRINT "@CATALOG".

At the end of the program POKE 43698, 132 to normalise. Instead of 192, the high byte value of any character may be used, including control codes unassigned by the HRCG.

Example program:

```
10 REM Set up HRCG first
20 POKE 43698,192
30 PRINT "@CATALOG"
40 POKE 43698,132
50 PRINT CHR$(4)"CATALOG"
```

Hope this helps somebody. – **Mike Farmer, Fishponds, Bristol.**

Dummy labels in & DOS File listings

I WRITE in respect of the excellent series of articles by Peter Harris, &DOSFile, and would like to draw your attention to the fact that some confusion may occur with regard to the assembler listings printed in the magazines, particularly to inexperienced assembly language programmers especially those like myself that rely on copy-typing these programs.

At the end of the first article (October 1985) the program lists a series of dummy labels – lines 428 to 439 inclusive – required in order to obtain a successful assembly.

Having typed in the program listing it was duly assembled and the magical "Successful Assembly: No Errors" message was obtained after correction of the inevitable typing errors.

However after adding the second part of the program listing (November 1985) it was not possible to obtain a successful assembly.

Successful assembly was only obtained after adding the following dummy labels to the program in a manner similar to part 1:

```
9366:                 593  * DUMMY LABELS
9366: 4C C9 DE        594  EXPAND     JMP   SNERR
9369: 4C C9 DE        595  JOIN       JMP   SNERR
936C: 4C C9 DE        596  COMPRES    JMP   SNERR
936F: 4C C9 DE        597  MEMFILE    JMP   SNERR
9372: 4C C9 DE        598  QUICKREAD  JMP   SNERR
9375: 4C C9 DE        599  SPLIT      JMP   SNERR
9378: 4C C9 DE        600  XCHECK     JMP   SNERR
937B: 4C C9 DE        601  JCOMP      JMP   SNERR
937E: 4C C9 DE        602  ZERO       JMP   SNERR
```

Similarly to obtain a successful assembly upon addition of the listing in the third article (January 1986) the following dummy labels seem to be required as those lines shown above are replaced by other code:

```
95FC:                 1039  *
95FC:                 1040  * DUMMY LABELS  *
95FC: 4C C9 DE        1041  MEMFILE    JMP   SNERR
95FF: 4C C9 DE        1042  QUICKREAD  JMP   SNERR
```

Could it be that the above lines were accidentally missed from your listings when the complete program was divided to provide the series of articles? – especially as each of the listings has at its foot "Successful Assembly: No Errors".

If so perhaps you should draw this to the attention of other readers who might also be struggling to obtain "Successful Assembly" messages.

If not, I would be interested to know why my program would not assemble without the addition of these lines (complete assembler listings available if required).

It might also be a useful tip to remind other readers that it is often quicker and easier to use a word processor such as Applewriter II for the editing of long assembly language programs such as &DOSFile, particularly for the correction of typing errors as the editing facilities in word processors are far greater than those such as found in the Apple II 6502 Assembler/DOS Toolkit.

I look forward to receiving the next article in the series and hopefully the final replacement of the dummy Labels! – **Alan G. Hurst, Exeter.**

● Peter Harris replies: I am glad that Mr Hurst has enjoyed the &DOSFile series. He is entirely correct in his comments, and I apologise for not having made the point more clearly myself.

Reset module

A PROBLEM with the Apple IIe is that its programs have to be reset manually if even a short power cut occurs.

To remedy it Flex Controls has released a reset module for the computer which will automatically reboot a program after such an interruption.

The module, priced £35, is aimed at industries whose processes include control and monitoring.

Resetting a program is not a problem in an office environment where the computer is on constant show. In industry, however, machinery is often left unattended.

So if a power cut goes unnoticed the whole control and monitoring process is thrown out.

● *FCL, Dell Road, Rochdale, Lancashire OL12 6BZ. Tel: 0706 343438.*

Keeping in touch

TOUCH Window for Apple II micros is designed for simplified menu selection, data input, drawing and digitising and can either be positioned as an overlay to a VDU screen or used on a desk top.

It responds to direct tactile commands without needing a special stencil or mouse using two plastic sheets with transparent conductors on the facing surfaces. The self-contained screen plugs into an I/O port.

