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# apple user

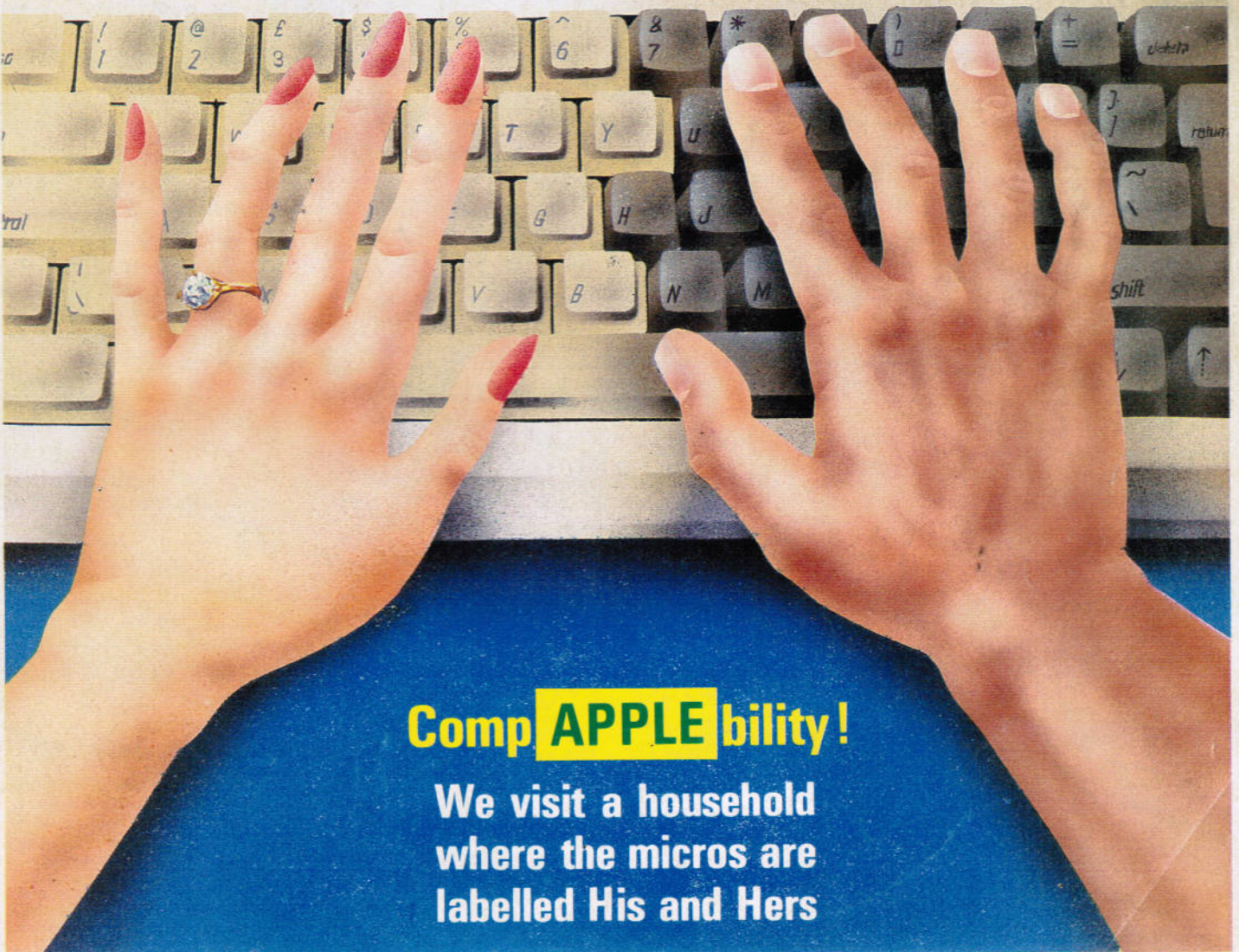
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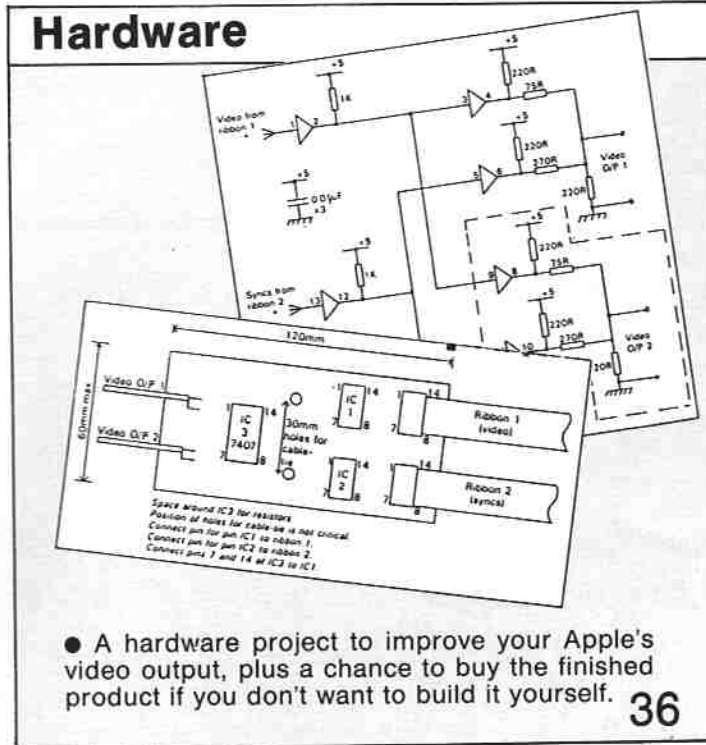
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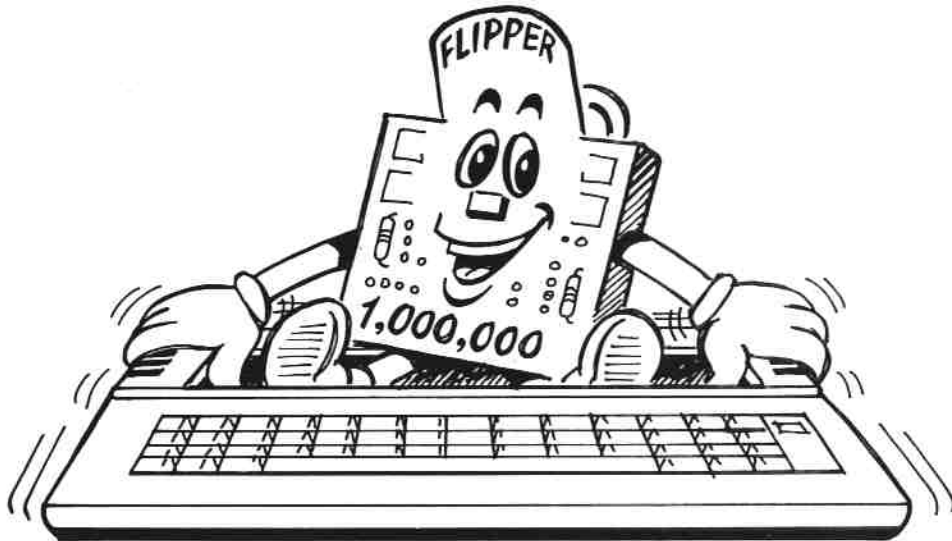
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## Sculley stops slide

**THE magic touch of president and chief executive officer John Sculley appears to have halted the economic decline of Apple Computers.**

His scalpel has cut deep this year since he took control from co-founders Jobs and Wozniak of what was being constantly referred to in the computer and financial press as "ailing Apple".

The fat-trimming exercise has seen drastic reductions in personnel and inventory, the beneficial effects of which are shown in the company's latest balance sheets.

Apple finished the 1985 fiscal year with \$337 million cash in hand, up from \$114 million in 1984 and the highest total in the company's history.

Net sales increased by 27 per cent over the previous year and totalled \$1.9 billion and profits of \$61 million compared with sales of \$1.5 billion and profits of \$64 million in 1984.

Apple reported a gross profit margin of 46 per cent in the fourth quarter of 1985, the highest achieved in more than two years.

Net sales for the fourth quarter were \$409 million with net earnings of \$22 million.

"It's working", said Sculley. "These results offer the most compelling evidence possible that the steps we've taken to streamline the company are producing results faster than anyone thought possible last summer.

"We managed down inventories, built up cash to our strongest position ever and still have no debt.

"Sales to education remain solid, retail sales have been increasing since July, and orders from dealers for the holiday selling season are brisk.

"With Apple's successful reorganisation and growing sales momentum we are now ready to invest increasing resources and efforts in product development and program implementation for the future".

## New developments

**DEVELOPMENTS currently under way in America promise to guarantee the future of the Apple II range of computers for many years to come.**

But at the same time the projects in the pipeline are casting a shadow of uncertainty over the Macintosh.

Reports reaching *Apple User* from the US reveal that the company plans a dramatic unveiling of several impressive new products at its annual shareholders' meeting next month.

Among them is said to be a new Apple IIe capable of running Macintosh software and based on either the 68000 processor or the new 68020 chip.

More bad news for Macintosh comes from Arizona, where Checkmate Technology is reported to have achieved a major breakthrough, producing an add-on board enabling Apple II, IIe and IIc computers to run 16 bit Macintosh programs.

The board, demonstrated recently on a coast-to-coast television programme, is also said to be able to read data from several IBM program packages such as Lotus 1-2-3.

An informed *Apple User* source in America says: "Checkmate Technology is a company that monitors Apple trends very closely.

## strengthen Apple range

### But is Mac in jeopardy?

closely. If they intend to market this product it is an indication of which way the wind is blowing at Cupertino.

"It is no secret that the present management at Apple is not as enamoured with the Macintosh as was Steve Jobs.

"And they are not afraid to make sacrifices in their fight to get the company back on the rails after all the upsets of the past twelve months.

"It isn't that the Macintosh is a flop - if the Atari or Amiga machines sold as well there would be dancing in the streets outside those companies' offices.

"It's just that cash-conscious Apple executives can see the IIe and IIc achieving faster turnover

and therefore more instant gratification in the balance sheets".

The ill-fated Lisa - briefly a Macintosh - and Steve Jobs' passionate and costly defence of the upmarket range before his removal from operational command, did not endear the machines to Apple's tough new boss John Sculley.

But there is hope that the Macintosh will remain alive for the immediate future, though in a different form and possibly with a new name.

Among the products said to be making their debut next month is a machine that sounds like the Big Mac that was much discussed but never made an appearance.

Reports say it will feature 1mbyte of RAM, 128k ROM, an 800k microfloppy drive, 17in screen, business keyboard with numeric keypad and a built-in trackball.

Informed sources say it will not be named Macintosh, but Oreo.

## Wozniak in control

STEVE Wozniak, the hardware genius behind the Apple II series, has now got switched on to something new - literally.

The company he launched after leaving the Apple Corporation has just unveiled its first product.

Known as Little Tyrone, it is a remote control device which Wozniak claims doesn't even have to be pointed at whatever appliance needs to be switched on or off.

However he insists that the fate of his new company, California based CL9, will not be decided by the market impact of the "no wires" device.

"We are not banking the company on it", says Wozniak, "but it's nice to find a tiny circuit that does something useful".

CL9 is also planning to release a much more sophisticated version of Little Tyrone. Called The Servant, it will allow switching between four interconnected home entertainment devices.

But why all the interest in this area of electronics?

"I've had a remote control life style", says Apple's co-founder. "I'm very anti-button.

"I've been around computers too long and have just about burned out on buttons".

**A NEW Applesoft and 6502 emulator program called Mac+II allows software originally written on an Apple to be transferred over to a Macintosh and run without adaptation.**

**It is said to not only allow Applesoft, Integer Basic and machine language programs to be run on the Macintosh, but to permit the Imagewriter cable to connect Apple and Macintosh machines together so that DOS 3.3 programs may be exchanged between them.**

## Mouse Paint pictures in print

OWNERS of an Apple mouse for the Ile no longer need Image-Writer or Snapshot Printerrupt for trouble-free printing of MousePaint pictures, says Dark Star Systems.

The company has bought out MousePrintz which, it says, not only lets MousePaint users print their pictures directly to any dot matrix graphics printer, but also offers a menu of useful features that can enhance the printouts.

Users patch a copy of the MousePaint disc by inserting it into the disc drive after MousPrintz has been booted. From then on the MousePaint disc will boot every time with the MousePrintz menu co-resident in memory.

When a printout is required MousePaint's print option is selected in the usual way, bringing up the MousePrintz menu.

After the picture has been printed MousePaint can be resumed without disturbance by selecting the Resume MousePaint option from the MousePrintz menu. Price: £25.

Dark Star has also released Version 10.0 of the software packages designed for use with its Snapshot interrupt-and-resume card for the Apple II+ and Ile.

Snapshot owners can update to Version 10.0 by returning their original discs to Dark Star with £15 for each upgrade. Snapshot card with one of the latest software packages retails at £115.

Also from Dark Star is ScreenSnapper, a software printing utility designed for use with Applesoft and machine code programs running on the Apple II+, Ile and Iic.

Like the Snapshot Printerrupt, it lets the Apple user interrupt and resume running programs in order to print the screen in a variety of ways with menu options for enlargement, rotation, inversion and shading. Price: £30.

# Frightening face of micro war

THE war simulation program which it is claimed frightened its own makers – plus some of the top chain stores' bosses – is to be made available for the Apple II series in January.

When software house PSS was working on the game, Theatre Europe, it fed in data released by Nato, the Ministry of Defence and Soviet military observers.

Said managing director Gary Mays: "We took figures of combat units for both sides from a variety of respected sources, set up the parameters of the game and played on the Nato side.

"The results were horrific",

he continued. "The Warsaw Pact forces won every time, steam rolling across Europe in as little as three days".

Nato's only defence in such a situation would be nuclear conflict.

The company had intended to produce a true simulation of a conflict in Europe, but in the circumstances decided to "fiddle" the figures.

Alan Steele, the game's author, believes if they had not there would be no game – the same side would always win.

He also built in a safeguard to ensure anyone considering a nuclear strike as a masterstroke should be fully aware of what

destruction it would entail.

Players must gain authorisation – a computer codeword – from a Coventry telephone number. Before it is given a recording of John Lennon's "Give Peace a Chance", a baby's cries, and a chilling warning are given.

● The safeguards did not impress the management of three top chainstores, Boots, Woolworths and John Menzies. After receiving copies of the game (earlier machine versions) they refused to stock it.

Moral grounds or worries about the possible comeback from the public were cited as reasons, claims PSS.

## Help for dealers fighting discounts

A LEADING American manufacturer of add-on boards for Apple computers, Microtek, is organising a "dealer fight back" against mail order discount offers.

To help retail outlets compete against the price-cutters, the firm is giving discount coupons worth 20 per cent off suggested list price and free software.

"We believe we are entering the year of the secondary market", a Microtek spokesman said. "With more than two million Apple II and Ile owners

out there, many will want to upgrade what they have rather than buy a new computer".

Microtek's products for Apple computers range from 16k language cards to the Q-disc that can add up to 512k of available memory for the Ile.

Another is the 80 column card with memory and RGB colour adapters.

The firm's leading sellers are its industry standard cards, the RV611 parallel printer card, and the Dumpling GX parallel graphics card that is pegged against the Grappler.

## Pocket Wordstar deal

FOLLOWING the signing of a manufacturing and distribution agreement with MicroPro, Cumana now has exclusive worldwide rights for Pocket Wordstar.

This is a full implementation of Wordstar and Mailmerge, the industry-standard word processing package, and is aimed at the CP/M market including Apple computers with

a Z80 card.

Features include automatic wordwrap each time a line is typed, special print functions like boldface, underline, subscript and superscript, on-screen menus and a command card, mailing list and file merging. Price: £119.

## Mac aids comet show

ANCIENT astronomical observations are being used in a major exhibition on Halley's Comet with a little help from the Macintosh.

Organiser of "Halley's Comet in History – Past Observations of a Distant Visitor" is the British Museum.

It is based on recently discovered Babylonian observations of the comet's visits in 164 and 87BC. Central to this part of the exhibition will be the Macintosh.

loaned by Personal Computers, the machine's role is a teaching one. Throughout the exhibition – which runs until May, 1986 – it will be giving a computerised explanation of the Babylonian texts.

The explanations will be backed up by on-screen graphical displays.

The exhibition also includes Chinese records of Halley's closest approach to earth in AD 837, and on its appearance in AD 1066, along with the publication by Edmund Halley of his discovery that the comet was to return in 1758.

# Some people go to extraordinary lengths to get a good picture!



Frustrating, isn't it? That dot-matrix printer and expensive interface card were supposed to let you print your Apple's display whenever the fancy took you.

But to get a print-out, you have to crash your program or make a file. Either way, it's a slow and tedious business. Then there's that long list of control commands you need to learn. And how are you supposed to capture the screen from a copy-protected program?

But hold on, don't reach for the camera yet!

The Snapshot Printinterrupt gives

you a better alternative; a different kind of printing utility. No matter what program your Apple II+ or IIe is running, the Printinterrupt can interrupt it, print its display, and resume running it as though nothing had happened. No files needed, no photography, and no frustration.

What's more, the Printinterrupt's easy-to-use menu features a galaxy of *really* powerful options which put other printing utilities to shame.

And because it uses the interrupt-and-resume power of the Snapshot card, the Printinterrupt

gives you access to a whole new world of great, easy-to-use utilities that will enhance your Apple at home and in the office.

Ask your local Apple dealer to demonstrate the power of the Printinterrupt for you, or write or call us for more information.

#### PRICES (ex VAT)

Printinterrupt software for Snapshot IIe card.....	£20.00
Shuttle software for Snapshot IIe card.....	£20.00
Copykit software for Snapshot IIe card.....	£20.00
Shell software for Snapshot IIe card.....	£20.00
Shuttle, Printinterrupt, Copykit and Shell combination pack.....	£55.00
Snapshot IIe card for Apple II+ and IIe (requires software).....	£95.00

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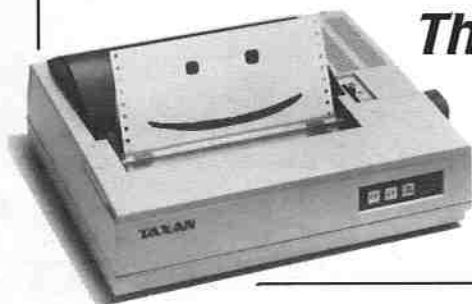
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# Anglo-Irish link up for data sharer

A CHANCE meeting at Database Publications' Apple '85 show in London has led to two firms teaming up to provide what they claim is the world's first 8-bit multi-user, multi-tasking environment for the Apple II range.

Glanmire Electronics of County Cork and Dark Star Systems of London are describing their Anglo-Irish agreement as "a marriage of convenience for Apple II users around the world".

The "bride and groom" are Glanmire's GE Microbus and the Snapshot Shuttle from Dark Star.

Microbus allows up to 256 Apple IIs to share programs and data from just two Apple disc drives.

Snapshot Shuttle is a software package which uses the Snapshot interrupt-and-resume card to partition Apple II memory into 64k or 128k workspaces, giving an operating environment similar to that afforded by Apple's Switcher on the Macintosh.

The user can load any Apple-compatible program into each of the Shuttle workspaces and then switch from one application to another, each program resuming exactly where it was interrupted.

With a Glanmire IIe 80 column 512k extended memory card installed in a basic Apple IIe, users can switch between any four 128k applications and use the remaining 64k as a RAMdisc for exchange of data between programs in the system.

Glanmire's managing director Joe Byrne and marketing manager Mary Pearce came across Shuttle at the Apple '85 show in May.

"We realised immediately that the British company's multi-tasking system would perfectly complement our own product", said Mary Pearce,

"and allow users of the Microbus network to switch from program to program - and even from one operating system to another - without the need to queue for access to the master Apple's drives".

A month after their initial meeting the two firms joined forces at Apple Expo in Paris and demonstrated their products to a wide-eyed French public.

Since then Glanmire has taken the Microbus/Shuttle combination into the Irish educational and small business markets and Dark Star has begun attacking the lucrative Apple-dominated US market.

Cost of the Microbus network controller card is £120, Microbus network interface card £109, optional GE 512k extended 80-column card £399 and Dark Star Snapshot card/Shuttle software £115.



Bob Sather of Dark Star Systems (left) and Joe Byrne of Glanmire Electronics iron out the wrinkles in their contract.

## Apple is lifeline for Richard

A SEVERELY disabled Dyfed man - he can only communicate by operating the keys of his Apple II+ with a pointer attached to his head - has recently completed his PhD thesis.

Cerebral palsy has left Richard Gomm without speech and with virtually no control of his body below his neck.

Yet using software written by himself, he has just completed the herculean task of preparing the manuscript.

"It is a monumental achievement", an educationalist told *Apple User*, "for apart from the academic skills involved, Richard's typing speed is only five words a minute".

Living in Wales with his parents, Richard featured in a

BBC Micro Live program describing how his computer has become his life line, even enabling him to gain a degree from York University.

Not only does he use it in his academic studies but he also has it linked up to enable him to switch lights on and off as well as operating his radio and television.

However it is the system he has lately designed which pleases him the most.

With the help of local hardware and software consultant John Piper, he now operates his Apple II+ alongside a BBC Micro.

Now that he has completed his PhD course Richard has one more ambition left - to land himself a job writing software.

## Bundles for schools

AMERICAN publisher Scholastic Software has teamed up with Apple Computer to produce two new educational bundles containing Bank Street Writer II, pfs:Write and pfs:File.

The bundle offer allows schools to equip 10 Apple II computers with a unified selection of Apple and third party instructional software which also includes Apple Logo II, and a typing tutorial in the elementary package and AppleWorks, Instant Pascal and Alphabetic Keyboarding in the secondary package.

The Apple Elementary Classroom Software Solution sells for \$1,099 and the Apple High School Classroom Software Solution for \$1,599. These prices are said to be 30 per cent lower than the cost of buying the programs individually.



# NEWSLETTER

## Special interests groups

MANY MicroLink subscribers have been in touch to say they want to organise closed user groups within the system to promote their special interests.

Systems manager Colin Rogerson says MicroLink is only too happy to help out where possible and invites interested parties to phone him on 061-429 0788 for details.

In order to assess the depth of interest in specific CUGs, he suggests that anyone proposing to form a group should advertise the fact in the Contacts or Communications sections of the MemoPad facility.

"We have messages on the MemoPad now from people who want to form closed user groups for Commodore, QL, Atari, 68000 machines, and Telecom Gold enthusiasts", says Rogerson.

"The response to them will indicate the demand for such facilities and help us in planning to provide them".

## Now Who's Who goes electronic

A WORLD first in electronic publishing, the Who's Who of the microcomputing scene in Britain, is now being made available on MicroLink.

It has been such a success since it was launched on DealerLink, our sister service, that it is seen as a logical move to extend it to MicroLink.

Constantly updated by our team of researchers, it contains comprehensive details of all the top per-

sonalities in the world of microcomputing. And they have dug up some little-known facts to help make the electronic pen portraits come alive.

For instance, the Who's Who reveals that one headline maker has the middle names of Marles, once worked as a reporter on Practical Wireless and unwinds by reading poetry. He is none other than Sir Clive Sinclair.

**YOUR  
chance  
to join  
MicroLink  
— turn to  
Page 52**

## Oman connection

WHAT is helping to make MicroLink the fastest growing international electronic communications system is the remarkable way its fame is spreading around the world.

From the Sultanate of Oman, chartered engineer S.R.G. Rajan wrote to say how he had heard all sorts of good things about MicroLink and could he please become a subscriber. Rajan, general manager of the Oman Industrial Gas Company, is the latest of many subscribers in the Middle East.

## Many yen for MicroLink...

ONE of the growing number of Japanese users of MicroLink, journalist Yuichi Ishikawa of 4 x 4 magazine, mailboxed from Tokyo to say how it has been saving him a lot of Yen lately.

This is because he discovered that it is cheaper to send a telex to his contacts in Japan via MicroLink than it is to use the Japanese telex service. It means his messages have to travel from Tokyo to the MicroLink computer in London and then back to Tokyo!

Yet there is no appreciable delay in getting

his message through — an essential requirement for a busy journalist battling against deadlines.

With the aid of Yuichi, MicroLink has even penetrated the bamboo curtain. He has regular telex correspondence with a contact in the Chinese capital Peking using MicroLink.

However Yuichi's active use of MicroLink is likely to be dwarfed by one of his neighbours — one of Japan's leading financial institutions, the Bank of Toyko, recently became a subscriber.

# Let's make your Apple Pascal less prone to crash



IF I had a crisp £1 for every time that someone has said to me: "The Apple Pascal system is ok, but it crashes too easily", I would by now be a very rich man.

While it may appear that the system crashes far too easily, the main problem is that, unlike under DOS and Basic, pressing Reset causes the whole system to re-boot.

The program being run is exited and when the system has

restarted the user is left at the command line of the system.

This month I want to see how we can make our Apple Pascal programs more robust, with less need for the dreaded re-boot process.

The main cause of system crashes is an input/output error. This occurs, for example, when a user enters a letter when a number is expected, or when a program tries to access a non-existent file. In the vast

majority of such cases it is relatively simple to trap the error and avoid a system crash.

In an earlier tutorial we looked at techniques of bomb-proof input. Any program with any pretensions to being robust should use such a technique to input numbers. In Basic a similar technique is invariably used, and no serious applications programmer would input numbers in any other way.

When it comes to file

handling we can use the Pascal system to trap almost every conceivable error, so that the user can be prompted to take the appropriate action.

Consider the following Apple Pascal statement:

```
reset(infile, '#5:fred.data');
```

This should open an existing file called fred.data on the disc in drive 2, slot 6, of the Apple running the program.

Let's list some of the



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## It is almost impossible to make an applications program totally bomb-proof

conditions that might cause an error when this statement is executed:

- There is no #5, as the Apple only has one disc drive.
- The disc drive door is open.
- There is no disc in the drive.
- The directory on the disc is corrupt, and so cannot be read by the program.
- There is no file called fred.data on the disc in #5.

Whenever such an error occurs the basic input/output system (BIOS) returns an error code to the operating system indicating the nature of the error.

The key to producing bomb-proof programs is the get the applications program to handle this error code rather than letting the OS enter its error-handling routine.

Apple Pascal allows us to direct the compiler to generate code that passes the error code (known as IORESULT) back to the program by using a compiler directive like this:

```
(* $! - *)
reset(infile, '#5:fred.data');
iocopy:=ioresult;
(* $! + *)
```

The first pseudo-comment tells the compiler not to generate error-checking code, but to return the result of the attempted I/O operation by the function IORESULT.

The second pseudo-comment turns on error-checking again.

The value of IORESULT is copied into IOCOPY to ensure that any subsequent I/O operations do not affect the error code produced by the "reset" operation.

We must remember that the normal safety net provided by the OS's error-handling is no longer provided, and that it is now the entire responsibility of

the programmer to cope with any I/O errors.

A trivial program using this technique might look like Program 1.

This provides no real improvement over the facilities provided by the Pascal system. What we really need is a general purpose way of handling I/O errors.

A possible technique is shown in this month's demonstration program, Program 11, which concludes this tutorial.

Obviously the precise action to be taken will depend on the applications program being used and the capabilities of the user.

One way of stopping the naive user from being presented with the command line of the

system is to rename the applications program as SYSTEM.STARTUP on the boot disc.

Then whenever the system is rebooted this file will be executed, and whatever the naive user does, such as pressing Reset, he or she will never be faced with the command line.

Unlike I/O errors, execution errors cannot be trapped and handled by the user program. Possible codes are listed on page 132 of the Apple Pascal Language Reference Manual.

The only way to avoid a re-initialisation of the system (or worse) is to ensure that your programs don't cause an execution error. Almost all of these will be one of 4, 6, 9 or 13.

"Stack Overflow" (error 4) is usually caused by a procedure repeatedly calling itself, either directly or indirectly. This is termed a recursive call, and soon fills the stack with copies of the return address of the procedure.

Exhaustive testing of a program with different test data should catch most stack overflow conditions and enable them to be eliminated.

"Divide by zero" error is self-explanatory. Careful programming should eliminate it, otherwise a "kludge" like this might be employed:

```
if bot=0 then res:=0
else res:=top/bot;
```

"System I/O error" (error 9) may occur when the system, as opposed to the user program, is performing I/O. A common cause is the failure of an attempt to load a segment of the user's program from disc.

Try to write applications that avoid the need to change the disc on which the user program resides, and stress to users the importance of not removing discs during the program execution.

"String too long" (error 13) generally results from careless programming. It is important to check the length of strings entered by the user.

A useful technique is to input a string into a long temporary string, and then only transfer it to the target string if it is of the correct length. This avoids such errors later in the program.

It is almost impossible to make an applications program totally bomb-proof. However by using the techniques discussed above and demonstrated in the example program we can make Apple Pascal programs robust in the context of most error conditions.

Such practices both produce more secure programs and make the programs themselves look more professional and useful. Perhaps, in the hands of a good programmer, Apple Pascal doesn't crash so easily after all!

● Next month we shall consider the optimising of Apple Pascal programs to speed them up and minimise their use of memory.

```
program simple;

var   f:file of char;
      iocopy:integer;
      ch:char;

begin
  (* $! - *)
  reset(f, '#5:fred.data');
  iocopy:=ioresult;
  (* $! + *)
  if iocopy <> 0 then (* 0 means no error *)

  begin
    writeln('Error in attempt to open file:');
    write('Type <ESC> to exit, space to continue ');
    repeat
      read(keyboard,ch)
    until (ord(ch) in [32,27]);
    if ord(ch) = 27 then exit(program)
  end;

  (* rest of program follows *)

end.
```

Program 1

```

program robustio;

const cleos = 11;      (* change for external terminal *)

var f:file;
    ok:boolean;

procedure reporterr(errno,unitno:integer);

  procedure reportdevice(unitno:integer);
  begin
    case unitno of
      1,2: write('screen/keyboard');
      4: write('drive 1, slot 6');
      5: write('drive 2, slot 6');
      6: write('printer');
      7,8: write('Remote I/O');
      9: write('drive 1, slot 4');
      10: write('drive 2, slot 4');
      11: write('drive 1, slot 5');
      12: write('drive 2, slot 5');
    end; (* of case *)
  end;

  procedure fatalerr;
  var ch:char;
  begin
    write(' type <SP>');
    read(ch);
    gotoxy(0,23);
    write(chr(cleos),'This error is fatal: please consult your supplier. type <SP>');
    read(ch);
    gotoxy(0,23);
    write(chr(cleos),'Restart by pressing the CTRL & RESET keys. ');
    repeat until false (* ie make 'em reset! *)
  end;

  procedure checkdisc;
  var ch:char;
  begin
    write(' type <SP>');
    read(ch);
    gotoxy(0,23);
    write(chr(cleos),'Please check that the correct disc is in the drive, type <SP>');
    read(ch);
    gotoxy(0,23);
    write(chr(cleos),'If the correct disc was loaded, type "Y", else <SP>');
    read(ch);
    if ch in ['y','Y'] then fatalerr
  end;

begin (* reporterr *)
ok:=false;
gotoxy(0,23);      (* bottom line of screen *)
write(chr(cleos));
case errno of

  5: begin
    write('ERROR: The ');
    reportdevice(unitno);
    write(' has gone off-line: ');
    fatalerr
  end;

  6: begin
    write('ERROR: A file on the disc in ');
    reportdevice(unitno);
    write(' has disappeared! ');
    checkdisc
  end;

  8: begin
    write('ERROR: There is not sufficient room on the disc in ');
    reportdevice(unitno);
    checkdisc
  end;

  9: begin
    write('ERROR: Required device - ');
    reportdevice(unitno);
    write(' is not connected correctly. ');
    fatalerr
  end;

  10: begin
    write('ERROR: A file is missing from the disc in ');
    reportdevice(unitno);
    checkdisc
  end;

  11: begin
    write('ERROR: Two files with same name on the disc in ');
    reportdevice(unitno);
    checkdisc
  end;

  12,13: begin
    write('ERROR in opening/closing file on disc in ');
    reportdevice(unitno);
    fatalerr
  end;

  16: begin
    write('ERROR: disc in ');
    reportdevice(unitno);
    write(' is write-protected: ');
    checkdisc
  end;

  64: begin
    write('ERROR: failed access to disc in ');
    reportdevice(unitno);
    checkdisc
  end;

end;      (* of case *)
end;      (* reporterr *)

procedure iocopy(unitnum:integer);
var iocopy:integer;
begin
  iocopy:=ioresult;
  if iocopy < 0 then reporterr(iocopy,unitnum)
    else ok:=true
end;

begin
  (* simple demonstration program
  - does not generate every error - this exercise
  is left to the interested reader! *)
  (* turn off normal I/O checking *)
  repeat
    reset(f,'#5:notthere'); (* causes error if no such file exists *)
    iocopy(5)
  until ok;
  close(f); (* should check for error here as well *)
  reset(f,'resin:'); (* causes error if no card in slot 2 *)
  iocopy(7); (* no point repeating this operation *)
  close(f);
  repeat
    reset(f,'#12:anyname'); (* causes error if no drive 2, slot 5 *)
    iocopy(12)
  until ok;
  close(f);
  (* turn normal I/O checking back on *)
  (* of main program *)
end.

```

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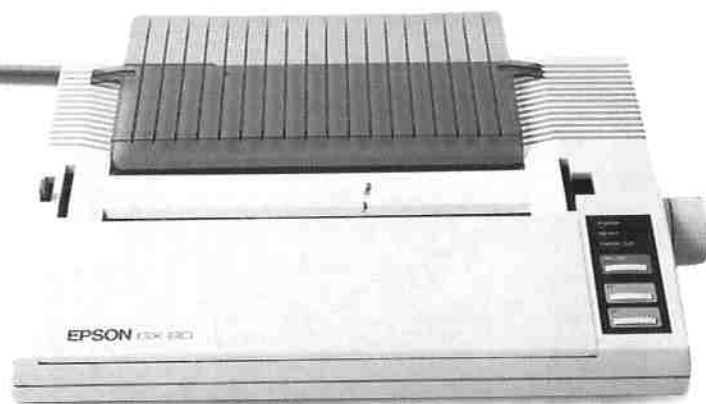
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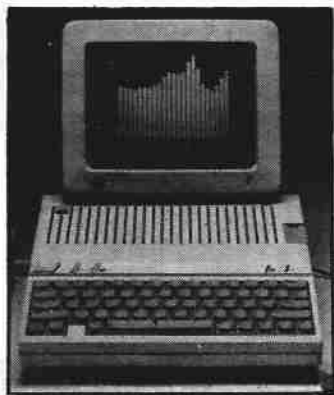
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**SWORD of Kadash** is an interesting new game from Penguin Software that combines basic fantasy role-playing elements together with arcade-type gameplay. The combination works well, although the ideas aren't all that original.

As the story goes, you are lost in the fierce Persian desert, having been abandoned by your guide two nights ago. He took off with your camel and other things, such as water.

Through a swirling cloud of dust a band of 30 horsemen appear and take you prisoner.

One pulls out a scimitar and prepares to behead you, but suddenly the leader steps forward and offers to spare you in exchange for some cooperation.

They want you to enter the deadly catacombs of the Fortress of the Dragon, find the legendary Sword of Kadash, and return with it.

You can keep any other treasures you find along the way, but they don't think you'll ever get out with them alive. I tend to agree with them.

Before playing the game you must make a copy of the second side of the disc, which contains the master copy of the fortress

# Fantasy blends well with arcade action

data, on to a blank disc of your own.

The game does the copying for you, but the annoying thing about it is that every time your character dies you must re-copy the disc.

However you do have a number of resurrections available, but once used, your character dies permanently, and the disc must be re-copied.

I can see that this will be a very negative aspect for single drive owners, since it takes 35 swaps of the discs to make a copy. Even with two drives the copying takes about three minutes.

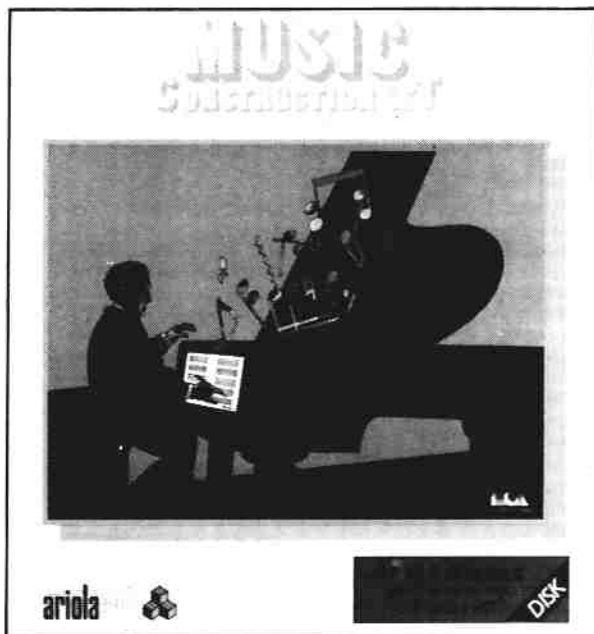
Once you have set the game

## Better deal for poor

*If you've ever played games on your Apple - go on, admit it - the cost of them probably won't have escaped your notice. In most cases the high price is*

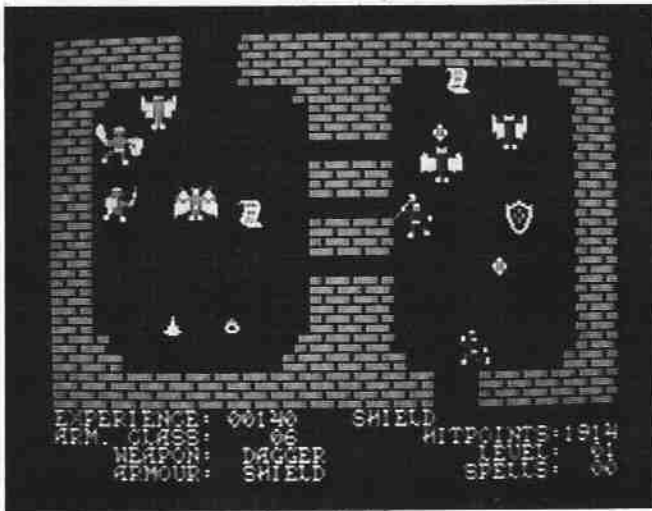
*attributable to the fact that they are imported from across the pond.*

*These days though, Apple users are starting to see more*



Cases in point ... Music Construction Set





*Sword of Kadash . . . graphics basic but neat*

up things start to look better. The graphics are basic, but neat.

The main part of the screen shows a plan view of the room you are in. The lower part of the screen shows your character's statistics, such as weapons, hit points, experience points, level, spells, and so on.

The game works by keyboard or joystick, and although there is no facility for defining your own keys the ones used are logical.

You can move the man

around, fire darts, cast spells and pick up objects. No matter what weapon you have, such as a sword or dagger, you still fight by shooting darts. Of course the better the weapon, the more damage the darts do.

Weapons can also have a numerical prefix, such as "+1 Sword" which means they are more powerful. Various types of armour are to be had. An interesting aspect is that if your weapon is of a higher status

than your armour, you can be damaged by your own arrows since they bounce off some walls.

Another facility is spell casting. There's not a lot to it, since there is just one type of spell, and all it does is scare off the monsters for a few seconds to give you a chance to escape.

As with all fantasy role playing games, most of your time is spent exploring the castle, accumulating experience

points, finding better weapons and magical items such as healers, anti-curse items and spell scrolls.

To make things even more interesting, there are secret doors to open up many new rooms.

When you find objects in the castle they are usually guarded by creatures of some kind. And most items will set off a trap when you take them. As the instructions say "sometimes the penalty will outweigh the reward".

This is sometimes true, especially as you go deeper into the castle, but some traps will actually help you, since they can kill the creatures that appeared from a previous trap.

The game is enjoyable enough while still being hard enough to make you want to have just one more go. If you like arcade adventures, then give it a try . . . chances are you'll like it.

**Leon Seltsikas**

*Title: Sword of Kadash  
Author: Chris Cole  
Publisher: Penguin Software  
Requirements: Any of the Apple II series*

## colonials

reasonably priced games. This is because various companies are now licensing the games from their original publisher rather than simply importing them. The games are re-published over here at a price which reflects the lack of import duty, trans-Atlantic transportation and so forth.

Ariolasoft is a case in point. We've already reviewed Skyfox, a game which was originally released in the States by Electronic Arts. Their latest batch of four releases are also licensed from Electronic Arts. Of the four we've reviewed two before, but two will be new to these pages when the reviews appear.

Music Construction Set was reviewed in the June 1985 issue, while Pinball Construction Set appeared in August 1984. No doubt you'll want to turn up the reviews before you rush out and part with the folding stuff, but for now suffice to say that both packages were enthusiastically received. At the

new British price of £19.95 each, therefore, they've got to be good value.

The two new packages, which also cost £19.95, are Adventure Construction Set and Seven Cities of Gold. The intrepid Leon is battling away on your behalf as I write, and reviews of the packages should appear in the near future.

Meanwhile keep an eye open for more licensing deals which should mean cheaper software for us poor colonials. On some other machines there is quite a bit of competition between companies to obtain licences from popular American software houses.

In cases where the licence has been to translate the game to another machine some of the results have been horrendous — if you've seen some of the non-Apple Lode Runners you'll know what I mean.

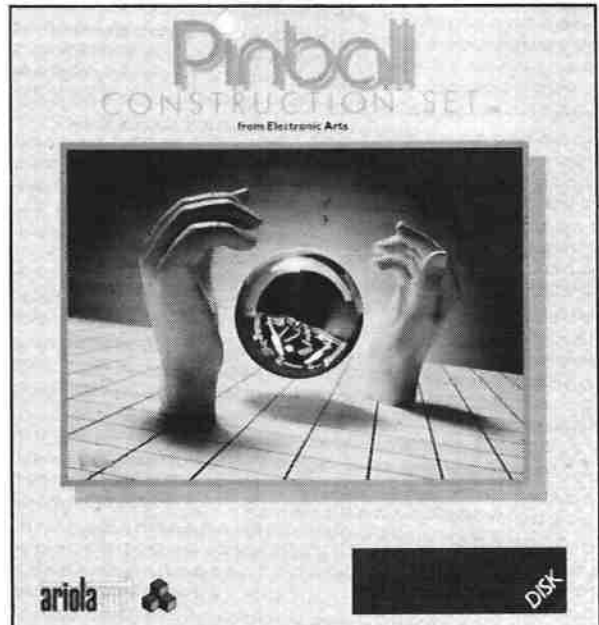
Fortunately there has never been a shortage of good quality software written specifically for the Apple. I gather Ariolasoft

also has some sort of connection with Broderbund, but that still leaves plenty more scope for the discerning licensee.

For example, how about Penguin, Sierra On-Line, Spin-

naker, Infocom, Datamost or Sir-Tech? Perhaps some enterprising person could even pick up the pieces of Sirius Software and make their games available again.