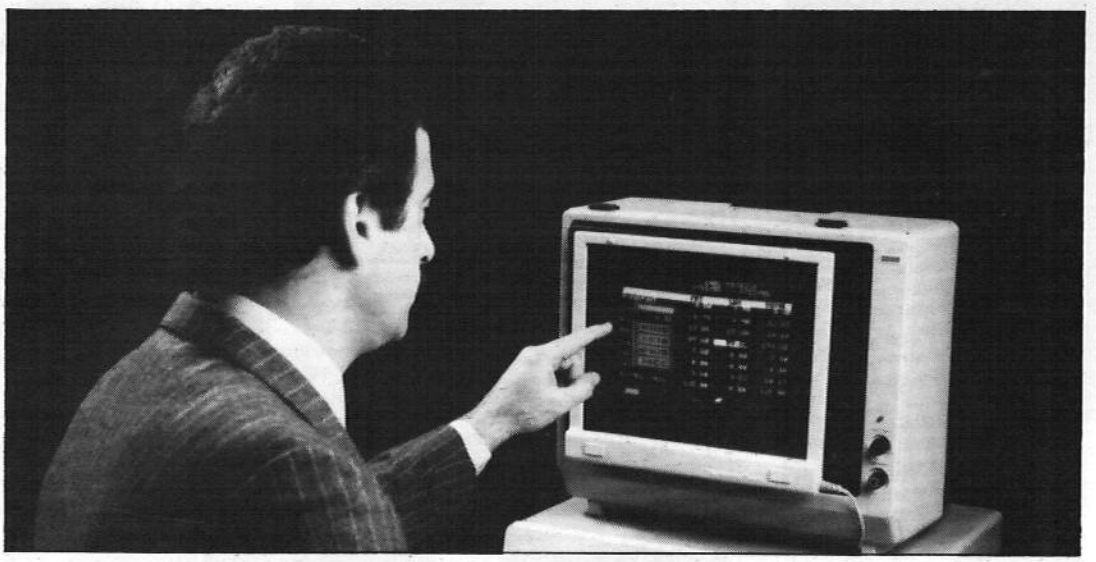
With a 250 x 250 resolution 62,500 touch points are available. The device averages the area of contact automatically to give the coordinates of the centre of the contact area when a finger or other probe is used.

In graphic tablet mode Touch Window can be used for business graphics, drawing and designing.

As an input pad it provides much easier menu selection and quicker cursor movement, while in education, training and some commercial applications it can be an interactive book pad for programmed learning, interactive videotext and catalogue selection in conjunction with special overlays.

Price is £190.

● *Ellinor Peripherals, Arkwright Road, Reading, Berkshire RG2 0LS. Tel: 0734 863417.*



Touch Window is designed for simplified input

Comms built in

TERMINAL type communications integrated with Appleworks is offered by the software package Pinpoint from Bidmuthin Technologies.

The program provides 300/300 or 1200/1200 comms directly from Appleworks and supports the super serial card IIe and IIc ports.

It enables communications with electronic mail/telex services such as One-to-One, Telecom Gold and Easylink and also with most bulletin boards, but not with Prestel or viewdata.

Messages can be created and edited using Appleworks and then the word processor file can be transmitted with a single key press.

Messages can be downloaded directly into an Appleworks word processor file for subsequent editing.

Pinpoint is fully compatible with the Ramworks extended memory card and can fully reside in RAM.

As well as providing comms, Pinpoint functions as a desktop accessory for Appleworks, providing calculator, appointment diary, calendar and notepad.

It also enables the Apple II to function as a typewriter and will merge graphics from Mousepaint or DazzleDraw with text from the Appleworks word processor.

Pinpoint requires a IIc or 128k enhanced IIe, plus Appleworks and costs £69.

Also new from Bidmuthin is an accelerator for the Apple IIe which speeds auxiliary memory and extended memory.

Transwarp carries 256k of fast RAM and can accelerate 256k of extended memory, auxiliary memory, main memory and ROM.

Because of its 256k of RAM it avoids the problems associated with using caching techniques. Price: £279.

● *Bidmuthin Technologies, 42 New Broad Street, London EC2M 1QY. Tel: 01-628 0898.*

Stress analysis

STRESS and deflection analysis in computer aided engineering design is made possible by Trimesh, from Learning Curve, for the Apple II.