**Cliff McKnight**



*. . . and Pinball Construction Set*



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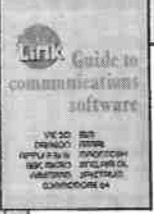
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# Text of the very best



You get more than a disc with Cutthroats

PSSST! Want to hear about a brilliant adventure? Sshhh – not so loud. And turn over the page now if anyone's close enough to read this. You can't be too careful. OK? No one around? Good. Read on – but keep looking over your shoulder.

If in the above you detect a note of caution bordering possibly on the excessive, then please don't blame me – blame Infocom. This adventure of theirs had me so engrossed that it was hard to revert to my normal saintly trusting self when writing this review.

You see, Cutthroats sets you down among the most villainous bunch of scoundrels this side of the Barbary Coast. Knowing which ones you could trust with your granny's life savings and which ones would slit your throat for just a smell of a fifty pence piece is guaranteed to make you paranoically suspicious, too.

The adventure concerns sunken treasure, and where there's treasure trove you can just bet your brass lamp there's bound to be skulduggery. Here's how Cutthroats sets the scene in its opening:

*"Nights on Hardscrabble Island are lonely and cold when the lighthouse barely pierces the gloom. You sit on your bed, thinking of better times and*

*far-off places. A knock on your door stirs you, and Hevlin, a shipmate your haven't seen for years, staggers in.*

*"I'm in trouble", he says. "I had a few too many at The Shanty. I was looking for Red, but he wasn't around, and I started talking about . . . here", he says, handing you a slim volume that you recognise as a shipwreck book written years ago by the Historical Society.*

*You smile. Every diver on the island has looked for those wrecks, without even an old boot to show for it. You open the door, hoping the drunken fool will leave. "I know what you're thinkin'", Helvin scowls, "but look!" He points to the familiar map, and you see new locations marked for two of the wrecks.*

*"Keep it for me", he says, "just for tonight. It'll be safe here with you. Don't let – ". He stops and broods for a moment. "I've got to go find Red!" And with that, Hevlin leaves.*

*You put the book in your dresser and think about following Hevlin. Then you hear a scuffle outside. You look through your window and see two men struggling. One falls to the ground in a heap. The other man bends down beside him, then turns as if startled and runs away. Another man then approaches the wounded figure.*

*He kneels beside him for a long moment, then takes off after the other man.*

*It isn't long before the police arrive and tell you that Hevlin's been murdered. You don't mention the book, and hours later, as you lie awake in your bed, you wonder if the book could really be what it seems".*

The adventure concerns your efforts to join forces with some of the locals, unsavoury as they might appear, and recover the lost treasure.

There are two shipwrecks, but you only get to search one in any single game. The program randomly determines which it shall be at the start.

To enlist the help of others, you'll need to visit quite a few places, the seediest of which is The Shanty. This is a scruffy wharfside bar where you shouldn't expect to meet the cream of society.

Johnny Red is a regular here, his bright red hair and black turtleneck sweater giving him an imposing appearance. The Weasel is another, a greasy cove who has the disconcerting habit of picking his teeth with a mean-looking knife.

Also frequenting The Shanty is Peter the Rat, so-called because he had to resort to extraordinary culinary measures when acting as cook on his last

voyage. He wears an eye patch.

Pete is not the only one with eye trouble. Perched on the bar is a parrot which not only has a black eyepatch but sports a wooden leg as well. I recommend you engage the parrot in conversation – it has a deliciously zany line in patter.

When you've recruited your gang and laid your plans, you'll need supplies and a ship. Later, and provided your gizzard is still intact, it's off into the deep and briny in search of the shipwreck.

Once there, it's then a not-so-small matter of exploring the wreck and recovering the treasure. Needless to say, don't expect any comforting cries such as "Oh, jolly hard luck, shipmate" from your cohorts if you foul up. Any hand that pats you on the back at such a juncture is likely to contain a knife.

Infocom go from strength to strength. Cutthroats is yet another example of their consistent ability to produce stimulating text adventures of the very highest quality. There's no one to touch them.

**Bob Chappell**

Title: Cutthroats  
Publisher: Infocom

ONE of the features of many commercially-available database systems of which users are totally unaware is the extravagant amount of space needed for each record.

It may seem obvious that at least one byte is needed to store each character in the record, but this is by no means always the case.

Furthermore, most databases use separator characters to separate the individual fields in a single record. A file containing 500 records, each with 11 fields, can therefore pack a disc with 5000 separators – clearly a waste of disc space.

How can the data be stored more efficiently? The answer is most clear when one considers binary data, for example the answer to a question being Yes or No, the sex of a person being either male or female. Such data requires only one bit of storage. The answers to eight such questions may be crammed into one byte.

The similarity with records kept on punched cards is obvious. Indeed, the first of the two systems I am about to describe represents an ideal way of computerising a punched card database.

The second system is even more efficient at packing data on to the disc, at the cost of more elaborate packing and comparison routines.

Packing is also possible even

# The gentle art of saving space – or don't use a byte when a bit will do nicely

More from PETER HARRIS on file maintenance commands

when there are more than two answers to a question.

There are, for example, only 31 days in a month at the most. There is no need to set aside a whole byte to store this value if five bits suffice.

Similarly only four bits are needed to identify one of 12 months in the year. A single byte serves to identify the current year within two centuries.

For the purposes of names and short text entries in many databases it is sufficient to use only capital letters. Again, only

five bits are needed to store 1 of a choice of 26 letters. Consider for example an address book with space for a name and 4 lines of address (see Table I).

The implementation of these ideas in a Basic program is not difficult, but the program runs very slowly, largely due to the time spent running the compression and expansion routines. Indeed, this is an excellent way of demonstrating the virtues of Pascal.

Economical packing may be achieved without any further

ado by declaring a PACKED RECORD (see Listing I), even greater packing densities being possible by declaring a PACKED ARRAY OF BOOLEAN and using routines like FILLBITS and BITTOINTEGER (see Listing I again). The program will also run faster, owing to the semi-compiled nature of Apple Pascal.

The equivalent routines in Basic are relegated to Appendix A. They look simple, but run slowly and will scarcely be touched on again.

Programmers using Basic should accept a compromise and be prepared to incorporate machine code routines. These will be provided as easy-to-use & commands in a further article in this series.

## Datasquash I

This system packs only binary data, without packing text characters, though integers in the range 0-255 may be represented by a single byte. It is therefore appropriate for recording data from punched cards with little text entry, such as name, date of birth, current date and so on.

It makes use of fairly simple and hence fast comparison routines for sorting cards. The prototype, devised to record details of anaesthetics given to patients in hospital, had space for 153 such items, together with the patient's initials, date of birth and date of operation.

Using relatively inefficient packing – only 7 bits/byte instead of 8 – the whole record for one patient was compressed into 29 bytes. Selecting the required records from the yearly total of around 7000 records takes around 12 minutes.

Figure I shows the flow of information from the keyboard via buffer areas in Datasquash I. These areas are allocated fixed positions in RAM.

The first buffer area, LINE, is used as a temporary store of binary information from the keyboard input routines, each whole byte having a value of 0 or 1. The length of LINE is equal to the number of bits in a single record.

A second area, WRBUF, has two components. WL is used to store the same data as LINE in a compressed form. The length of

### 1 Conventional storage

First name, surname (30 characters)	30 bytes
1st address line (20 characters)	20
2nd address line (20 characters)	20
3rd address line (20 characters)	20
4th address line (20 characters)	20
	110 bytes

### 2 Compressed storage

First name, surname (30 characters from A-Z and space)	150 bits
1st address line	
4 figure field for house no.	10 bits
20 character field for street	100 bits
2nd address line (20 characters)	100 bits
3rd address line (20 characters)	100 bits
4th address line (20 characters)	100 bits
Post code (8 characters from A-Z, 0-9, space)	56 bits
	466 bits
	= 59 bytes

Table I: Data compression for economical storage

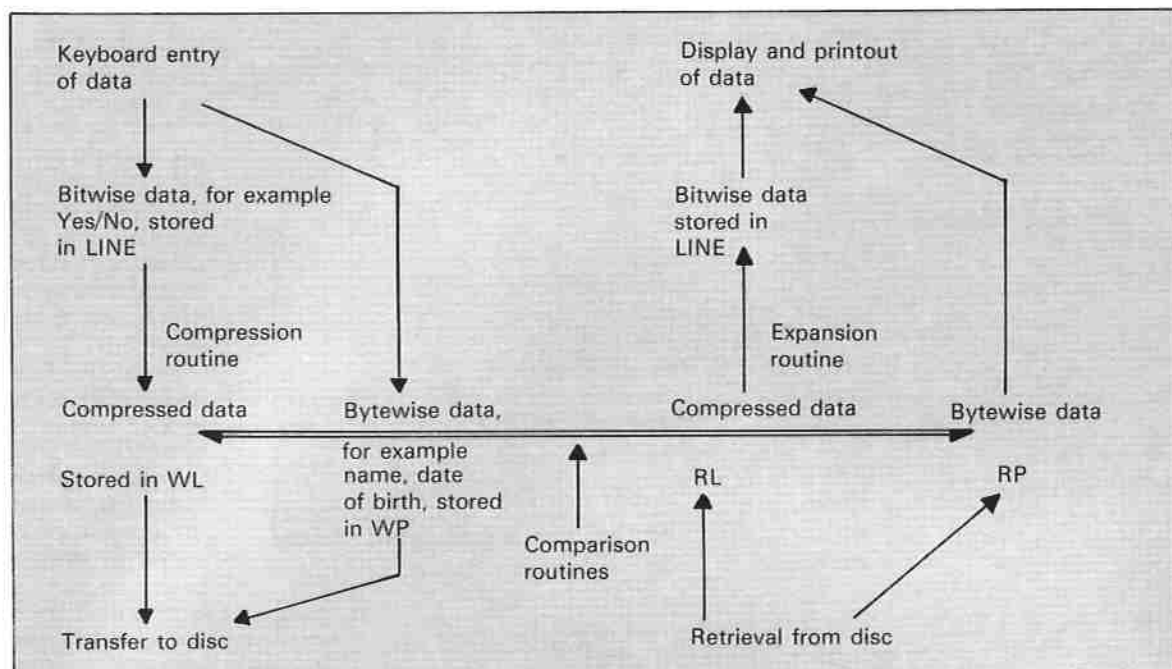


Figure 1: Flow of data in Datasquash I

WL is therefore 1/8 of the length of LINE.

Bytewise data – say name, date of birth, integers of up to 255 – are directed by the keyboard entry routines into WP. The combination of WL+WP is then transferred in

one fell swoop to the disc.

A similar process in reverse takes place when reading information from the disc, but the data from the disc ends up in a different buffer, RDBUF.

Space for LINE, WRBUF and RDBUF is allocated during the

initialisation by the &DOSFILE machine code (640 bytes for LINE, 80 bytes each for WRBUF and RDBUF).

**Comparison of records in Datasquash I**

There are two types of data

to be compared, whole byte and single bit data. Consider the very simple 4 byte record in Table II.

Obviously it would be easy to pick out all the records in a database of the persons with an initial N and an age of 43, but

```

]PROGRAM TESTBITPACK;

TYPE DATABLOCK = PACKED ARRAY(0..40) OF BOOLEAN;
DAY      = 1..31;
MONTH    = 1..12;
YEAR     = 1850..2050;
DATA     = PACKED RECORD
           D : DAY;
           M : MONTH;
           Y : YEAR;
           END;
VAR MO,DA,HO,MI: INTEGER;
    DATA1 : DATABLOCK;

FUNCTION BITTOINTEGER(LSB,MSB:INTEGER;DATA:DATABLOCK):INTEGER;
VAR COUNT,POWEROF2,TOTAL: INTEGER;

BEGIN
TOTAL:=0;POWEROF2:=1;
FOR COUNT := LSB TO MSB DO BEGIN
IF DATA[COUNT] (* is true *) THEN TOTAL := TOTAL+POWEROF2;
POWEROF2 := POWEROF2*2 END;
BITTOINTEGER := TOTAL
END;
  
```

```

PROCEDURE FILLBITS(LSB,MSB,INPUT:INTEGER;VAR DATA:DATABLOCK);
VAR COUNT: INTEGER;

BEGIN
FOR COUNT := LSB TO MSB DO BEGIN
DATA[COUNT] := ODD(INPUT);
INPUT := INPUT DIV 2 END
END;

BEGIN (* DEMO *)
WRITE('MONTH (1-12) ');READLN(MO);WRITELN;
WRITE('DAY (1-31) ');READLN(DA);WRITELN;
WRITE('HOURL (1-23) ');READLN(HO);WRITELN;
WRITE('MINUTE (1-59) ');READLN(MI);WRITELN;

FILLBITS(0,3,MO,DATA1);
FILLBITS(4,8,DA,DATA1);
FILLBITS(9,13,HO,DATA1);
FILLBITS(14,19,MI,DATA1);

WRITELN(BITTOINTEGER( 0, 3,DATA1));
WRITELN(BITTOINTEGER( 4, 8,DATA1));
WRITELN(BITTOINTEGER( 9,13,DATA1));
WRITELN(BITTOINTEGER(14,19,DATA1))
END.
  
```

how do we pick out all the ones with an interest in birds, fast cars and keeping out of jail? This combination codes to a value of 134 (2+4+128).

If we select only the records in which the 4th byte has a value of 134, we shall avoid picking the persons in which the 4th byte has a value of 134, we shall avoid picking the persons who are only interested in keeping out of jail, but we will fail to pick out the extravagant individuals who care for the booze as well as the birds, fast cars and keeping out of jail.

The answer lies in a truth table, Table III. If a bit in the key byte for comparison is zero then the sorting routine accepts any record, regardless of whether the corresponding bit of the record is 0 or 1. If the key bit is 1 the record will not be accepted unless the matching bit is also 1.

Note that this search process can be described as an AND search on multiple keys. Data in RDBUF may be compared directly with data in WRBUF without the delay involved in expanding each record back into LINE using the machine code routines provided in the next article in this series.

### Datasquash II

This system is more complicated than Datasquash I, and is intended to provide efficient packing when the data contains not only binary information but substantial amounts of text or

Byte 1	Ascii code of person's first initial
Byte 2	Ascii code of person's second initial
Byte 3	numerical value of age in years
Byte 4	Bit 0 (LSB) Interested in booze
1	Interested in birds
2	Interested in fast cars
3	Interested in easy money
4	Interested in horses
5	Interested in dogs
6	Interested in smart clothes
7 (MSB)	Interested in keeping out of jail

Table II: A simple database for market researchers

Record (in RDBUF)	
	0 1
Key	0 A A
(in WRBUF)	1 R A

A = record accepted (matched)  
R = record rejected

Table III: Truth table

figures. The flow of information is slightly different (Figure II).

### Comparison of data in Datasquash II

Again, this is slightly more complicated than in Datasquash I. Consider a byte of data in which 7 bits are used to record a single Ascii character, the 8th bit being used for a Yes/No answer:

Data byte	
Bit 7 (MSB)	0
Bit 6	1
Bit 5	1
Bit 4	0
Bit 3	0
Bit 2	0
Bit 1	0
Bit 0 (LSB)	1
Yes	Hex 41=Ascii code for letter A

If this byte were to be used as the key byte for comparison in the Datasquash I system only

records with a Yes answer would give a match. So far so good. However the following bytes would also give a match:

1 1 0 0 0 0 1 1	corresponding to letter C
1 1 0 0 0 1 0 1	corresponding to letter E
1 1 0 0 1 1 1 1	corresponding to letter G
.	.
.	.
1 1 1 1 1 1 1 1	corresponding to DEL character

Furthermore, it would be impossible to select only the records in which the answer in Bit 7 was No.

It is therefore necessary to compare the data twice, once, as in Datasquash I by selecting the records in which 1s in the key byte must be matched, and the second time by selecting the records in which 0s in the key byte must be matched but 1s do not matter.

In practice this is achieved by writing the data for comparison to two buffer areas. One is WRBUF, which has been previously cleared to 0s as in Datasquash I and the other is COMP, a new area of the same length as WRBUF which has been previously set to 1s before writing the data.

The truth table for COMP is shown in Table IV.

Space for COMP (80 bytes)

and for its associated expansion area CLINE (640 bytes) has also been reserved by the &DOS-FILE routines.

The first stage in planning a database program along these lines it to establish the number of bits required for each field. Some examples have already been given.

Whenever possible, limits to the range of possible answers should be set, the number of possible answers determining the number of bits needed.

A number may, of course, need more than 8 bits, but this is not hindrance. Even 6 digit numbers can be represented by 20 bits (3 bytes as opposed to 6).

A table is now drawn up (Table V) to arrange all the bits of each field into a chain before organising them into 8 bit groups (bytes).

At this stage I would recommend adding 4 bytes to the 76 required in the first table.

There are three reasons, the first being that one may well need to add further fields to the

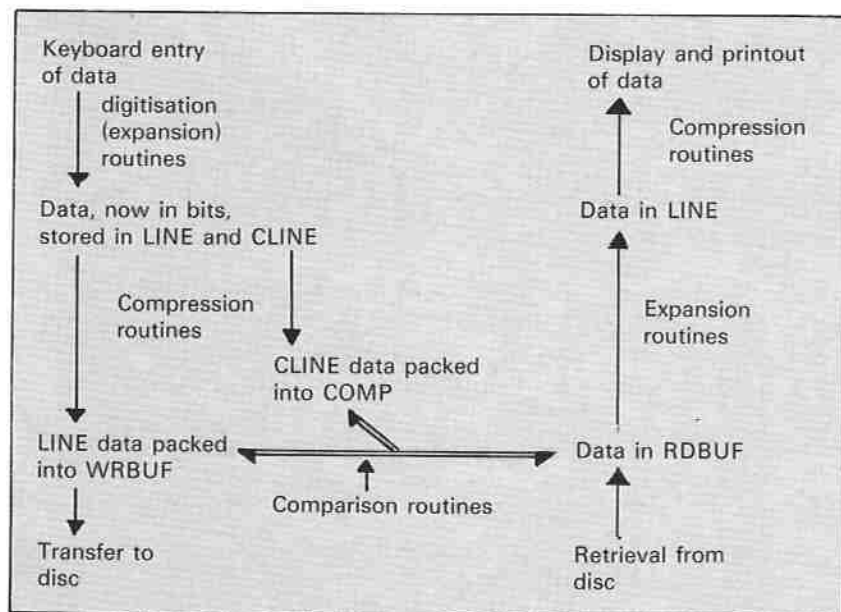


Figure II: Flow of data in Datasquash II

database, and the second that input, output and comparison routines set up for 80-character records may also be used for text handling programs.

The third, and perhaps best, reason is that 80 bytes is the default record length in the &DOSFILE system (see my previous article) which was specifically designed for the implementation of such databases, and which automatically reserves space for these areas.

Of course, it is perfectly possible to modify the lengths and positions of these buffer areas to suit one's own particular requirements, and there is no problem in having shorter record lengths.

It is not within the scope of this article to discuss the input routines necessary for the entry of information into the computer, but it is important to be

able to convert the results into bits to be stored in LINE. Routines for achieving this will be presented in the next article.

Record (in RDBUF)			
		0	1
Key (in COMP)	0	A	R
	1	A	A

A = record accepted (matched)  
R = record rejected

Table IV: Truth table

Field	Bits per field	no. of first bit	no. of last bit
First name (10 letters)	50	0	49
Surname (10 letters)	50	50	99
Date of birth			
Day	5	100	104
Month	4	105	108
Year	8	109	116
(Starting with the year 1850, this database will do until the year 2105)			
Sex (make/female)	1	119	
.	.	.	.
.	.	.	.
Number of pairs of socks (maximum 30)	5	600	604
Dog lover (Yes/No)	1	605	
Cat lover (Yes/No)	1	606	
Child lover (Yes/No)	1	607	
608 bits fit into 76 bytes			

Table V: The chain of bits

## Appendix A: Temporary storage of data as bits, using Basic routines

Listing II is a general subroutine for converting

```

998 REM Listing 2
999 REM Integer-to-bit
    routine
1000 FOR I = LSB TO MSB STEP
    -1
1010 N2 = INT(N/2)
1020 POKE I,NOT (N2*2 = N)
1030 N = N2
1040 NEXT: RETURN
    
```

Listing II

```

1047 REM Listing 3
1048 REM String-to-bit
    routine
1049 REM S$=string input,
    F=first address of string
    store in LINE
1050 IF LEN (S$) = 0 THEN
    RETURN
1060 MSB = F: FOR LE = 1 TO
    LEN (S$)
1070 N = ASC (MID$
    (S$,LE,1)) - 64: IF N < 0
    THEN N = 0
1080 LSB = MSB + 4: REM 5
    bytes altogether
1090 GOSUB 1000: REM Listing
    2
1100 MSB = MSB + 5: NEXT:
    RETURN
    
```

Listing III

decimal integers into a series of 0s and 1s stored in LINE, a previously defined area of random access memory (RAM). Before calling the subroutine, the integer must be placed in the variable N, and the addresses of the first and last bytes to be used must be placed in the variables MSB and LSB respectively.

This routine may be used for a positive integer of any size. It is up to the user to set aside sufficient space in LINE.

Listing III is a general subroutine for converting strings which consist only of uppercase letters and spaces to an appropriate series of 0s and 1s stored in LINE, using only 5 bytes per character.

It makes use of the subroutine in Listing II. If the string is to include lower-case characters, punctuation and digits, then lines 1070, 1080 and 1100 should be altered to:

```

1070 N = ASC (MID$
    (S$,LE,1))
1080 LSB = MSB + 6: REM 7
    bytes altogether
1100 MSB = MSB + 7: NEXT:
    RETURN
    
```

and space must be found in LINE for 7 bytes per character.

It is no good packing the data if you can't get the suitcase open again! Readers may like to try their hands at writing their own unpacking routines, but answers are also provided in Listing IV:

```

1108 REM Listing 4
1109 REM Bit-to-integer
    conversion
1110 N = 0
1120 FOR I = MSB TO LSB
1130 N = N * 2 + PEEK (I)
1140 NEXT: RETURN
1148 REM Bit-to-string
    conversion
1149 REM F=first address,
    E=last address in LINE
1150 S$ = ""
1160 FOR LE = F TO E-5 STEP
    5
1170 MSB = LE: LSB = MSB + 4
1180 GOSUB 1110
1190 IF N = 0 THEN N = -32
1200 S$ = S$ + CHR$ (N + 64)
1210 NEXT: RETURN
    
```

Listing IV

If the string packing routine has been modified to allow the entry of all Ascii characters the unpacking routine must be modified as follows:

```

1160 FOR LE = F TO E-7 STEP 7
1170 MSB = LE: LSB = MSB + 7
1200 S$ = S$ + CHR$ (N)
    if CHR$(0) is an acceptable
    character
    or
    1200 IF N (>) 0 THEN S$ = S$
    + CHR$ (N)
    if it is not. The following short
    program demonstrates the
    above routines:
    
```

```

5 REM Listing 5
10 MSB = 16000: REM
    Arbitrary start for LINE
20 LSB = MSB + 7: REM
    arbitrary limit of 8 bits
30 INPUT "DECIMAL NUMBER?
    (0-255) ";N
40 GOSUB 1000
50 VTAB PEEK (37): HTAB 30
60 FOR I = MSB TO LSB
70 PRINT PEEK (I);: NEXT:
    PRINT
80 INPUT "STRING ENTRY? ";S$
90 F = 16000: E = F + LEN
    (S$) + 5
100 GOSUB 1050
110 PRINT: FOR BYTE = F TO E
    - 1: PRINT PEEK (BYTE);:
    NEXT: PRINT
120 GOSUB 1150
130 PRINT S$
    
```

Listing V

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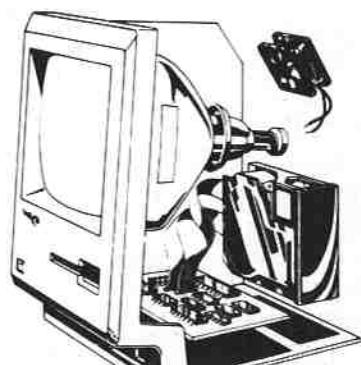
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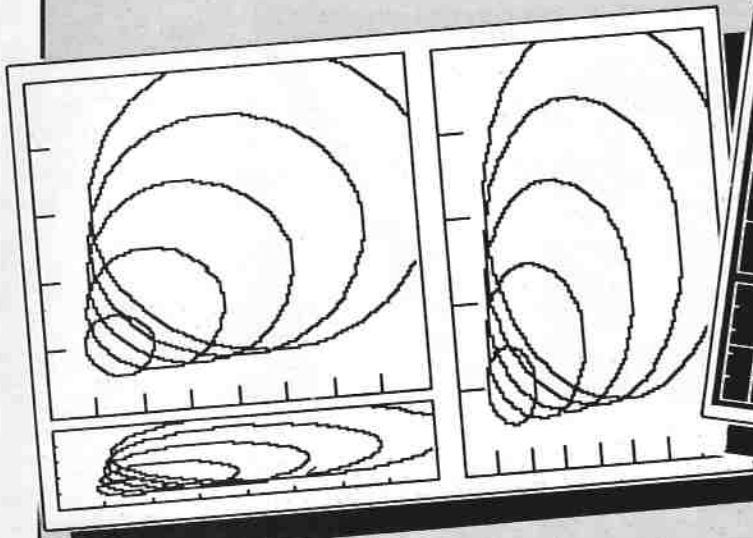
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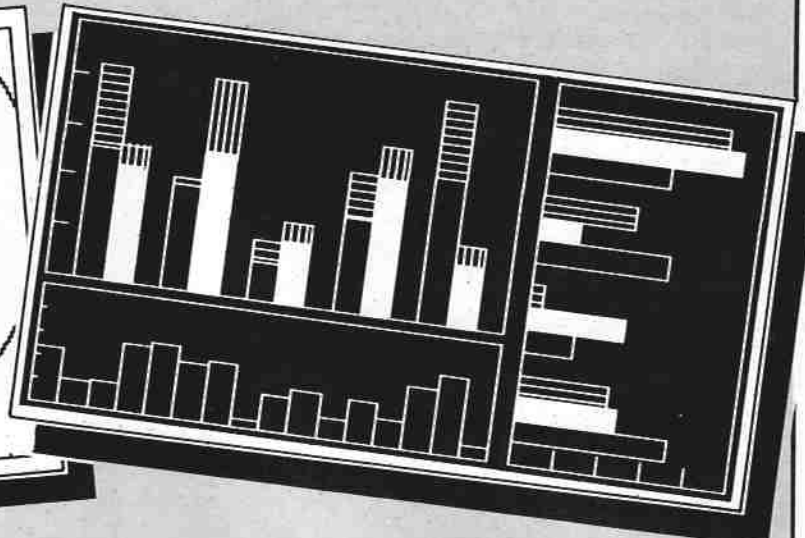
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# Apple User Graphics Library



Three plots from the example program



Example of the flexibility created by calling the routines three times

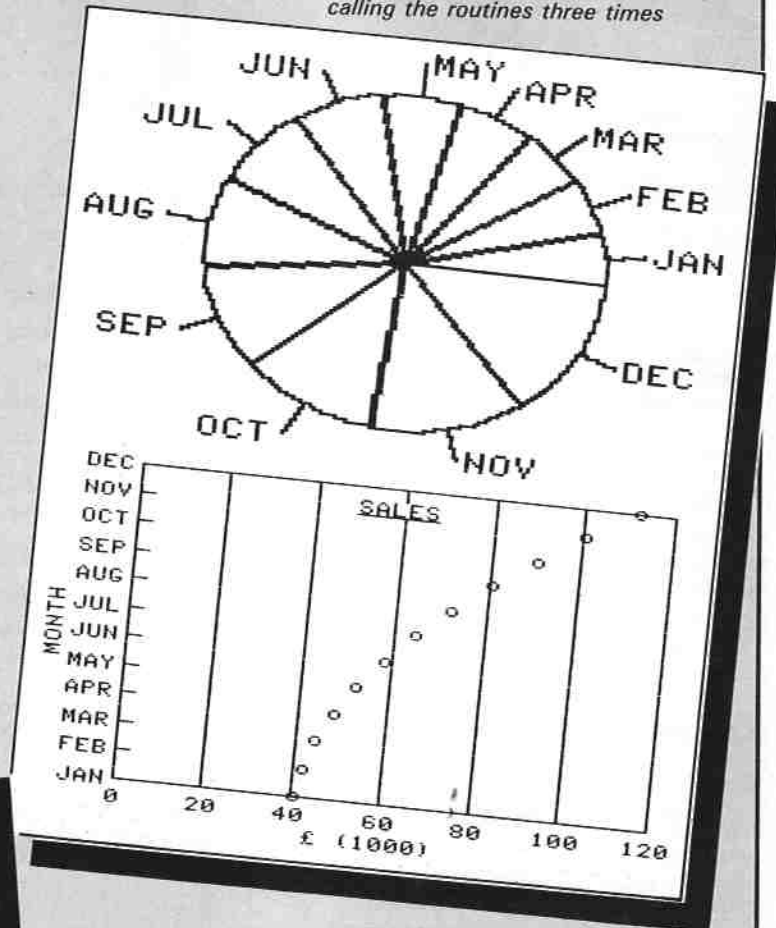
The November issue of *Apple User* saw the last in the Graphics Library series. For the benefit of those readers who missed some of the articles the complete list of issues that featured the Apple User Graphics Library are given in the panel below. Back numbers are still available, and these are listed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

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

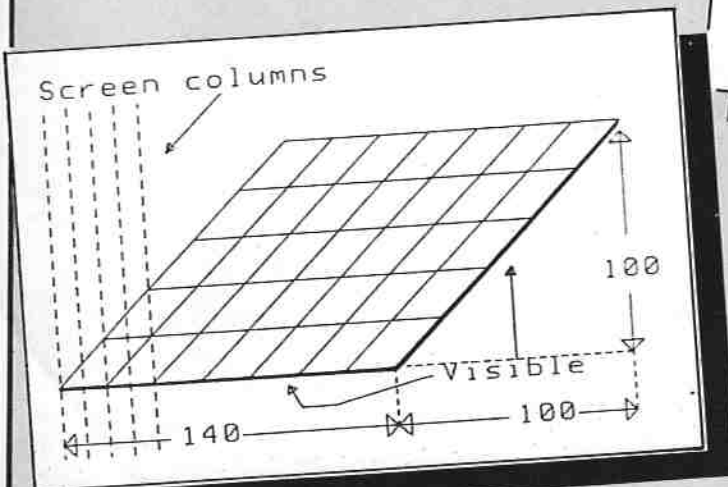
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**To order, use the form on Page 61.**



Produced by the example program



Part 1	February 1984	Part 10	December 1984
Part 2	March 1984	Part 11	February 1985
Part 3	April 1984	Part 12	March 1985
Part 4	May 1984	Part 13	May 1985
Part 5	June 1984	Part 14	July 1985
Part 6	August 1984	Part 15	August 1985
Part 7	September 1984	Part 16	October 1985
Part 8	October 1984	Part 17	November 1985
Part 9	November 1984		

NEARLY two years ago I had a detailed look at the Ice II card from Rovino (see *Windfall*, November 1983). This was a combined in-circuit emulator and debug card, and I was sufficiently impressed by it to buy one for my hardware projects.

At that time the DDT card was also available from Strategic Systems Technology and although it didn't offer the Ice facility, it seemed to provide an elegant and versatile debug facility that was operated entirely from the Apple's keyboard.

In contrast, the Rovino card requires the setting of a row of 48 miniature switches along the top of the card, meaning that the lid of the Apple must be kept off more or less permanently while using the card.

With this slight restriction in mind, which is just fine for the "hardware hacker", I thought it would be useful to look at the DDT card, which is more suited to the user developing complex software for the Apple, rather than for eventual use on a stand-alone single board computer.

At Apple '85 I spent some time chatting with Mike Adamson of E.D.A. Software, and was interested to find that his company has modified the original DDT, and now produces the DDTe card for the Apple IIe. He kindly agreed to loan me a card for this review.

The card is about 10.5 inches long by 3 inches high — some 3 inches longer than Rovino's card — and has a small piggy-backed circuit board near one end.

This, together with a much revised program in the on-board eprom, constitutes the modifications that E.D.A. made to the original design.

At the keyboard end of the board is fitted a 40 pin DIL header on a ribbon cable about four inches long, the other end of which terminates in a 40 pin plug which fits into the socket next to the IIe's power supply, normally occupied by its microprocessor.

It is through this cable that the DDTe card picks up the necessary signals from the motherboard, and the first thing that I noticed was that the card only uses the Gnd and +5V

# DDTe offers a powerful development environment

**BILL ALLEN examines a versatile debug card for the Apple IIe**

connections on its edge connector.

In other words, a whole slot of the Apple is tied up when, just as easily, the supply could have been taken along the ribbon cable from the microprocessor's socket.

This would have left us with the problem of where to put the DDTe card — I found that it could have been fitted on top of the Apple's power supply, with, say, sticky squares to hold it in place and prevent it from being shorted out, or even alongside the supply. Very tight for space, but it could be done with a sheet of insulating material to prevent short circuits.

Whatever the solution, I really would advise E.D.A. to look at this problem, as most people can't afford to lose a slot unnecessarily.

Another point to watch out for is that one has to be very careful fitting the 40 pin plug into the microprocessor's socket the correct way round. The instructions provided are fairly clear, but the 40 pin plug had been fitted the wrong way round and, had I not noticed this, I might have ended up with a very sick IIe on my hands.

It would be advisable for the User's Manual to include a diagram to make the connection absolutely clear — it would also help with the exact folding and route of the cable.

At the rear of the card is a

cable about 24 inches long with a pushbutton on the end. This button is one way of "intercepting" the execution of a program.

In order that the lid may be left permanently fitted, the pushbutton was led out through a convenient opening in the back of the Apple. Unless the button is pressed, the DDTe card has absolutely no effect on the operation of the Apple, which is as one would expect.

After powering up the Apple, the program which has been booted can be intercepted at any time by pressing the pushbutton. This causes the initialisation of the DDTe card and, after three short beeps on the Apple's speaker, we are presented with the menu shown in Figure 1. This is actually the Help screen, and can be invoked any time the DDTe card is active by entering the command "?".

With this Help screen dis-

```
APPLE-DDTe .ADE#000054 (C) 1985 BY EDA
? HELP
A ASH MODIFY MEMORY
H HEX (ASC) MOD MEM
L LIST-16
D DUMP HEX (ASC)
P PRINT SCREEN
F FIND STRING
M MOVE MEM
C COMPARE MEM
R REGISTER
E EXECUTE
I INTERCEPT
S SNGL-STEP
V VIEW SCREEN
W WINDOW
Q QUIT

PRESS ANY KEY TO CONTINUE
```

Figure 1: Help screen

played, pressing any key causes the main screen to be displayed. The latter can be a bit bewildering at first sight (see Figure III). Therefore, before looking at this in detail, it would be worth considering some simple application programs that will illustrate the features of the DDTe card.

The first program was a simple Applesoft Basic loop:

```
10 FOR K=1 TO 10000:
PRINT K: NEXT K:
END
```

Intercepting this program at any time, we enter the command Q (Quit), and are then presented with a sub-menu:

```
PC, MON, BAS, LANG,
RESET
```

Entering the default option P quits from the DDTe to the current program counter value, that is, the program continues from the point at which it was intercepted.

Entering B quits to Applesoft Basic, M to the machine language monitor, R clears any bank-switched RAM and quits through the Reset vector, and L quits through the "soft-entry" vector \$3F2/3.

As a check on this last command, the simple loop program was entered in Integer Basic rather than Applesoft and, as expected, entering Q then L quit to the Integer Basic prompt.

What was surprising, however, was that Q followed by B also quit to Integer rather than the expected Applesoft Basic. This clearly needs looking at.

Another thing I noticed was that, after running the program in Applesoft and quitting using B or L, it was possible to enter Integer Basic using the INT command, as expected.

Conversely, after running the program in Integer Basic and quitting using the L command, Applesoft could be entered using the FP command.

However if we quit Integer Basic using the B command, any subsequent attempts to enter Applesoft, using FP, resulted in "Syntax error". Even resetting the Apple didn't clear this problem — it had to be powered off, or, at least, the System Master disc rebooted.

So much for intercepting and resuming a program — this is the sort of facility that many boards

offer, for example, the Snapshot card.

What really concerns us is the debug facilities of the DDTe card. An obvious program for me to try out was the program Traffic1, which was used as an example in my review of Rovino's Ice II card. For the present review, however, I'll use a shortened version (see Figure II) which simply flashes a single light on and off. This is connected to line PBO of a Versatile Interface Adapter card in slot 4 of the Apple.

As with the earlier program, this has features typical of many application programs. That is, it has a subroutine, useful for checking the operation of the stack. It involves branches so we can watch flags changing in the 6502's status register. And it involves a zero page scratch location, to illustrate the windowing feature.

Above all, when we connect the appropriate peripheral – a demonstration traffic light, or even a stepping motor – something happens *outside* the computer!

After assembling "Flasher1", the resulting machine code is in locations \$800 to \$82D inclusive. We can thus press the pushbutton to intercept, then enter Q followed by M to quit to the machine code monitor.

The program can then be executed using the command 800G. Alternatively, the S-C Macro Assembler allows us to execute the program directly using the command MGO START.

As with Basic, we can intercept the program at any time, and resume from the point of interception by entering Q followed by P (quit to program counter value).

To examine the operation of the program in detail the pushbutton was pressed to intercept the execution and then W was entered to invoke the window function. We were prompted to enter the window number (0 to 7), so we entered 0.

Then the menu gave us the choices CLR, HEX, ASC, DEC, according to whether we wanted to remove the window, display its contents in hex, Ascii or decimal.

We entered H (hex), and another sub-menu was then

presented, with the alternatives BASE, X-, Y-, S-INDX.

We entered B (base), which selects the default direct entry mode of a window address, without indexing – the other three modes use the X, Y or S register to index from a starting address.

Finally we were prompted to enter the address. The full four hex digits must be given, and these scroll from left to right as they are entered, thus any errors may be corrected by further key presses. Then Return is pressed to enter the final address.

Since we wanted to window the zero page scratch address, 0000 was entered. Further prompts were given – AUX, MAIN RAM (M was entered); AUX, MAIN ZP (another M entered), INT, SLOT ROM (we entered S).

Note that since we ended up selecting the default in each case, we could alternatively have pressed the Return key three times.

Finally, we were prompted for a name for the window – although it comprises eight consecutive locations, we were only interested in a single one (0000), and so we entered its

symbolic name CNTR.

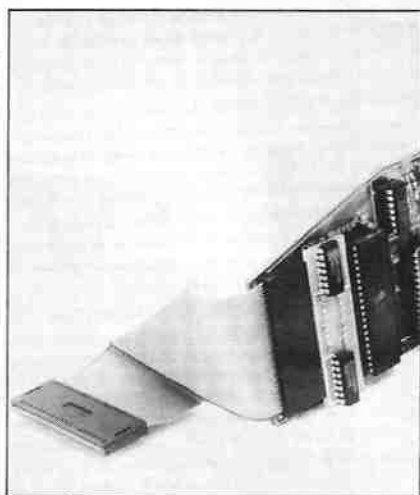
In a similar way, a second window was entered, called PRB (the port address, C400), and a third one (starting at 01F8) corresponding to the 6502's STACK. The program was then executed, using the command E followed by 0800.

When the program was intercepted by pressing the pushbutton the windows allowed us to examine the current state of CNTR, PRB and the STACK at the point of interception.

It was decided then to continue execution of the program one step at a time, using the command S. We were presented with three options: START, PRINT, QUIT – pressing S again caused the program to step once, and then return us to the screen menu.

So it really amounted to having to press S *twice* for every single step. It would have been very much easier if the commands could have been rearranged so that only a single key press was necessary.

It should be noted that, with the windowing facility on Rovino's Ice II card, the windows were displayed all the



SST's DDTe card

time, and their contents could be monitored during the real-time execution of a program. Of course, their display would slow the program down a little.

In contrast, the DDTe card doesn't interfere with the screen display in any way during the program execution, so the windows only show up when the program is intercepted.

Obviously, the basic philosophy of the two cards is different and windows, whether permanently visible or not, are a really useful feature.

One of the commonest problems with single stepping is that excessive amounts of output can result, especially when the program being executed contains multiple nested loops, as ours does.

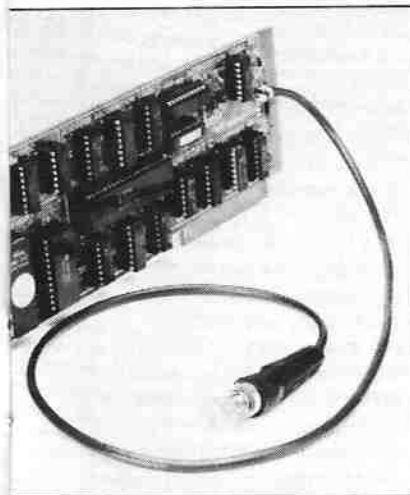
However we can easily avoid this problem by changing the contents of the appropriate registers or memory locations during the single stepping, to effectively shortcut the loops.

To illustrate this, assume that we have the light on and that we are in the middle of timing out the three second delay. The first window would indicate that PRB = 01, and the second one might show that CNTR = 0B. Also, typical values in the registers might be A = 03, X = 36 and Y = AF. This means that more than 300,000 instructions must be executed – and twice this number of presses of the key S – before the light goes off again.

Alternatively we could examine the program's execution at the end of the timing loop by making the following changes: CNTR = 01, X = 01 and Y = 01. We can do this by entering R (for registers), X, 0, 1, Return, R, Y, 0, 1, Return, H (for

		1000	;PROGRAM "FLASHER1"			
		1010				
		1020	;SIMPLE LIGHT FLASHER			
		1030	;APPLE USING VIA CARD IN SLOT 4)			
		1040	; (21 JULY 1985)			
		1050				
		1060	CNTR EQ \$00	NO. OF SECONDS DELAY REQUIRED		
		1070	PRB EQ \$C400	PERIPHERAL REGISTER B		
		1080	DDRB EQ \$C402	DATA DIRECTION REGISTER B		
		1090				
		1100	OR \$0800			
		1110				
0800	A2	FF	1120	START	LDX #\$FF	INITIALIZE STACK POINTER
0802	9A		1130		TXS	
0803	A9	FF	1140		LDA #\$FF	SET UP I/O PORT...
0805	8D	02 C4	1150		STA DDRB	...FOR ALL O/P
			1160			
0808	A9	01	1170		LDA #%00000001	LIGHT INITIALLY ON
080A	8D	00 C4	1180	SEND	STA PRB	SEND LIGHT STATUS TO PORT
080D	48		1190		PHA	PUSH STATUS ONTO STACK
080E	A9	03	1200		LDA #\$03	
0810	85	00	1210		STA CNTR	DELAY 3 SEC
0812	20	1B 08	1220		JSR DELAY	
			1230			
0815	68		1240		PLA	PULL LIGHT STATUS FROM STACK
0816	49	01	1250		EOR #%00000001	REVERSE STATUS...
0818	4C	0A 08	1260		JMP SEND	...AND SEND IT TO PORT
			1270			
			1280			
			1290			
			1300	DELAY	ASL CNTR	
081B	06	00	1310		ASL CNTR	
081D	06	00	1320	COUNT	LDX #\$C3	
081F	A2	C3	1330	AGAIN	LDY #\$FF	
0821	A0	FF	1340	MORE	DEY	
0823	88		1350		BNE MORE	
0824	D0	FD	1360		DEX	
0826	CA		1370		BNE AGAIN	
0827	D0	F8	1380		DEC CNTR	
0829	C6	00	1390		BNE COUNT	
082B	D0	F2	1400		RTS	
082D	60					

Figure II: Sample program



hex modify memory), 0, 0, 0, 0, Return, Return, Return, Return, 0, 1, Return. After single-stepping seven times from this point, the screen display would be similar to that shown in Figure III.