Trimesh is a finite element analysis package capable of handling plane stress/strain and axisymmetric problems.

The package features a comprehensive editor for data input, automatic mesh generator, comprehensive graphics module, graphical representation of results, and output to printers and plotters.

Trimesh costs £250 but is available on discount to educational establishments for £175.

● *Learning Curve, 42 Bullens Green Lane, Colney Heath, St. Albans, Herts. Tel: 0727 23684.*

Animation program

CONSTRUCTION set program Movie Maker from Ariolasoft allows Apple II users to create their own animated pictures.

Text and graphics can be mixed to create tracks of up to 30 frames each and up to six tracks can be combined in a single animated sequence.

Special effects include hundreds of built-in pictures, 10 ready made movies, numerous animated Hallowe'en and Christmas card sets and a music and sound library.

Movie fans can share their work by videotaping their productions and sending them to friends. Price: £19.95.

● *Ariolasoft, 68 Long Acre, Covent Garden, London WC2E 9JH. Tel: 01-836 3411.*

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January 1985

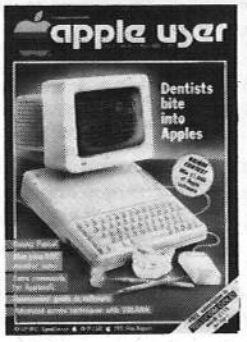
John Sculley's View of 1985 – Games (Gelfling Adventure, Story Maker, Stellar 7) – Application: Apples down on the Farm – Cloze Technique (Plus review of Clozemaster) – World of the 6809 Part II: Flex Operating System – Apple II v ITT 2020 – Reviews (Ormbeta Compact Accounting System, CGL Half-Height Drive) – Apple IIe and IIc compatibility – Handling Interrupts and large arrays in Pascal – Reporter's view of Macintosh – PLUS News, New Products, Appletips and Letters.

February 1985

Steve Wozniak talks about Apple II developments – Quicksort algorithm in Forth and Basic – Games (Deadline, Witness, Planetfall, Enchanter, Scorcerer, Expedition Amazon) – Graphics DIY part XI – Targeting with a spreadsheet – Apple to Apple file transfer – Miners' strike resolved by computer? – Chemical formulae on Lisa – two Macintosh books reviewed – World of the 6809 Part III – Software reviews (Sales Edge and Management Edge) – Application: book publishing – Split screen techniques – PLUS News, new products and letters.

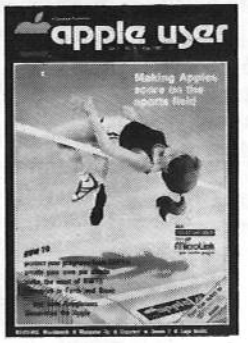
March 1985

Circle drawing algorithms – Super Pilot System Log – Summarising data with VisiCalc – Competitive estimating with Multiplan – Graphics DIY part XII – Ampersand editing – Macintosh (MacTerminal, Mouse Stampede, optical mouse, plus Mac book) – Reviews (Merl modem, Intec hard drive, Vision 128/256 card, the Editor, plus three educational packages) – Fun and Games (Xyphus, Fighter Command, Picture Writer) – PLUS News, New products, letters and Appletips.



April 1985

Apples in the dental surgery – Adding graphics commands to Applesoft – Using the VBLANK signal – Getting to grips with software – Reviews (Spee-Demon card, PFS File/Report for Macintosh, W-P-LAB) – Weather forecasting with Mac – Pascal Filer's D command – Fun and Games (La Triviata, Design Your Own Home: Architecture, Interiors, Landscape) – Books (Appleworks, VisiCalc, Machine level programming) – Index to Windfall Vols. 1 and 2. PLUS News, New products, Letters and Appletips.

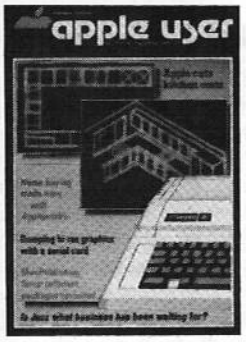


May 1985

Sports Day runs smoothly with Apples – Graphics DIY Part XIII (pie charts) – Reviews (The Workbench, Macputer IIc, Copytext, Omnis 2 on Macintosh, seven Logo books) – The RWTS explained and demonstrated with a disc verify routine – protecting programs from Copya – Pascal (directory access from within programs) – Binsearch in Forth and Basic – Reaction Timer – Apples in Hungary – Fun & Games (Smart Shopper, Plantin' Pal, Micro Cookbook) – PLUS News, New products, Letters and Appletips.