Note that the actual display would contain one line less than that shown – the extra line has been included to show additional features.

The status line shows that the current intercept status (INT) is not set for any (X) access – that is, we are intercepting with the push-button at present – the current screen soft-switches (SCR) are set to text rather than graphics, all rather than mixed, low rather than high resolution, page 1 rather than page 2, 40 rather than 80 column display, and normal rather than alternative character set.

We note the following. The instruction DEY decrements from 01 to 00, resulting in the Z flag becoming set. The branch BNE 0823 is therefore not taken, and we continue to the next instruction at address 0826.

This instruction, DEX, decrements X from 01 to 00, again resulting in the Z flag being set, so that the branch BNE 0821 is not taken.

The zero page memory location decrements from 01 to 00, and so the branch BNE 081F is not taken.

Therefore the RTS instruction causes the return address to be pulled from the stack and incremented, so that we return to the address 0815.

The next instruction, PLA, causes the status of the light to be pulled from the stack before being reversed. It may be noted

that a diagnostic output of the kind shown in Figure III may be sent directly to the printer, giving a very powerful debug facility.

It would have been useful, however, to have this single stepping facility automatic, perhaps at a controllable rate of 0 to 9, to avoid the need for always having to press the S key twice to make a step.

So far we have assumed that the current program is intercepted by means of the push-button.

As an alternative the intercept can be set directly from the keyboard. For example, let's again look at Flasher1. We first set the DDTe card to intercept at the address CNTR by entering 1, 0, 0, 0, 0, Return.

We were then presented with the options >=<X, which allow us to intercept at addresses greater than, equal to, less than the specified address, or any address at all. Obviously, when we use X, it doesn't matter what address was entered.

We entered =, and were then given the option of intercepting on a Write, Read, Sync operation of the specified address, or Not at all – that is, effectively switching off the interception facility. We selected R.

Finally, the program was executed from the beginning. It intercepted at the addresses

```
main() /* Program "double.c" doubles an integer number */
{
  int number;
  for(;;) {
    printf ("n= ");
    scanf ("%d", &number);
    number=doublesize(number);
    printf ("2n= %d\n\n",number);
  }

  doublesize(arg)
  register int arg;
  {
    int i;
    i=arg*2;
    return(i);
  }
}
```

Figure IV: A simple C program

expected (081B, 081D, 0829, 0829, . . .), but displayed the details of the next instructions, that is those at 081D, 081E, 081F, 082B, 082B.

Once this is appreciated, the facility can be used very easily, and each interception results in a new instruction being scrolled on to the bottom line of the main screen display, while previous interceptions are shown on the lines above.

One really funny "feature" – could I be so bold as to refer to it as a bug? – is that the first instruction of the program (LDX \$FF) slipped in before the first legitimate interception.

At first this seemed to be a reasonable reminder of the address from which the pro-

gram was executed. However, this was checked out by inserting NOP's at addresses 07FC to 07FF, and then executing from each address in turn – the "spurious" instruction was displayed as LDY #A0 when the program was executed from 07FC to 07FE, and LDY #A2 wehn it was executed from 07FF.

This clearly needs to be looked at and, while on the subject of the main screen display, it is felt that there should be a facility for clearing the display – the previous six interceptions displayed above the bottom line could be left behind from a previous program and can cause a lot of confusion.

Various other interceptions were carried out. For example, >C400W resulted in interceptions at the instruction STA DDRB (since this is a write to the address C402).

>07FFS intercepted every line of the program, and effectively single-steps through the program. Remember, by selecting a sync operation, this causes interception on every op-code fetch.

It was decided to put the interception to really good use by investigating the allocation of memory locations during the execution of a program using the Aztec C compiler (6502 version).

Register variables provide one way of linking between C and assembly language, and so a thorough understanding of storage locations is essential.

Rather than looking at the particular program that I was developing, the general prin-

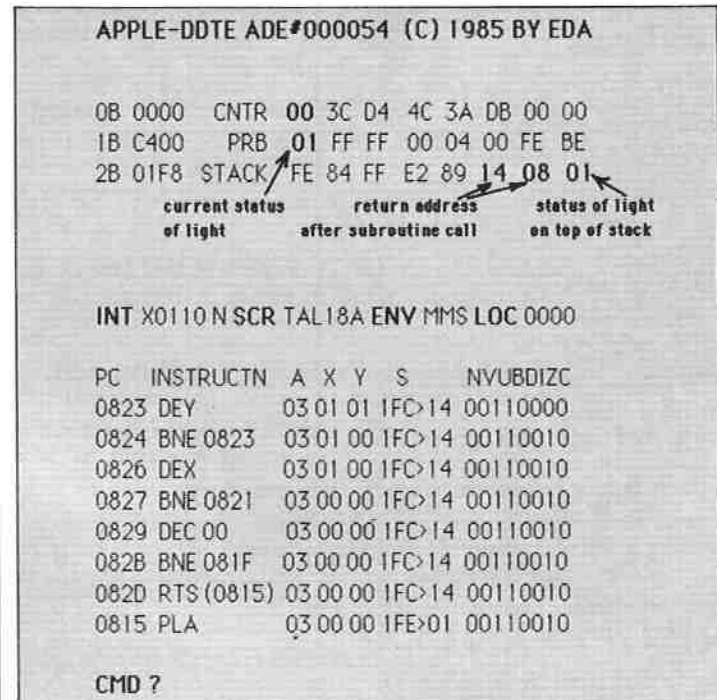


Figure III: Main screen display

ciples can be more easily illustrated by the simple program shown in Figure IV.

The problem is that we know from the Owner's Manual that memory location 0080 is used for the register variable arg, but are not quite sure how this links with the rest of the program.

So we execute the program, enter a single digit, say 3, and then, before pressing Return, we set the DDTe card to intercept on a read from the address 0080, as suggested by the statement `i=arg*2`.

When execution is resumed we find a whole succession of places in the program involving a read operation on location 0080.

However with a window set for location 0080 we can identify which of the instructions actually writes 03 there.

Since the bottom line of the screen identifies the address at which this occurs, it is a simple matter to look at the section of code in this area and verify, in fact, that instructions LDA 80,

STA 1C, LDA 81, STA 1D transfer the 03 from the register variable in 0080/81 to the general variable 001C/1D.

Finally we can reset the intercept address to the end of this block of code (0897) on Sync, that is op-code fetch, and the program will then only intercept at the point in which we are interested.

It must be mentioned in passing that the V (view screen) facility is particularly useful when stepping through a large section of code like this. At any stage any of the screens can be examined to ascertain at exactly what stage we are with the execution, such as outputting a string of characters to the screen.

It has to be admitted that a certain amount of detective work is necessary to find one's way around a large and sophisticated piece of software like the Aztec Compiler, but there are less ambitious projects for which the DDTe card may be used.

**VERDICT:** The DDTe card is certainly for the specialist, since a good knowledge of the 6502 at machine code level is essential for an understanding of how to use it effectively.

To such a person it offers a powerful development environment.

For the engineer who is developing software for a 6502 system other than the Apple, Rovino's Ice II card still has the edge. In other cases the DDTe card is certainly worth consideration.

It's nice to be able to set up all the intercepts from the keyboard, rather than worrying about setting a large number of miniature switches.

A particular strength of the card is that it allows examination of any kind of memory, including that on

some of the more sophisticated peripherals for the Apple, such as extended 80 column cards.

However the manufacturers would be well advised to look carefully at the ergonomics of the card's design and its software – there's no way it could be described as user-friendly.

Although the User's Manual was quite well written, I feel that some concrete examples could have been included to illustrate the many features of the system, rather than confining it to pure description.

Finally, at £235, I feel that the card may be a little too expensive for the hobbyist.

For the professional software developer, it would be a very worthwhile investment.

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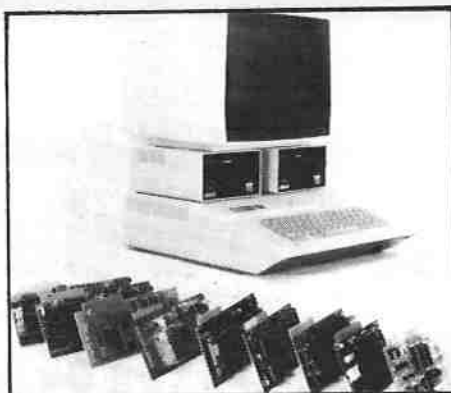
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VISA

MICROSOFT'S Multiplan was the first spreadsheet for the Macintosh and it offers a wide range of features. But one of its shortcomings is that it does not have built-in functions to do calculations with dates.

One way to solve this problem is to buy Lotus Jazz, which has built-in serial numbers for all the dates from January 1, 1904 to February 6, 2040. However to run Jazz you need a 512k Mac and if you already have Multiplan and a 128k Mac you may prefer a cheaper solution.

Fortunately, Multiplan offers the Lookup function which can look up a value in a given cell then search the first column of a table until it finds the number, then extract another value from the last column of the table on the same row.

The printouts shown a Multiplan worksheet which features three lookup tables to find the number of days between two

dates.

The first shows the formula that calculates the number of days from January 1, 1981 to the date shown on row 3 of the table. The formula refers to cells which have been "named" with the names Day, Month, Year, Ldays, Ndays and Ydays.

The name Day refers to rows

3, 4 and 5 of column 1. Month and Year refer to the same three rows of columns 2 and 3. Ldays refers to the table that occupies rows 9 to 20 of columns 3 to 5.

Ndays refers to rows 9 to 20 of columns 3 and 4 while Ydays refers to rows 9 to 20 of columns 1 and 2.

So the formula in R3C4 first

tests to see whether the Year in R3C3 is a leap year. For this purpose it uses the INT function which drops the decimal portion of a number.

When 1983 is divided by 4 the result is not a whole number, whereas INT(1983/4) is bound to be a whole number. Because 1983/4 is not equal to

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INT(1983/4). Multiplan uses the second lookup table named Ndays.

It looks up the value of the name Month in R3C2 and finds the number 10. It then searches rows 9 to 20 of column 3 until it comes to the number 10 in row 18 then it selects the number 273 from column 4 which is the number of days from January 1 until October 1 in any non-leap year.

Having found the number 273, the formula then adds the value of the name Day in R3C2, in this case two days. Finally it looks up the value of the name Year in R3C3, then searches rows 9 to 20 of column 1 until it finds 1983 in row 11. It then selects the number 730 from column 2.

The sum total of 273, 2 and 730 is 1005, which is then displayed in R3C4.

The formula in R3C4 is copied down into the next two rows so the values 1381 and 1740 are derived in a similar way. Finally, simple formulae in rows 4 and 5 of column 5 calculate the difference between the numbers in column 4, giving the number of days between the two dates.

The table covers only 12

File Edit Select Format Options Calculate

R3C4 =IF(Year/4=INT(Year/4),LOOKUP(Month,Days),LOOKUP(Month,Ndays))+Day+LOOKUP(Year,Ydays)

Elapsed Days							
	1	2	3	4	5	6	7
1	ELAPSED DAYS						
2	Day:	Month:	Year:	Days:	Elapsed:		
3	2	10	1983	1005	Days:		
4	12	10	1984	1381	Days:		
5	6	10	1985	1740	Days:		
6							
7	Days per year		Normal year		Leap year		
8	Years:	Days:	Months:	Ndays:	Ldays:		
9	1981	0	1	0	0		
10	1982	365	2	31	31		
11	1983	730	3	59	60		
12	1984	1095	4	90	91		
13	1985	1461	5	120	121		
14	1986	1826	6	151	152		
15	1987	2191	7	181	182		
16	1988	2556	8	212	213		
17	1989	2922	9	243	244		
18	1990	3287	10	273	274		
19	1991	3652	11	304	305		
20	1992	4017	12	334	335		

The formula in R3C4

years from 1981 to 1992 but it is quite easy to extend it to cover more years. A refinement of the table is shown in the printout displaying the formula in cell R10C2 which is copied down into the remainder of the

column. This checks to see whether the year in the previous row is a leap year.

If so it adds 366 days to the cumulative total. If not, it adds 365 days. The numbers from rows 10 to 20 of column 1 are

generated by formulae that add 1 to the number in the previous row. Thus, if the starting date in row 9 is changed, the Ydays table is automatically adjusted to give consecutive years in column 1 and the correct number of cumulative days in column 2.

The only shortcoming of this technique is that it treats the year 2000 as a leap year. It is not difficult to adapt it to cope by nesting another IF statement in the formulae in the Ydays table.

If all this seems like a solution searching for a problem, try analysing your gas and electricity bills with this technique. Some people compare the quarterly bill with the same quarter in the previous year, but this is not a reliable comparison because the number of days between the meter readings can vary from 80 to 110.

The reliable way is to calculate the number of days between the meter readings then divide this into the total number of units used per quarter to obtain an average daily consumption figure. This Multiplan technique makes it easy to calculate the number of elapsed days accurately, whereas manual methods with a calendar are prone to error.

File Edit Select Format Options Calculate

R10C2 =F(R[-1]C[-1]/4=INT(R[-1]C[-1]/4),R[-1]C+366,R[-1]C+365)

Elapsed Days							
	1	2	3	4	5	6	7
1	ELAPSED DAYS						
2	Day:	Month:	Year:	Days:	Elapsed:		
3	2	10	1983	1005	Days:		
4	12	10	1984	1381	Days:		
5	6	10	1985	1740	Days:		
6							
7	Days per year		Normal year		Leap year		
8	Years:	Days:	Months:	Ndays:	Ldays:		
9	1981	0	1	0	0		
10	1982	365	2	31	31		
11	1983	730	3	59	60		
12	1984	1095	4	90	91		
13	1985	1461	5	120	121		
14	1986	1826	6	151	152		
15	1987	2191	7	181	182		
16	1988	2556	8	212	213		
17	1989	2922	9	243	244		
18	1990	3287	10	273	274		
19	1991	3652	11	304	305		
20	1992	4017	12	334	335		

The formula in R10C2

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Z-RAM is available with either 256K or 512K of additional memory PLUS a powerful Z-80B microprocessor for running CP/M software. Added to the IIc standard 128K of memory, that gives 384K or 640K of Ram, which gives an AppleWorks desktop size of 229K or 413K.

Z-RAM with AppleWorks will knock your socks off.

As well as expanding the actual desktop size, Z-RAM will also simultaneously load the AppleWorks program into memory thus eliminating the need for a second disk drive. This "Ram-disking" also means that AppleWorks will now run about 10 times faster.

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Z-RAM will expand the AppleWorks DataBase to 5100 records per file, and doubles the Word Processor size to 5100 lines per document.

Z-RAM even gives you a printer buffer (print spooler). So you're back into AppleWorks without waiting for the printer to finish.

Z-RAM is also a high speed solid state disk drive or Ram-Disk and is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

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Z-RAM is easily handled by the IIc power supply by using a patent-pending power saving design.

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RAMWORKS has the same features as Z-RAM except that it does not have an in-built Z-80 co-processor (it provides 80-column display) and the print spooler works with Apple's Super Serial Card (or compatible).

RAMWORKS can be expanded to a greater size (2.5 Megabytes). Additionally, there is an RGB option which will provide double-hi-res colour graphics without using a further slot.

Ramworks	Appleworks Desktop
128K	101K
256K	183K
512K	367K
1 MEG	736K
2.5 MEG	1837K

As well as AppleWorks, other programs supported by RAMWORKS and Z-RAM include: Magicalc, Flashcalc, Supercalc 3A, Diversi-DOS and others. Also, RAMWORKS supports Dark Star's Shuttle Multi-Tasking System.

## CLOCKS for IIc & IIc

### TIMEMASTER H.O. – IIc SYSTEM CLOCK – IIc

Both these clocks offer full Pro-Dos compatibility and automatic time and date stamping of files – including AppleWorks files. When used in conjunction with RAMWORKS or Z-RAM, these clocks will continuously display the date and time on the Appleworks screen, and give automatic access from AppleWorks database (just use a time or date field).

Timemaster for IIc plugs into any slot, features a 20 year auto-recharging battery and will emulate other clocks.

System Clock for IIc features a pass through serial port – the IIc system clock plugs into either IIc serial port, then the modem or printer plugs into the clock. Batteries are replaceable (1-2 years).

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SUCH is the power of television that we quite regularly watch quite degraded pictures. As long as we can make out roughly what is going on, our brains reject any interference with normal service.

When using a computer, the only information on the screen is the text, and all of it has to be clearly visible to be understood.

Poor picture quality leads to excessive, or at best unnecessary eye movement. This makes for tired eyes and what we often call eye-strain. The computer user ends up having to rescan a line to extract the meaning.

It is exactly the same as trying to decipher Gothic script when you aren't used to it. All the letters, and probably the words, are well-known, but the text often has to be read more than once.

While not wanting to get into any of the "Are VDUs safe?", or "Do they cause eye-strain?" arguments, a few comments aren't out of place.

Quite often I see VDUs, or monitors, with the contrast set far too high. Lines of text ping out at you and almost burn a hole in the back of your head. This is quite unnecessary.

A reasonable monitor screen, with not too much incident light falling on it, can produce perfectly adequate results at quite a low contrast setting.

An effect of the contrast being too high is to defocus the electron beam as it scans the tube. This naturally degrades the image. Having the contrast too high also ages the tube considerably.

The correct way to set up a monitor is as follows. In the television industry there are two words that have very clear meanings:

- Brightness always means the brightness of the background, or raster. The raster is the scan of the electron beam with no picture or text on it.

- Contrast is always the level of modulation of the beam, in our case text.

The contrast control actually alters the amplitude of the video signal fed to the tube. If we set the brightness so that the raster is just not visible, and then

# A sight for sore eyes?

Then improve your video image with a little help from CHRIS PAYNE

adjust the contrast for a reasonable level of text then all should be well.

If you find that the raster is now visible – not all monitors are perfect – reduce the brightness until it just can't be seen. If your monitor has a focus control, adjust it with the contrast turned down quite low, and look closely at some text on the screen.

If the control is inside the monitor, and quite a number are, get your dealer to do it for you. It's worth doing, even if you assume that the manufacturer has done it, as it does change a bit with ageing of the set.

Video now means anything from the machine used to record television pictures to what used to be called "pop promos" made by a group to help sell its latest record. This article will use the word with its original meaning, that is the electronic signal that leaves your computer and gets plugged into the back of your monitor. It may not be as exciting, but this isn't a music

magazine, is it?

If you are using a high resolution green or orange screen monitor with your Apple you may be interested to know that you aren't using anywhere near its full capability. Most of these monitors have a bandwidth approaching 14MHz, or in some cases 20MHz. This is the highest frequency that the set maker reckons that it can reproduce on the screen.

Without embarking on a long discourse on television technology, I'll explain what this means to an Apple user. As we are often told, you can't get a normal domestic television to reproduce 80 column text very well. In fact you would be lucky to be able to read it at all.

The reason is that the characters are too close together, and the duration of a vertical line making up the characters is too short for the set to resolve.

Normal broadcast television has an approximate bandwidth

of 5MHz, and our 80 column text needs at least twice that to be anywhere near readable. A bandwidth of 14MHz improves the situation considerably, and superbly defined characters are possible. All fine and dandy.

There is one snag though, especially if you have an Apple IIe. This machine has only one video output which must handle both 40 and 80 column text as well as colour.

Without going into too much detail, the 80 column text capability is degraded considerably by the need to provide colour. The video output has only a bandwidth approaching that of a normal broadcast television signal, and the fast edges needed to produce sharp 80 column text are very poor.

While not wishing to criticise Apple in any way, the 40 column video signal is not as good as it could be either, as the add-on video board described here will show.

By producing a new video output, the quality of the

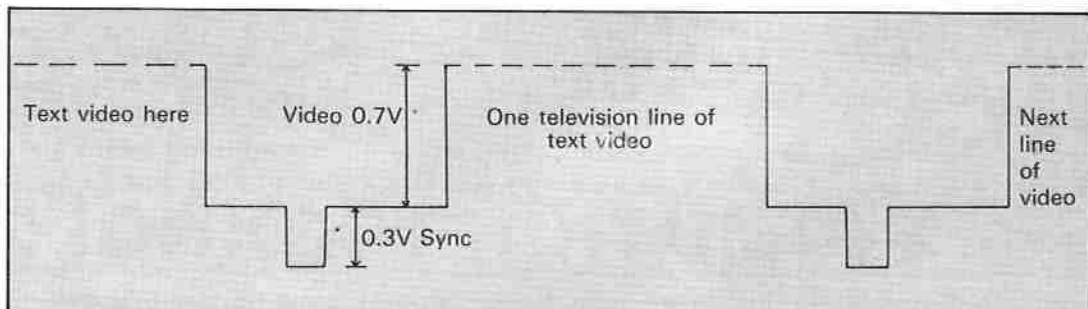


Figure 1: Video waveform

display, especially when using 80 column, is faultless. Needless to say, high resolution graphics are improved just as much, whether on a II+ or IIe, as well as double high resolution graphics on a IIe.

What does the board do? It takes the raw data signal for the screen text and adds the sync signal to produce a standard-level video signal but using a TTL chip - TTL stands for transistor-transistor logic, and is the basis of many of the chips in use today.