June 1985

Apples keep track of mus companies and Macintosh de igns record sleeves – Fun a Games (Music Construction S Song Writer, Music Readiness Pascal Tutorial: start of a ne series looks at records – Review (Tick-Tack translation packa for Apple II+/IIe, Musicworks f Macintosh) – Graphics (thr books reviewed) – Mugrap light dependent resistors maki sounds – Ampersound: routin for making music and soun from Basic – PLUS all the late News, New Products a Readers' Letters.

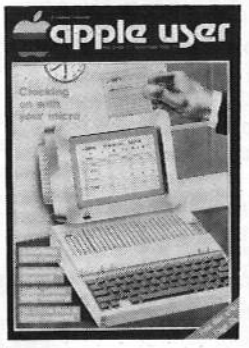


September 1985

Appleworks spreadsheet eases house purchase calculations – Pascal Tutorial: Units – Macintosh: Review of Lotus Jazz – Applesoft line by line comparator – Graphics dumps via a Super Serial card – Mac Publishing: Review of three page layout packages – Kitchen design based on Apple IIe – Choosing educational software – Bomb-proof input routines – Fun & Games (Skyfox, Wishbringer, Rescue Raiders) – Book reviews (Visicalc, Accounting software) – PLUS News, New products, letters and Appletips.

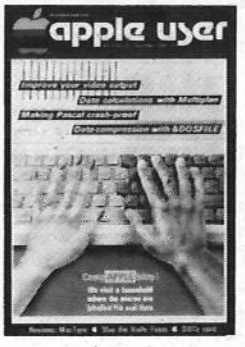
October 1985

&DOSFile: start of a new series – spreadsheet for home budgets – Apples in a Hertfordshire college – using Page 3 routines with a language card – Graphics DIY Part XVI – Reviews (Ramworks extended 80-column card, Computereyes and Magic digitisers) – add a factorial function to Basic – Pascal tutorial: assembly language programming – lower case Pascal – Fun & Games (Mix and Match, Spotlight, Instant Zoo, Ernie's Quiz) – free sectors on disk – PLUS News, New Products, Letters and Appletips.



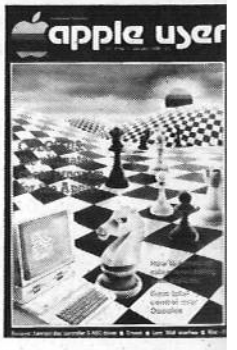
November 1985

Graphics Library final part plus disc offer – MEMDOS operating system – calculating duty rosters with a spreadsheet – Macintosh: reviews of Microsoft's Excel and P&P's fat Mac upgrade – ProDOS gives Applesoft new lease of life – Review of Cirtech CP/M Plus system for IIc – Apple word processors compared with MS-DOS counterparts – &DOSFILE: two more routines added – Pascal tutorial: parameter passing – extra tracks on discs – Fun & Games (Suspect, Karateka, Dazzle Draw) – PLUS News, New Products and Letters.



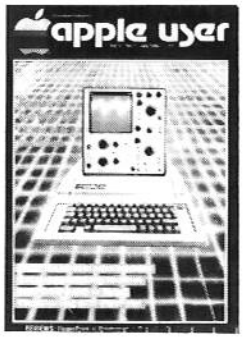
December 1985

Hardware project to improve video output – Pascal Tutorial: bomb-proofing programs – &DOSFile: data compression techniques – date calculations with Multiplan – Application: Apples in an academic household – Review of DDTe debug card – Macintosh: reviews of MacType and Mac the Knife Fonts – Fun & Games (Sword of Kadash, Cutthroats) – Sliding block puzzle in Metacraft's Forth – Apple User Games Disc offer – PLUS News, New Products and three pages of readers' letters.