The sync signal is needed in order to synchronise the scanning circuits in the monitor to the video signal coming out of the Apple.

It is added in such a way as to make a standard video signal, as shown in Figure 1.

In employing TTL circuits to produce the video output the sharp edges of the text signal are preserved, and even using 80 columns the results on the screen will only depend on the capability of the monitor in use. A 14MHz monitor will be perfectly adequate.

This board is suitable for use with an Apple II+ as well, as we shall see later. The Apple II+ suffers from a considerable amount of hash in the background of the video output, especially when a disc drive operates. This add-on board eliminates the problem.

The board still effects a vast improvement in text clarity on 40 columns, both on a II+ and a IIe. There is a tendency to have to adjust the contrast on a IIe every time you go from 80 to 40 column, as the subjective brightness, used in its descriptive sense, alters.

With this board, however, there is no need to adjust the monitor at all once it is set. If you are using an 80 column board with an Apple II+ you may be able to get at the text and sync signals and feed them to the board, but this I will leave to those brave enough to try and find them.

Figure II shows the circuit of the add-on board, with two video outputs. There are two because it is a shame to waste half a chip, as the board is so simple. The two outputs may be

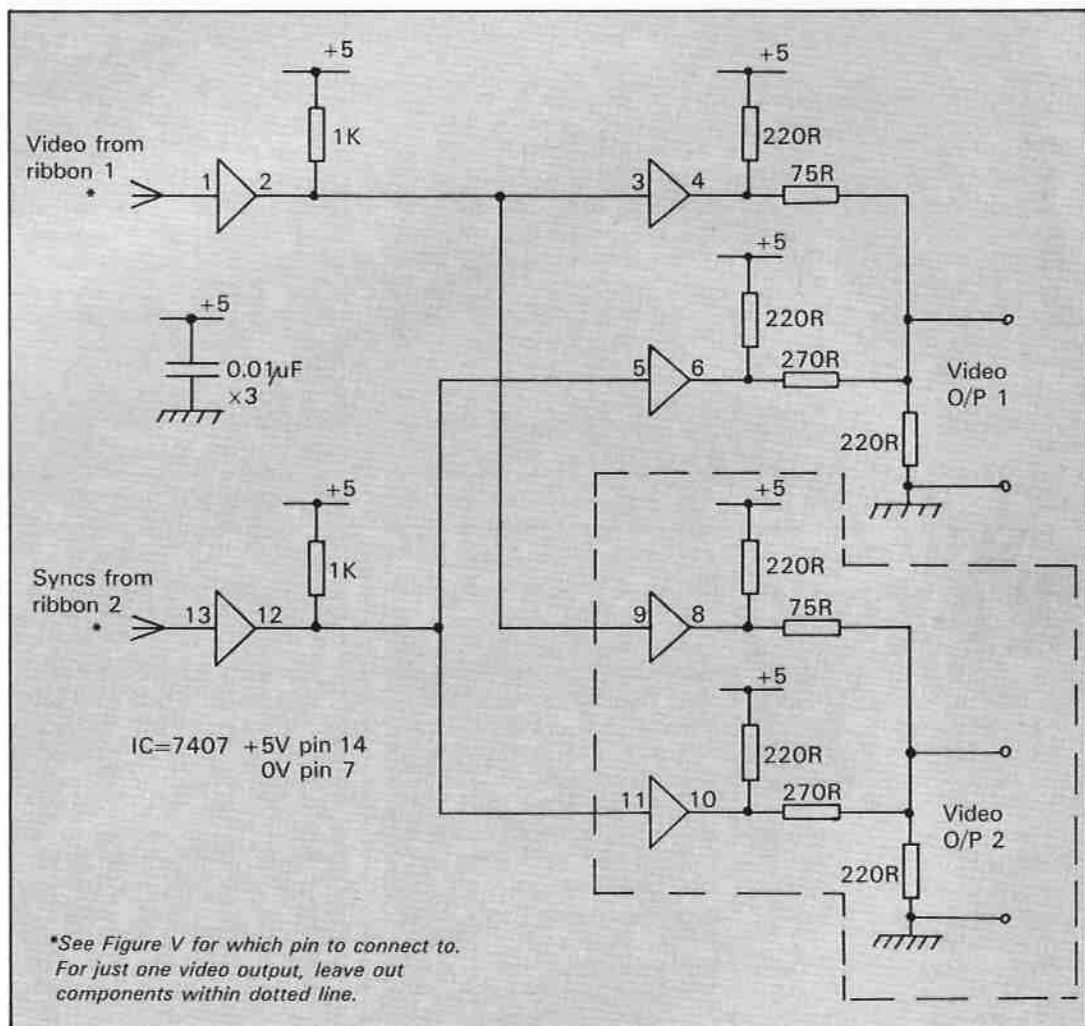


Figure II: Circuit diagram

useful in schools, or when doing lectures or presentations, or wherever there is more than one monitor in use.

In this sort of environment, the improvement in clarity is startling, especially on a large screen. The video output is also suitable for use with projection television equipment, although 80 columns is asking a bit much of these units as their bandwidth is rather restricted even by domestic television standards.

Remember, this board won't give you colour. However, if you use colours in your bar charts or pies, or other graphics, then the texture of these will be very clearly shown. So the use of a colour monitor may not be necessary in many cases.

Those with any knowledge of logic should be able to fathom out the circuit. The resistor values are chosen to produce the video signal of Figure 1. This is a standard level, but does rely

on the monitor presenting a load of 75 ohms.

This is sometimes provided on the monitor input as a switch marked TERM, which should be in the TERM position. If yours doesn't have this don't worry, as the input impedance will be 75 ohms.

I'll talk first of all about modifying a IIe, but to modify a II+ is very similar, so don't skip anything if you have a II+.

It goes without saying that you should switch off the Apple before poking around inside. It's not a bad idea to unplug the mains lead as well, especially when you are taking chips out, as you will be doing to fit this board.

The board needs the video and sync signals. To get at these on a IIe it is necessary to connect to pin 6 of the IC at location D12 and pin 11 of the IC at location C15 respectively.

There are two important things to note here. Firstly, the

location on the main board of a IIe (this also applies to a II+) is found by looking at the letters down the left-hand side of the board, as you look at it with the keyboard nearest you, and referring to the numbers across the front.

Secondly, you won't find the correct chips at these locations by looking at the circuits in the Apple IIe Reference Manual. This is because the manual shows the layout for American machines which have a completely different circuit around the video output. An updated circuit is available from Apple, but you won't really need it for this modification.

Having found these chips on the main board, note that the first one is designated S10 by the white lettering near the farthest end of the chip. Actually it's the bottom, as we'll discover later.

The second chip is designated LS74. This should con-

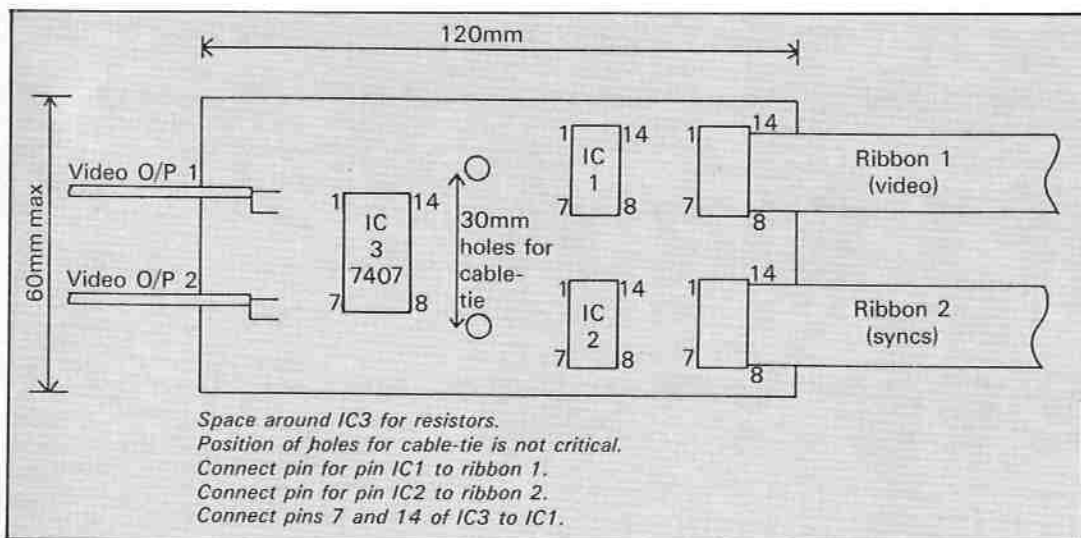


Figure III: Board layout

firm that you have located the correct positions on the board. For a II+, refer to Figure V for details of the locations and chip types of the ones that need moving to the add-on board.

In order to get at these signals the two chips mentioned are moved to the add-on board, and all the pins on the chip are connected back to their respective sockets on the Apple by a 14-way ribbon cable with a DIL plug at either end.

This facilitates connection on the add-on board to any of the pins that we require. The ribbon cables also supply power to the board from the Apple.

Figure III shows the layout of the board, with interconnections. You could build it on a piece of standard 0.1in pitch Veroboard, but there would be a large number of tracks to cut. It isn't easy to arrange this well-loved standard board to accommodate chips. Vero also make various prototyping boards, with pads laid out for chips. Only a small piece of board is needed.

RS Components supply a small single-sided board that would be suitable, number 434-267, although some of it will be wasted. This is 100mm x 160mm in size.

The best way that I have found to cut board of this sort is to score it a couple of times along the line to be cut on both sides. Hold it with the line on the edge of a table, with a ruler pressed firmly on the edge on the top. Do a karate chop with the side of your hand on to the part hanging over the edge, but

try and hit it about half an inch away from the line.

This never fails, once you have faith in hitting the board hard. Quite wide boards can be trimmed in this way.

Figure IV details the parts list, with RS Components' numbers beside some of the parts. If you haven't got access to someone who can buy from this firm — they will only deal with trade customers — then Tandy, Ambit, Farnell, Technomatic or Henry's Radio should be able to supply the chip, sockets, resistors and capacitors, and probably some sort of board.

Figure VI is a list of parts that I can supply, including a full kit for the lazy and not-so-brave. The printed circuit board can be used with either a II+ or IIe.

I will also supply the ribbon cables made up, as you may have difficulty obtaining short pieces of 14 way cable. The RS number against the cable in the parts list is for a complete 0.5 metre cable with a DIL plug at either end. This is really too long, but by obtaining two more DIL plugs and cutting the cable in half, you will end up with two cables of about the right length.

The capacitors are not critical in type, but you should put one between +5V and 0V near each chip on the board. It is similarly not critical what wattage of resistors that you use. You will only find the 75 ohm resistor in 2 per cent or better tolerance ranges of resistor.

Now a note about the added chip, IC3 on the schematic. This can be any of the following: 7406, 7407, 7416, 7417. The

ones ending in 6 are inverters, and the ones ending in 7 are buffers.

Since we do two inversions in the circuit, it doesn't matter which we use. Yes, I know for one output it needn't have been done that way, but for two video outputs the load of two standard TTL inputs is out of specification on the Apple bus.

The chips mentioned have driver outputs. This means that they can sink a much larger current than a standard TTL output. This extra current is

needed in order to feed the resistor network satisfactorily.

The only difference between a 7406 and a 7416 is that the maximum voltage allowed at the output is different, but since we are running the board off 5V, this is satisfactory for both types.

Here are some notes on construction. Although the layout isn't critical, you may like to lay it out as in Figure III. The DIL plugs that are on each end of the ribbon cable I soldered directly into the board, although you could plug them into DIL sockets if you prefer.

If you solder the plugs into the board make sure you use the ones with pin 1 at the top left and the cable pointing to the right with reference to Figure III.

ICs 1, 2 and 3, have sockets that should be orientated so that pin 1 is at top left.

Some sockets don't bear any marking, so in some cases this won't matter. Bear in mind constantly that pin 1 should be regarded as being at the top left of each of the sockets. The interconnections may be found with reference to Figure II.

Parts list		
1 off	7407	IC (RS 306-336, pack of four).
3 off	0.01µF	Capacitors (RS 115-051, pack of five).
2 off	75 ohm	Resistors (see text).
6 off	220 ohm	Resistors (see text).
2 off	270 ohm	Resistors (see text).
2 off	1K ohm	Resistors (see text).
3 off	14-pin DIL sockets.	(RS 401-790, pack of four).
4 off	14-pin DIL plugs suitable for terminating 14-way ribbon cable.	(RS 467-734, or RS 471-367 (pack of 10)).
0.5 metres	0.050 pitch 14-way ribbon cable.	(RS 489-958, but see text).
1 off	Cable tie and base	(RS 543-484, pack of five). Length of co-ax cable to suit phono plug or socket. Piece of suitable circuit board.

Figure IV: Parts list

IC 1 (video) (ribbon 1)		Location on mother board
II+ Rev 0	74LS74 pin 5	B10
II+ Rev 7	74LS74 pin 5	B10
IIe	74S10 pin 6	D12
IC 2 (syncs) (ribbon 2)		
II+ Rev 0	74LS51 pin 8	C13
II+ Rev 7	74LS51 pin 8	C13
IIe	74LS74 pin 11	C15

Figure V: Chip locations

Figure V shows the locations for the chips that need moving to the board, and the pins that should be connected to IC3 to obtain the signals. Make doubly sure of the location by referring to the chip type as well.

The add-on board should be fixed to the right-hand side of the Apple, just below the vents. Use the cable-tie and base to do this. The case could be drilled in order to mount the board, if you are brave enough.

The "left" ends of the ribbon cables are attached to the add-on video board, and the other end is plugged into the mother board.

Pay particular attention to the fact that pin 1 on the sockets on the mother board of all Apples is nearest the keyboard, so that the ribbon cable should be orientated to reflect this.

If you don't use the kit, which contains a plate that will fit the back of a II+ or a IIe, then try and use a tie-wrap to fix the video cable to the vents on the right-hand side to stop it pulling on the board. Lead the cable through one of the holes at the back of the computer.

On a II+, if you haven't used too many of the slots at the back of the case, you can tie the video cable around one of the posts.

The plate supplied with the kit or separately has one or two phono sockets mounted on it as required.

The co-ax cable for the video signal should preferably be connected to pins put into the board, as you will find it difficult to get the cable to go through the small holes. You could drill the holes out a bit, but as the pads are quite small you may end up with very little to solder on to.

If you haven't any pins, the off-cuts from the legs of the resistors are suitable. Just solder a short length, about 5mm is about right, into the board, and then solder the cable to the bit sticking out of the board.

You will find it easier if you fold over part of the wire underneath the board when you solder it, as that will help stop the wire moving about when you solder the cable on.

The in-line phono socket should be soldered to the other end of the cable. If you prefer, you could make the cable long enough to go straight into your monitor, and use a plug instead.

If you use the plate that I can supply for the rear of the Apple, then the cable connects to the socket on this plate.

Make sure your soldering is good, and check for shorts on the board. If you aren't using the printed circuit board get someone else to check the connections if you can. It's surprising how easy it is to be blind to your own mistakes.

Witness the situation when someone else finds a bug in your own program that you *knew* was bug-free.

Use a chip extractor if you've got one to extract the two chips from the Apple. An IC test-clip can sometimes be used for taking out ICs if they aren't too tight.

Just clamp the clip as tightly as you can to the chip and exert a rocking motion from end to end. Once the chip is loose it can be extracted with a small screwdriver.

If you haven't either an extractor or a test-clip use a very small screwdriver carefully to ease up one end of the chip slightly, then attack the other end. Doing this a small amount from either end lessens the risk of bent legs, although if you do bend them, they will usually

straighten out by using a pair of long-nosed pliers.

Insert the extracted chips in the relevant sockets of the add-on board, with particular reference to pin 1. This is very nearly always marked on a chip by a pip at that pin, or by a wedge in the moulding of the chip that denotes the pin 1 end.

There is another way of finding pin 1 that isn't generally known. It is now a standard that the printing on a chip is in a certain orientation. If the chip is held so that the printing is upright, so that it can be read, then pin 1 will be on the left-hand side on the bottom row of legs. Beware of trying this with extremely old chips from the early 70s though.

Static electricity shouldn't be a problem with the chips that you take out. However it is a good idea to touch the top of the Apple power supply to discharge yourself before touching any circuitry. Also avoid wearing nylon shirts or all-nylon socks or underwear.

Plug the DIL plugs into the relevant sockets on the main board of the Apple, taking care with pin 1 again. This should be clearly marked on the plug.

It is probably a good idea to plug everything in and try the board before fixing it into the Apple, taking care that the bottom of the add-on board has no metal objects near it.

In the unlikely event that it

doesn't work first time - there isn't a lot to go wrong - go through the following. Check that the Apple itself is functioning normally on its usual video output. If it isn't then there is probably something wrong in the ribbon cable connections back to the board.

Unless you actually connect 5V to an output of a chip then there is very little chance of damaging anything in the Apple with wrong connections.

Assuming the Apple works normally, but there is a strange or no output from the add-on board, check that you have the correct connection to the 7407 or whatever you have used.

If you are the owner of an oscilloscope look at the places where there should be video and syncs. The video should look like the top part of Figure 1, and the syncs the bottom part.

Check also that you have connected the 5V rail and 0V to all chips. This is very easy to miss in checking.

In the unlikely event you can't get anything at all out of the Apple and the power supply is making a sound like a new-born chick you have a short on the 5V rail to 0V.

Switch off immediately and find the problem. The power supply will have shut down and the likelihood of any damage to the Apple is quite small.

Assuming you have an output from the new board, adjust the monitor as described earlier, clean your glasses, and surprise yourself with what you have been missing.

If the monitor is used in the depths of the night with not much ambient light and also in the glare of day, you will find that adjusting the brightness in the differing circumstances may be all you need. Turn it up until you can see the raster, then turn it down until you only just can't see it.

If you are using a colour monitor as well, that can of course be left connected to the normal output of the Apple.

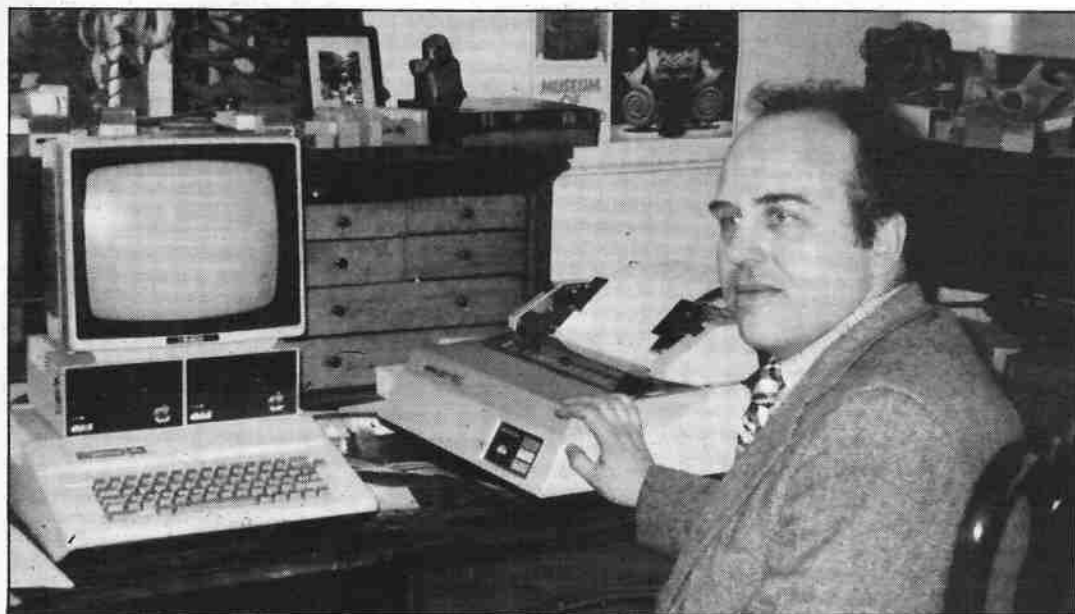
That's all there is to it. No pages of software to type in and correct. I suppose it's one of the few accessories for an Apple that will be in use all the time.

2 off	Ribbon cables with 14 pin DIL plugs attached	£4.80
1 off	Plate with two phono sockets to suit rear of Apple II+ or IIe	£3.50
1 off	Plate as above with just one phono socket	£3.20
1 off	Printed circuit board	£6.30
	Complete kit including printed circuit board and plate with two video outputs for rear of Apple	£18.50
	Complete kit as above with one video	£17.70
	Ready-built board with plate with two outputs	£25.50
	Ready-built board with plate with one output	£24.70
All prices include VAT and P&P.		
Send to: Chris Payne, 15 Braddenham Walk, Stoke Mandeville, Bucks. HP21 9DZ.		

Figure VI: Parts and kits available from the author



# When it comes

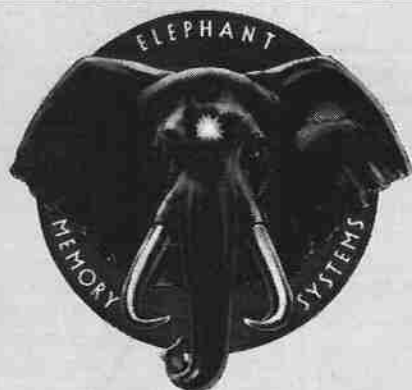


**For him... IIe**

JUST outside the centre of the beautiful city of Durham there is a private house containing more than one compatible couple. Its inhabitants each own an Apple personal computer – the husband a IIe, the wife a IIc.

If this seems a little excessive, it should be pointed out that Dr and Mrs Gullick are not excessive people. They bought two systems because they each needed one and it made sense to have them compatible, particularly for the purpose of sharing the printer which is attached to the IIe.

Dr Charles Gullick is the more experienced Apple user in the family, having bought his IIe in September 1983. He works as a lecturer in anthropology at the University of Durham, and this naturally involves him in a large amount of writing – research for



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# to compatibility

lectures, papers for seminars, review articles and contributions to books — most of which have to be fully referenced with notes and a bibliography.

He first became interested in the use of micros as word processors when he spent half a year as Professor of Anthropology at the University of Kansas in the USA. Here the secretaries in the department all used Apple II personal computers in their work, and when Dr Gullick returned to England he took a closer look at the IIc at Business Sense Computing in Hexham.

The Apple dealer was very helpful, particularly in advising Dr Gullick about a spelling program, which was very important for his work: "I'm a terrible speller, so I really needed this for documents of any size", he said. "Moreover, my work involves the use of several unusual names and terms, so I wanted to enter a whole bank of them into the spelling program to facilitate the process even more".

This was also a big help to Mrs Gullick, who used to check all her husband's manuscripts before the arrival of the IIc.

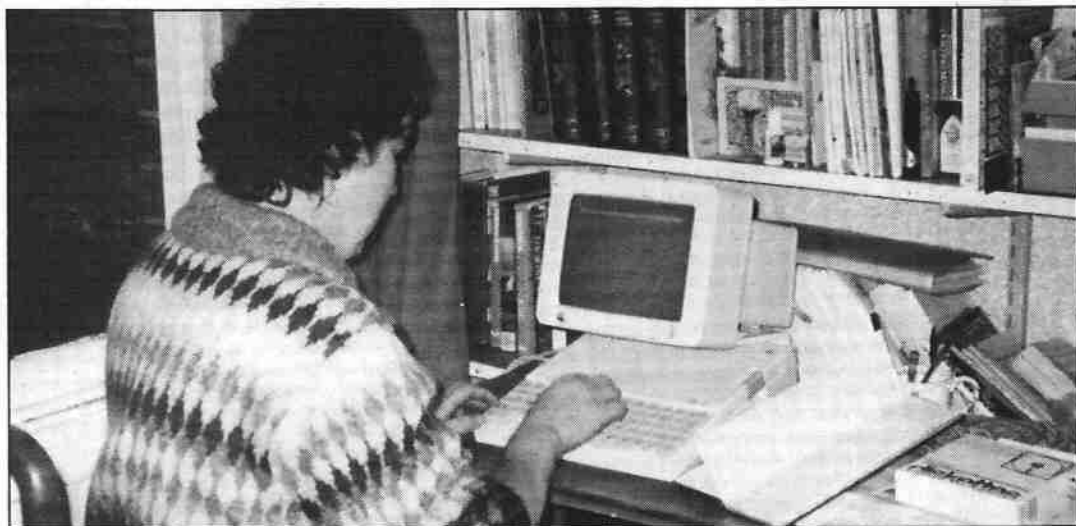
Dr Gullick bought an Apple IIc and monitor with an extended memory card to 128k for larger documents, two disc drives and a Juki daisywheel printer.

He does his writing using AppleWriter II, Apple's own word processing package, and uses the ProofReader spelling program.

Already he has completed a number of major projects with the help of the IIc, including a year-long project on a bibliographical essay about West Indian material culture written for Museum Ethnographers Group to be published in a special issue of their newsletter on racial minorities in Britain.

A new book on Afro-Indian Studies, to be published by the Department of Anthropology at Durham University, is currently being prepared with the help of Dr Gullick's Apple dealer.

"The book contains the



## For her ... IIc

proceedings of a conference held in 1982, which I had hoped to complete entirely on the Apple. Business Sense have helped me to put it all on to discs so that I will meet the deadline. The book will be printed from the hard copy that I produce on the Apple, so it has to be perfect".

Dr Gullick is pleased with his investment for a number of reasons. "It's mainly ease of living. Cuts in administration at the university have meant that

undertaking a part-time thesis, an M. Phil in folklore at the Centre for English Cultural Tradition and Language at Sheffield University. She bought a IIc last January and intends to use it in much the same way as her husband uses the IIc.

"Because we have two children, it always turned out that whenever I was free to use the IIc my husband was using it. And I was worried about deleting some of my husband's

naires to be used in her research.

"I intend to write my thesis on the Apple IIc, which will keep me busy for 5½ years. I will also use it for writing articles, and for smaller tasks such as keeping my husband's and my tutee lists".

The other possible use for the IIc that Dr Gullick is considering is hooking his Apple to the telephone with the IIc modem port.

Now that Dr Gullick is proficient on the IIc, he is looking for a number of new applications, in particular a Spanish spelling checker and a database that will link into AppleWriter.

He also requires a program to assist in his work on a series of folktales. For this task, Dr Gullick will reduce the tales down to a series of equations and use the software to measure the closeness or distance of one equation from another. The only other improvement to the system he can envisage at the moment is the purchase of a hard disc for storing data.

In the meantime, Dr and Mrs Gullick's eldest son is starting to learn how to use the Apples, and he is writing a story which he saves on his own floppy disc. It looks as if his and hers will soon be on loan to the next generation.

## By Bryan Williams

there is less secretarial help available, and since I am not a typist I really have to have a word processor for easy editing".

The fact that his work often involves long-term projects is also ideally suited to the Apple, because he can store material for as long as he requires it, inserting or deleting sections as the work takes shape.

Having spent about a term getting used to the computer, he now spends about eight hours a week using it during term time when he is busy at the university, and about 15 hours a week during vacations. "I usually work on it five mornings or five afternoons a week in the vacation", he said.

Mrs Mary Gullick is currently

files, so it seemed logical to buy another system", she said.

Dr and Mrs Gullick chose an Apple IIc because they wanted the second computer to be compatible with the IIc. "We also liked the idea of having a transportable computer, although we don't use it as such yet. And, of course, it is very convenient to have the 128k memory without buying an extra card".

Mrs Gullick is using a IIc with monitor and stand running AppleWorks. Her first job was to type in her Christmas card list for next year so that she can print out all the envelopes when the time comes. This was to help her become familiarised with the system, and she soon started compiling question-



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# Typing tutor calls for a touch of dedication

**L**ISTENING to the Mac tick-tocking metronome rhythms is hardly my idea of fun. But sacrifices must be made — especially if it really does help master the art of typing with more than two fingers.

My 15-year-old daughter Nicola has just started a school typing course and needs practice. I decided this was a good enough excuse to lash out on a typing tutor for the Mac — I reasoned that my better half could hardly complain at educational expenditure.

I was unable to obtain Typing Tutor 3 which I believe is an upgrade of an excellent program already known to Apple II and other computer users. Instead I fell for the advertising of Palantir Software of Houston, USA, who say that their "No bull" state-of-the-art serious product MacType is F A S T. These initials stand for First, Advanced, Simple and Tested.

They claim to use proven teaching techniques that speed up learning by utilising mental patterning which teaches the fingers and brain rather than the eyes. It's all supposed to be painless, enjoyable and to really

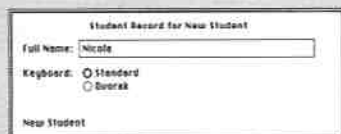


Figure 1: New students enter their name to form an on-going record which is automatically updated

work. It sounds too good to be true — but we will see.

MacType is an interactive program supplied on a single copy protected disc which must be booted in the internal drive. Up to 100 students can store their ongoing records and scores, making the program ideal for school or night-school use. A 15 page guide gives a concise, well written run-through of the training phases and program features.

The opening chapters, while discussing touch typing technique generally, clearly aim to enthuse and motivate. After I'd read "If you type, you will learn

the keyboard... you cannot type regularly and not get a feel of where the keys are", I actually started to have faith.

Then I found out the *raison d'être* for the little white labels supplied. Yes you've guessed it — they're just the right size for covering all the keys. I wavered, but egged on by Nicola quickly obeyed the Page 7 command: "Please do it. We're serious". We were then ready to begin.

Upon opening the program from the File menu as a new student you're prompted for your name (see Figure 1). A personalised desktop icon folder is assigned which you can click in future sessions to resume individual training where you left off.

This record is always automatically updated — a separate save command is not necessary.

Also should you want to learn the optional Dvorak keyboard or start a new history — just create a fresh record icon in a different name. Unfortunately there is no provision to store records on a second drive.

A nice touch is that if the telephone interrupts a timed test there's no need to panic. Simply Cancel to end the session without updating your student record and try again later. The cancel command will always check that you really mean it so that you will not lose results accidentally.

When starting as a new student you're given on-screen instructions as an over-view of the procedures (see Figure 11). Cleverly these are not repeated in subsequent training phases. MacType itself supplies useful ongoing hints when it feels you need them.

To get more information yourself on any item that interests you hold down the Option Key while selecting

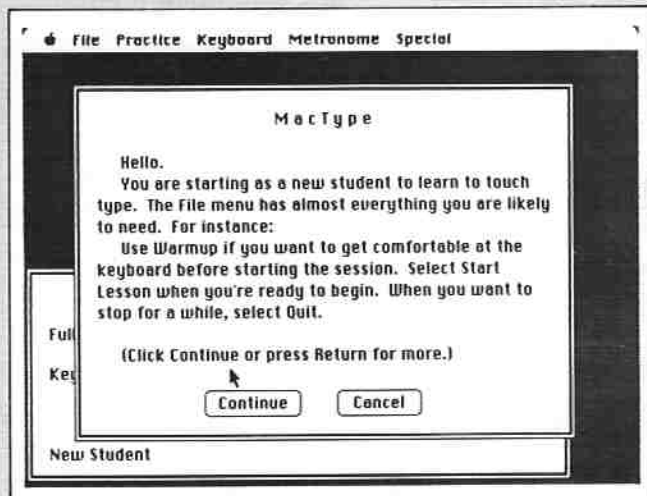


Figure 11: Friendly welcome screen for new students — not shown for future sessions

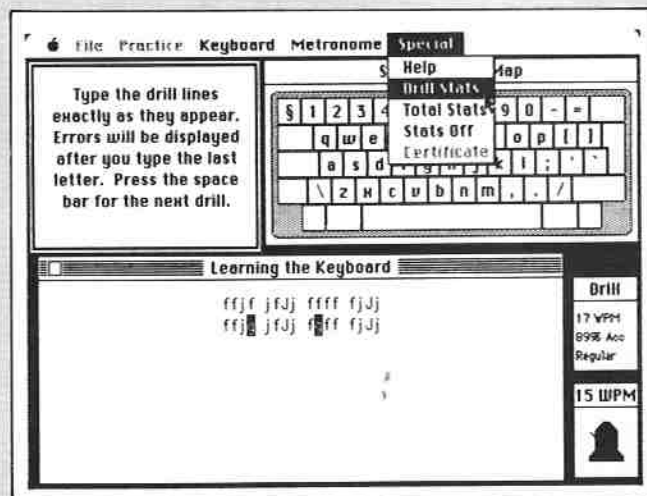


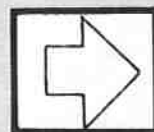
Figure 111: Key drills start training, and although tedious, once done are not repeated

from the pulldown menus.

The manual recommends a time limit of 15-20 minutes per session — if you're keen to progress simply do more sessions. Each period can be split into a warmup, key learning and standard training cycle which may include a test if you're good enough.

Apart from your own free

selection of the drills and review tests MacType is able to control training entirely if the Start Lesson option is selected from the File menu. Invariably I found



## MacReview

this best — although in the key learning phases the program progressed to new unfamiliar keys far too quickly for my liking or ability.

I would have preferred constant repetition until I was ready to move on. To add insult to injury the program never revises when starting a fresh session — you are taken to your exit stage. The problem can be overcome though by restarting from the MacType icon rather than your own.

The first stage of the learning phases proper is a series of drills based on learning the keys (see Figure III). The program drills you on various combinations for the same row or finger until you achieve acceptable accuracy, and then moves on.

Once you've completed the drills you will hopefully never see them again, although you can select Learn Keys from the Practice menu to start again from scratch should you so wish. After the tedium of learning the keys, Accuracy and Speed drills follow in training cycles which utilise similar screens to the key learning as in Figure III.

Drills are issued in a series of lines containing test sentences or lists of words chosen to concentrate on your weak spots. Merely type the lines as shown and any errors are highlighted. Pressing the spacebar moves on to the next drill.

The main difference between accuracy and speed is the criterion for selecting words — as accuracy is always placed ahead of speed. When you enter these drills from Start Lesson word lists are produced based on your specific needs.

Once you're reasonably competent and think you are ready, you can take an unlimited number of Reviews of word lists (see Figure IV) and one of six standard Tests of prepared texts.

If you interrupt a test or review by clicking the close box before completion, partial results to that point aren't recorded. There's no penalty for retaking the tests at a later time, although this might distort your own record if you kept on doing

this. If a test is failed you keep retaking until you pass. Then your new goals become the next test, whose goals exceed your current rating. The standard test goals are shown in Figure V, going from Test 1, 15wpm at 95 per cent accuracy to Test 6, 60wpm at 99 per cent accuracy — and even faster tests if you are a typing greyhound.

During the training cycles you're really forced to touch type, however slowly, as eyes must be glued to the screen to

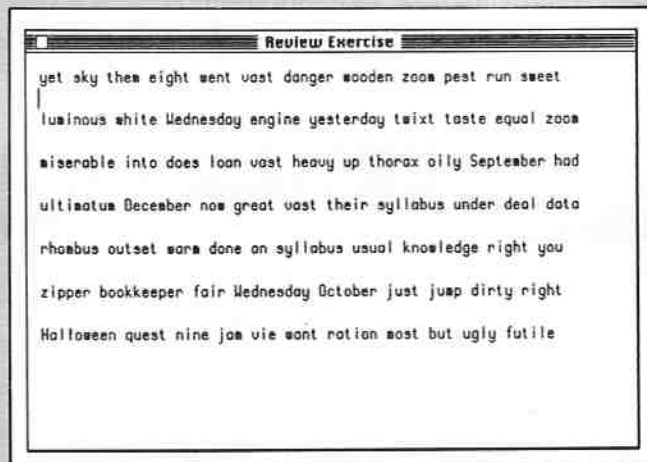


Figure IV: A typical review or test screen — just type between the lines and any errors are highlighted

follow the text. In Warm-up mode however a beginner can easily be tempted to cheat and look at fingers — and this is where the nasty little stickers come into their own.

Nicola found the Warm-up vital preparation to get comfortable before proceeding to the lesson proper.

You're allowed to play with all the MacType features, called tools, without ruining your current statistics. The facility works much like a simple word processor with auto wordwrap, delete key operation and line scroll.

The most interesting ability of the Warm-up is to test yourself using your own normal mix of material. Both characters, punctuation and layout will obviously vary for say business, technical or private work.

The two Stat commands in the special menu enable you to get either the Drill or Total Stats Boxes on to the desk-top. Just

type 100 or so words and your wpm and consistency score will be displayed after each line.

You must, of course, inspect visually for errors, since even MacType isn't smart enough to display an accuracy rating on your home-spun text.

During warmup progress recording is turned off so you can make as many mistakes as you like without affecting your session rating. You can also experiment with the Dvorak or special option character set contained in the standard keyboard.

One very useful tool is the Metronome which is manually selected in any mode. This is a great idea for maintaining an all important steady rhythm and mercifully, the volume can be adjusted from the Mac control panel in the usual way, and even switched off. You are recommended to opt for a slowish speed at first to get the beat.

MacType normally only dis-

As you progress, you will always be striving for the goals of the next test in the series. If you fail a test, you will retake it until you pass. Once you pass, your new goals become the next test whose goals exceed your current rating. The standard test goals are:

#1 - 15 WPM 95% Accuracy

#2 - 20 WPM 97% Accuracy

#3 - 30 WPM 99% Accuracy

#4 - 40 WPM 99% Accuracy

#5 - 50 WPM 99% Accuracy

#6 - 60 WPM 99% Accuracy

Subsequent tests are 65 WPM, 70 WPM, 75 WPM, etc.

Continue

Cancel

Figure V: Speed goals for each test

plays the Metronome when your work indicates the need for more stroke consistency. If your style is really smooth you may not see it at all!

The snag Nicola found is that there is too large a gap between the speed options. 20wpm was too slow while 30 proved a little rapid for her present ability. What is wanted is a macro choice in 5wpm steps, particularly in the critical learning ranges.

Despite this you can at least appraise how fast your fingers should go at the next speed. Over 45wpm the gadget is best left off — the clicking drives you mad.

Another tool option allows you to display a pin-sharp graphical keyboard in a separate window (see Figure III). You can also choose whether or not to echo keystrokes — highlight each character as it is typed — and which format, Standard or Dvorak. Some people find the keystroke echoing distracting, or you may wish to proceed without any display at all.

A major philosophy of MacType is not to pressure you in any way. Because of this MacType does not always show your current performance times as it is considered distracting to have an on-going rating. However MacType recognises that most students want to monitor how far they are from their next goal and you can peek at the figures if you want.

The Drill or Total Stats boxes are updated with each drill to reflect either your line by line or cumulative progress.

The first line shows the wpm

rating based on five strokes per average word, the second line your percentage of accuracy and the third gives an indication of your stroke consistency – either smooth, regular or erratic.

In this way a well timed finger action is encouraged and any speedy typing at the expense of accuracy is spotlighted. Where a rating is irrelevant to the current drill nothing is shown.

At any time after you pass a formal test with 99 per cent accuracy and at least 30wpm you have earned the right to print a Certificate of Achievement.

The program will not let you cheat though. You have the option of reprinting as often as you like showing your best score and the never-to-be-forgotten date. Certificates can also be printed at any time by selecting your student record from the desk window.

If you're already experienced there is a valuable option to skip the preliminary tests and stages and go straight to one of the Review tests to earn a certificate if MacType feels you are up to scratch.

The manual explains that the qwerty layout was originally designed to slow fast secretaries on old manual

typewriters. The Dvorak layout allows you to type 3,000 English words without moving your fingers from the home row – compared to only 100 with qwerty. Dvorak therefore has the advantage of speed once learned. I didn't try. Like driving different cars – switching be-

tween the two should not be a problem. The address of the Dvorak International Federation is printed in the rear of the manual for those who want to find out more.

The question of "Should you learn Dvorak?" is also discussed. Reputedly Apple has a

utility program up its sleeve to convert any application program to function in the Dvorak layout. Once this is available interest will certainly increase.

A lot of public pressure will be needed before keyboards are produced in the Dvorak style – old habits die hard!

**VERDICT: One of the joys of the Mac environment is that all the various MacType windows can be moved around at will.**

This is a distinct advantage for this program, as it allows you to place the Metronome or Stats boxes, for example, wherever they feel most comfortable.

Unfortunately they will not stay that way upon reopening your record.

Pleasingly, all the usual Mac conventions – quit or cancel session, NotePad, Scrapbook etc all function fully. Menus toggle intelligently in context. For example Echo reads either on or off and emphasises the well thought out program structure. No printing facility exists, as this is unnecessary.

MacType is at pains to stress that learning to touch type is a habit which

is only achieved calmly at your own pace and by regular daily practice.

After using the program for several months both Nicola and I have improved our speed and accuracy – sad to say Nicola is beating Dad hands down. My relative lack of dedication shines like a beacon and I still peep at my two fingers hitting the keys – albeit faster.

With MacType particularly you only get out what you put in. I must confess that it didn't take long for me to remove the nasty little key stickers as I found it impossible to use other programs without severe frustration.

I shall persevere with MacType over the longer term, but Nicola will hopefully quickly reach RSA standard.

Overall I found the pro-

gram excellently implemented with clear manual and on screen Help facilities. Nicola too has found it a delight to use – fun and easy to follow but serious with it.

There is little doubt that MacType is an effective tutor given a pupil prepared to put in the necessary regular time.

It's a refreshing change from the touch typing "space invaders" packages such as Type Attack which I soon tired of on my Apple IIe. Rather than 'beat the energy-loss' pressure MacType goes out of its way to see you acquire the necessary skills in a relaxed but entertaining way.

Strongly recommended and well worth the price for all who wish to touch type, or like me merely brush up their keyboard skills.

Price: £49.95.

## Here's a livelier line in type

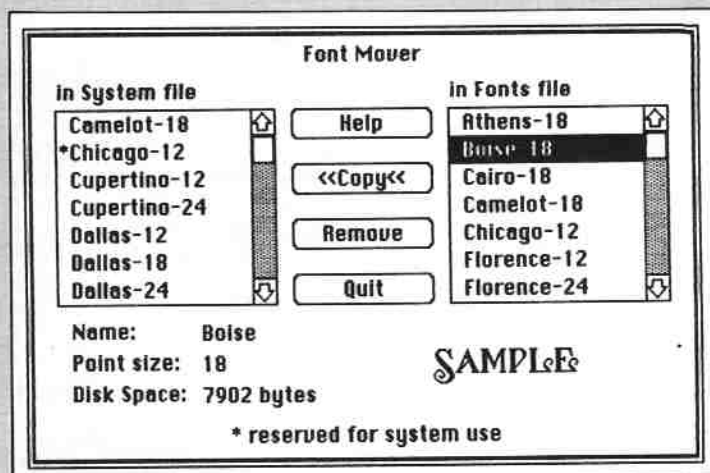


Figure 1: Using the Font Mover

HERE comes a time when most proud Mac owners yearn for some new fonts to liven up their output. Even the excellent range built into the original system disc fails to satisfy.

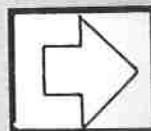
New York, New York is no longer a great little town, Geneva, usually so versatile, looks very very ordinary. Even Chicago leers a little too thick and bold for comfort in MacWrite's narrow 6in width.