January 1986

Spreadsheet model for sale forecasting – Pascal tutorial speed-up techniques – Fun Games (Colossus Chess 4. One Man Band) – Applicatio how a shopkeeper uses an App IIc – Reviews (Lawtant dis controller card, Lemi Midi inte face) – Heapsort in Forth ar Basic – Macintosh review (Crunch, Mac +II) – Duodis write protect switch hardwa project – &DOSFile: expansi and compression – Index Volume 5 – PLUS News, Ne Products, Appletips an Letters.

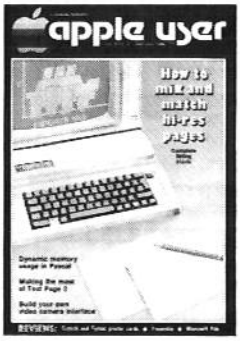


July 1985

Apples at the heart of Papworth Hospital – Fun & Games (Secret of Arendarvon Castle, Antagonists, Fahrenheit 451, Rendezvous with Rama, Amazon, Shadowkeep, Adventure Writer) – Pascal Tutorial: using files of records – Binary file load utility – Using extended 80 column card memory – Macintosh (Flowcharting, Preview of Guide) – Book reviews (Business Basic, Epson printers) – Reviews (FingerPrint and Printerrupt) – Graphics DIY Part XIV – DOS patches – PLUS News, New Products, Letters and Appletips.

August 1985

Spreadsheet secrets shared – Apple IIIs provide power behind computer bureau – Graphics DIY Part XV – Wordstar scrolling problems solved – Descartes data processing program generator – Fun & Games (Winnie the Pooh, Mickey's Space Adventure, Print Shop, Hitchhiker's Guide to the Galaxy) – Mac at the centre of a publishing revolution – Pascal Tutorial: random access files – Review of Micro Planner for Macintosh – Restore to any Data line – PLUS News, New Products, Letters and Appletips.



February 1986

Hi-res overlay utility – Pascal tutorial: first look at dynamic memory usage – Hardware: build an interface for Snap EV1 video RAM camera – Application: Apples at home in 14th century house – &DOSFile: database and form generator – Reviews (Cirtech and Tymac printer cards) – Macintosh (reviews of Microsoft File and Ensemble) – Fun & Games (Seven Cities of Gold, Adventure Construction Set, The Pay-Off) – Using Text Page 2 – PLUS News, New Products, Letters and Appletips.

March 1986

Pascal tutorial: dynamic memory usage Part 2 – Fun & Games (Transylvania, Ring Quest, Crimson Crown) – CP/M: PIP patch to enable repeated commands – &DOSFile: RAMdisk function – ProDOS: four books reviewed – Spreadsheet: useful miles-per-gallon calculator – Comms: budget equipment interfaced to Apple Part 1 – Reviews (Speed-Loader, P-tral) – Macintosh (review of Ultraplan) – Machine code step-by-step tracer utility – Applesoft lower case input routine PLUS News, New Products and Letters.

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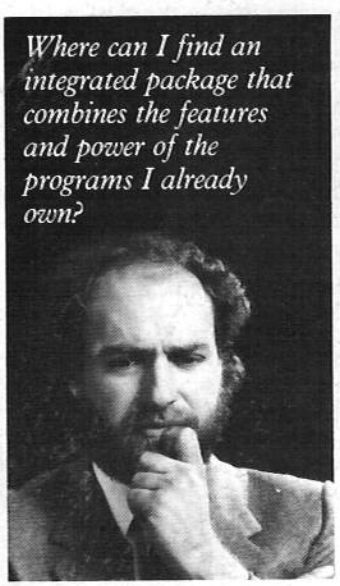

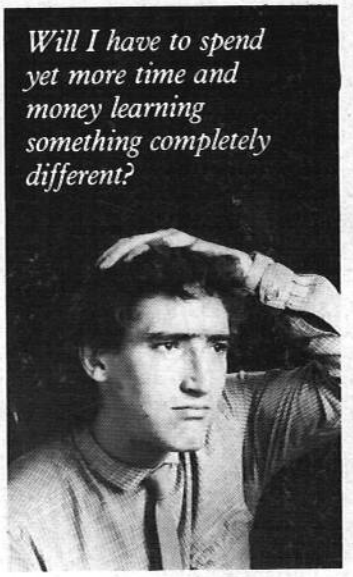

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