The solution is simple – buy a copy of Mac the Knife Vol. 2 – Fonts. This is the companion to

Vol. 1, dedicated to image icons and reviewed in the *Apple User* October 1984 issue.

Vol. 2 comes on a single disc with 26 distinctive new fonts literally crammed in with no bytes to spare – there are no Finder or System files present so boot-starting is not possible.

The fonts are housed in seven folders as Font Mover documents with names like New Faces, Florence/Tokyo and



## MacReview

Saigon/Sydney. Additionally one MacPaint folder contains various new borders and pattern shades.

An exceptionally flimsy but effective typed-look booklet explains with friendly Californian humour the styles and point sizes available.

Simple instructions give the lowdown on installing fonts in your desired applications.

The first sensible move is to make a working copy of the master disc – an essential precaution to avoid any risk of losing precious fonts.

It is then easy to create a Fonts File containing your choice of new fonts on a separate Test Fonts disc using the Font Mover utility. This itself usefully includes an integral on-line Help facility in case of difficulty.

The final stage is to drag/copy your Fonts File to an Application disc, then transpose them to the System file, again utilising Font Mover – see Figure I.

For single drive Macs Font Mover must, of course, be present on the Application disc. Even with two drives I find this a good idea, and make a habit of gracing my system folders with this indispensable utility, space permitting.

As if by magic your fresh fonts are available for selection within the application from the usual Fonts pull-down menu.

In practice it is necessary carefully to remove the original unrequired fonts for storage on your Test Fonts disc before inserting the new ones. This is because fonts, especially the larger sizes, take up considerable disc space – also the overhead of disc access time becomes intolerable if too many fonts are present. Certain key system fonts like Geneva are, however, locked and cannot be removed.

And so to the special Vol 2 fonts on offer. Many come in several point sizes but Mac users will know that for high-quality printing the double-sized version must be present. For example, for high-quality 12 point Sydney you need 24 point also.

Figures II and III show screen

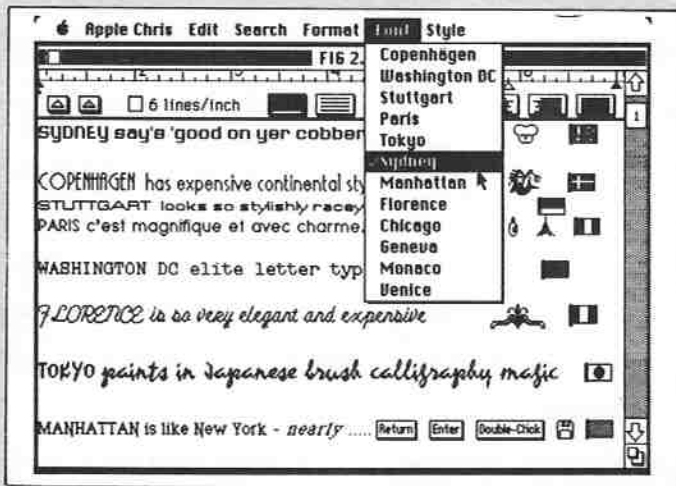


Figure II

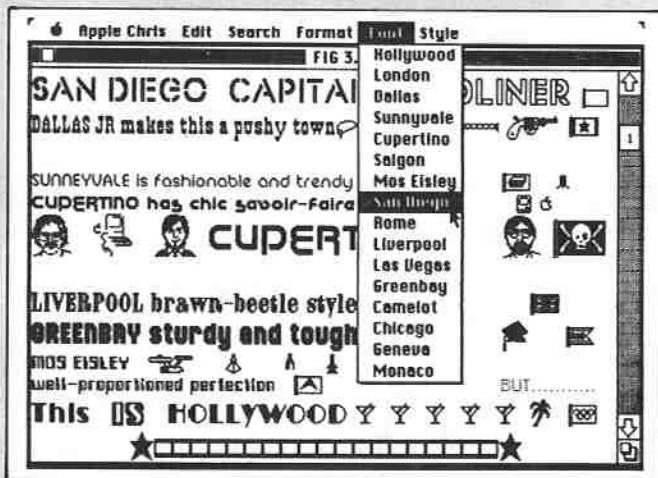


Figure III

dumps of some of my favourite styles. In the practical business context contrast the emphatic arrogance of Sydney and Dallas, the smooth style of Copenhagen, Stuttgart and Paris and the sheer flair of Cupertino or Sunnevale.

Washington DC is an interesting implementation of 9 and 12 point elite – looking for all the world like yer good ol' manual typewriter.

Decorative fonts are catered for too. Look enviously at the elegance of Florence, the romance of Camelot and even enjoy the thrill of Japanese brush calligraphy with Tokyo.

Just imagine impressing your friends with a personal letter scripted from this trio.

For creating eye-catching headlines or posters look at the showmanship of Hollywood, the toughness of Liverpool and Greenbay or the symmetric lines of San Diego and Mos Eisley.

Text characters may be the main course, but ferreting out the hidden icons contained in

selected fonts is definitely the dessert. Each named town, for example, invariably boasts its own flag somewhere – but where?

There is a rope, noose and gun in Dallas, portraits of three gentlemen and a skull and crossbones flag in 24 point Cupertino and, of course, Paris has an Eiffel Tower.

Manhattan is similar to New York, well nearly – apart from descenders on the Ns. All the familiar MacPaint tools are proffered plus boxed commands such as CLICK and TAB.

As you would expect Hollywood has not been outdone – a camera, banner, film or cocktail glass etc are available at the touch of a key.

With such a profusion of exciting new fonts in this package, I found myself spoiled for sensible choice. I mean, what really are the final printed differences between say Paris and Geneva?

Logical thinking was called for – in a rare brainwave I

decided to produce MacWrite samples of all fonts in the sizes recommended. The results were then mounted in a photo album with self-fixing plastic covering, after sorting into groupings – plain, fancy and point size.

It was then easy to select my pet fonts and customise two MacWrite program discs – one chiefly for business correspondence and a fancy version. My finished efforts are shown in the pull-down menus of Figures II and III.

Chris Burridge

**Verdict: At around £45 the package, from Miles Computing of California, is good value and should be an essential purchase for all discriminating Mac owners.**

**The fonts are child's play to take advantage of and the choices are truly different from Mac's standard offerings. The only shame is that you can only use one at a time – but that's life!**

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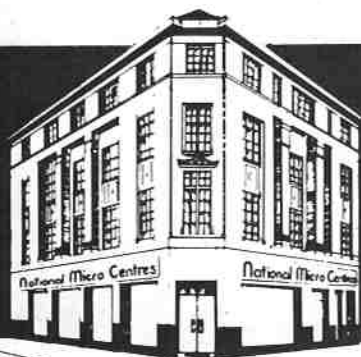
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# National Micro Centres

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HERE's a short, simple, puzzle game written by Max Parrott in Metacraft's Forth which will function in both 40 and 80 column mode.

To play just press the key for the letter you want to move. The object - to get from:

This

G J L A  
H C D  
F E I O  
N K B M

To this

A B C D  
E F G H  
I J K L  
M N O

## Go Forth and puzzle it out

```

0 ( Letter Puzzle Game, First Block )
1
2 : SETUP 4 0 DO 4 0 DO J OVER C! 1+ I OVER C! 1+ LOOP LOOP
3   DROP ;
4   CREATE TILE 32 ALLOT CREATE END-PATTERN 32 ALLOT
5   TILE SETUP END-PATTERN SETUP
6   : TILEPOS 2 * ' TILE + DUP C@ SWAP 1+ C@ ; ( n...x,y)
7   : WHICH 16 0 DO 1 TILEPOS ROT DUP ROT = ROT 4 PICK =
8   IF IF 1 ROT ROT THEN ELSE DROP THEN LOOP 2DROP ; ( x,y...n)
9
10  : TILEKEY BEGIN KEY 32 OR 96 - DUP
11    0) IF DUP
12      16 < IF 1
13        ELSE DROP 0 THEN
14      ELSE DROP 0 THEN
15    UNTIL 1- ; --> ( 0...n)
    
```

```

16 ( Letter Puzzle Game, Second Block )
17 : TAB SWAP 3 * 5 + SWAP 3 * 10 + !CURSOR ;
18 : DRAWBOARD 15 0 DO 1 TILEPOS TAB 1 65 + EMIT LOOP
19   15 TILEPOS TAB SPACE 1 23 !CURSOR ;
20 : PUT 2 * ' TILE + DUP 4 ROLL SWAP C! 1+ C! ; ( x,y,n...0)
21 : SWAPTILES DUP TILEPOS 15 TILEPOS 5 ROLL PUT 15 PUT ; ( n...0)
22
23 : VALID DUP IF DUP 2 < IF 1 ELSE 0 THEN
24   ELSE 1 THEN ; ( d...d,f)
25
26 : PRINTMOVE 1 7 !CURSOR DUP U. ;
27 : ENDOFGAME 1 32 0 DO ' TILE 1 + C@
28   ' END-PATTERN 1 + C@
29   = AND LOOP ;
30
31 -->
    
```

```

32 ( Letter Puzzle Game, Third Block )
33
34 VARIABLE RAND HEX C064 @ RAND ! DECIMAL
35 : RND RAND @ 1021 * 41 + DUP RAND ! U* SWAP DROP ;
36
37 : NEWBOARD PAGE 16 0 DO 1 TILEPOS 1 16 RND DUP
38   TILEPOS 4 ROLL PUT PUT LOOP 1 1 !CURSOR ." Move:" ;
39
40 : GETTILE BEGIN TILEKEY DUP TILEPOS 15 TILEPOS ROT - ABS
41   SWAP ROT - ABS VALID IF SWAP VALID IF = IF DROP 0 ELSE 1 THEN
42     ELSE 2DROP DROP 0 THEN
43     ELSE 2DROP DROP 0 THEN
44   UNTIL ;
45
46 : Y/N KEY 32 OR 121 = NOT ; ( 0...f)
47 -->
    
```

```

48 ( Letter Puzzle Game, Fourth Block )
49 : PLAY NEWBOARD 0 BEGIN
50   ENDOFGAME NOT WHILE DRAWBOARD
51     23 1 !CURSOR
52     GETTILE
53     SWAPTILES
54     1+ PRINTMOVE
55     REPEAT DROP DRAWBOARD ;
56
57 : PUZZLE BEGIN PLAY 1 22 !CURSOR
58   ." Another Game Y/N?" Y/N UNTIL PAGE ;
59
60 FIND PUZZLE EXECUTE
61
62
63
    
```



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**Order form on Page 61**

# MicroLink

Your personal passport to the world of communications with

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## What it offers the Apple user...

### Give your micro mainframe power

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### The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. 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.

### We're only a local phone call away

More than 96 per cent 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 access to the international Dialcom system through MicroLink.

### Telemessages – at a third of the cost

The modern equivalent of the telegram is the telex message, which if sent before 8pm is delivered by first post the following day (except Sunday). Originally designed for people to phone their message via the operator, the service costs £3.50 for 50 words. Now it's available via MicroLink – and costs only £1.25 for up to 350 words!

### 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, 1½ 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. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

### 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.

### 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 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01 London call area. Charges for telex, tele-messages 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; 10.5p 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:** 2p per minute or part (300 baud); 2.5p 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); 16.5p per 100 (N. America); £1.15 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.

**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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## Application Form

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## Printer buffer

SOLVING the problem of a printer keeping an Apple waiting is a new product from Orange Micro. Called the Bufferpak, it is a printer buffer for use with the company's Serial Grappler interface and the Imagewriter printer.

The Apple can output at over 1,000 characters a second while Imagewriter prints at 120, says Orange. That means the Apple has to keep stopping to wait, frustrating the user who bought the computer to save time.

The company says the Bufferpak, which receives data as fast as an Apple, removes this delay by acting as a data storage tank and taking over responsibility for feeding it to the printer. It will give up to 20 pages of text storage.

No additional slots are needed, the unit attaches directly to the serial buffer.

It features standard 16k RAM memory expanding up to 32 or 64k, automatic memory configuration and built-in RAM test. price: £129.95.

● P&P Micro Distributors, Todd Hall Road, Carrs Industrial Estate, Haslingden, Rossendale, Lancs BB4 5HU. Tel: 0706 217744.

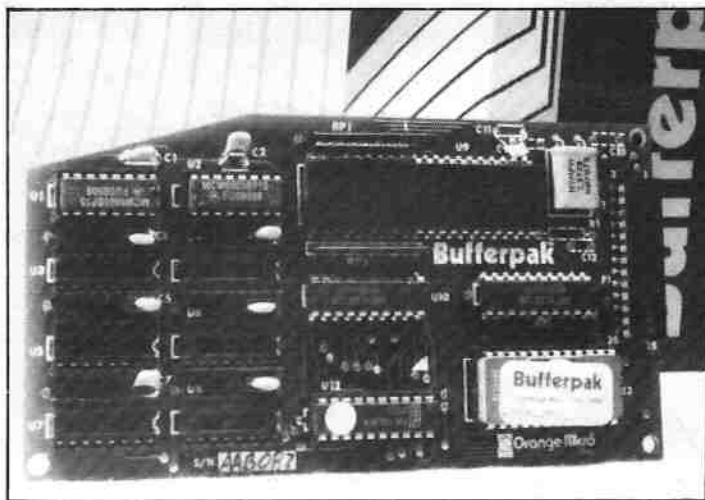
## Memory megaboost

A ONE megabyte ramcard from Cirtech, Flipper, will enable Apple II+ and IIe users to boost their machine's memory by up to six megabytes.

Up to six of them can be plugged into the computer. It is compatible with all ProDOS, including Appleworks, DOS 3.3 and Pascal 1.3 software. It is also recognised by Cirtech's own CP/M-Plus System.

Features include Flip Flop, which enables the user to zoom between programs or data in various sections of the ramdisc, even if under different operating systems. Price: £350.

● Cirtech, Currie Road Industrial Estate, Galashiels, Selkirkshire TD1 2BP. Tel: 0896 57790.



Orange Micro's Bufferpak

## Decisions, decisions

A SOFTWARE/book package written for Apple II users in engineering and allied industries is "Microcomputers and Marketing Decisions", published by Engineering Market Research.

The package includes 12 programs on floppy disc which cover key areas of marketing decisions.

They include market planning for maximum profit, optimising product and resource mixes, market plan monitoring, export market selection for sales promotion, selective selling and assessing business and input prospects.

Price of the package is £120.

● Engineering Market Research, 62 Talbot Road, Manchester M16 0PN.

## Editor updated

COMBINED on one disc for the Apple II are Lostock Software's new ProDOS version of its Screen Editor and its original DOS 3.3 version.

There are a number of extra features. Whole screen lines can be copied at a single keystroke, another control code makes the editor skip the spaces inserted into strings and REMs by the

LIST command, and auto line numbering is standard.

Like the original, it makes use of two screen cursors for ease of editing. The copy cursor, or screen cursor, is used for moving around the screen, the normal cursor for generating the new input line.

The Screen Editor comes in the form of a standard Applesoft program and can be used as each disc's greeting program. To discourage piracy each copy is supplied with a secret identifier.

Price for the combined package is £18.35, but holders of the original DOS 3.3 Editor can have it updated to include the ProDOS Editor for £4.

● Lostock Software, 13 Cranborne Close, Lostock, Bolton BL6 4JG. Tel: 0204 697715.

## Peanut power

A RANGE of new products for the Apple comes from Peanut Computers.

A high capacity power supply is available for the Apple II. The standard voltages are +5v at 7.5A, -5v, +12v, -12v.

The high current feature of this unit allows the operation of attached peripherals which would otherwise overload the system. It is a plug-in replacement for the standard Apple unit. Price: £59.50.

A disc storage upgrade for Apple II is a self-powered stand alone unit based on an American mechanism giving 10

mbytes of formatted storage.

The device, five times as fast as floppies, may be partitioned between DOS 3.3, CP/M and Pascal with the patch software provided. Price: £895.

Designed to test more than 500 kinds of TTL 74/54, CMOS 74C and CMOS 4000 series ICs is a card for the Apple II+ and IIe.

It will also test and identify unknown ICs, printing the series number on screen.

The card comes with ZIF socket on an extension cable, menu driven software and manual. Price: £110.

For users with an 80 column card in their Apple II there is a 40/80 column display switch.

It enables one of two video outputs to be routed to a monitor, selecting either 40 or 80 column text generated by the computer. Price: £12.50.

● Peanut Computers, Low Mill, Dewsbury, Yorkshire WF13 3LX.

## Compatible cartridge

THE near letter quality GX-80 nine-pin dot matrix printer from Epson features a printer interface cartridge which makes it compatible with the Apple IIc.

Based on the LX-80 launched earlier this year, the printer features a new method of connecting up to a computer.

At the back instead of the normal Centronics type connector there is a space for users to fit the PIC of their choice with cable and plug all in one.

An optional tractor feed and cut sheet feeder for word processing input are available.

Printing is bi-directional in draft at a speed of 100 characters per second and 16 cps second pass, in Roman NLQ.

The printer incorporates font selection from the front panel to give choice of Pica, Elite and Roman as well as emphasised, condensed and double strike Pica.

Italics, sub/superscript, emphasised, enlarged and underlining are also available through Epson software control. Price of the GX-80 is £249, the printer interface cartridge £50, sheet feeder £55 and tractor

## NEW PRODUCTS

unit £20.

● *Epson (UK), Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Tel: 01-902 8892.*

### Speedy roller

A HIGH-SPEED trackball – MacTurbo Touch – has been developed for the Macintosh by Assimilation Inc.

Designed for quick response, it is a high speed direct input device. A touch sensitive gyroscopic ball positions the pointer on the screen. Speed is derived from four optical sensors and a micro processor.

Price is £144.

● *P&P Micro Distributors, Todd Hall Road, Carrs Industrial Estate, Haslingden, Rossendale, Lancs. BB4 5HU. Tel: 0706 217744.*

### More art for Mac

VOLUME 2 of McPic, the push button art program for the Macintosh, has been released by Magnum Software.

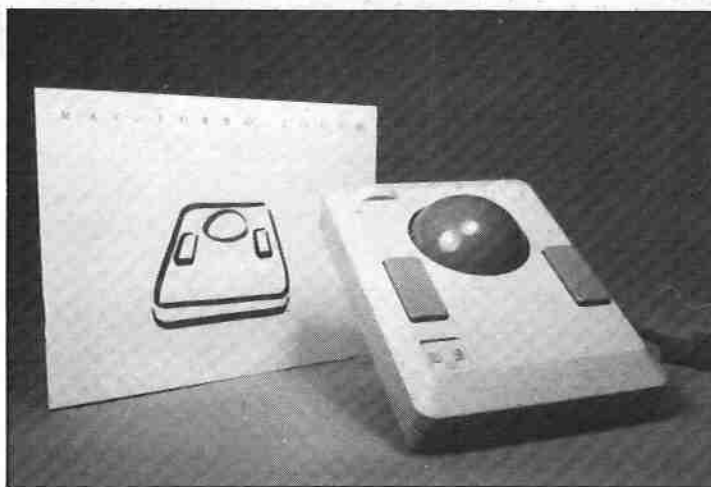
New categories include Science, Special Effects and Exotica and the package enables customised stationery to be produced. Included in the price of £49.95 is a 28 page manual.

● *MGA Microsystems, 140 High Street, Tenterden, Kent TN30 6HT. Tel: 05806 4278.*

### Memory expander

THE GE 512k RAM Card from Glanmire Electronics plugs into the auxiliary connector of the Apple IIe increasing the memory from 64k to 512k.

The card which is expandable to 1mbyte, also provides an 80 column display and is compatible with the Apple 64k extended 80 column card and all Apple software up to 128k for the IIe.



MacTurbo Touch trackball

Recent software releases like Flashcalc and Magicalc will utilise the extra memory automatically. Software modifications for AppleWorks, Visicalc and other packages are available.

Utilities for using the 512k card as a large RAM disc under ProDOS, DOS, Pascal and CP/M are also available.

In conjunction with The Shuttle from Dark Star Systems, the card can be used to hold and switch between four applications in memory at the same time. Price: £399.

● *Glanmire Electronics, Westley House, Trinity Avenue, Bush Hill Park, Enfield EN1 1PH. Tel: 01-366 3245.*

### Drawings in full colour

FOLLOWING the original MacPlot program which enables the

Macintosh to be interfaced with a wide range of colour plotters, software company Microspot have launched MacPlot version 1.5.

Documents, charts, plans and other drawings can be produced in full colour with greater resolution than when using a dot matrix printer.

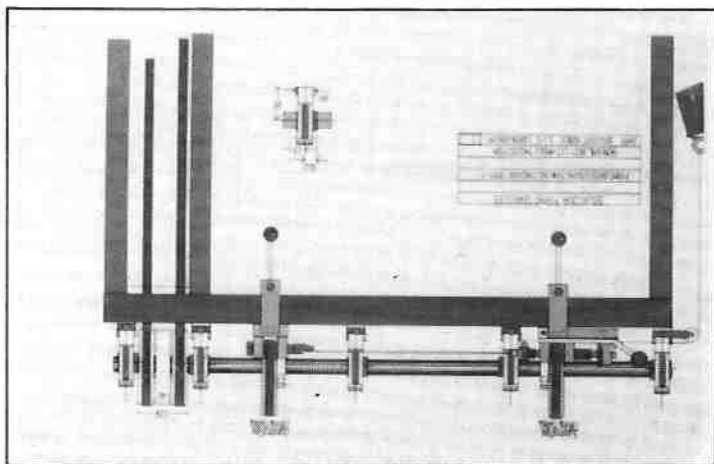
Sixteen different plotters can be interfaced and connection of the plotter to either printer or modem ports is possible.

Overlapping objects can be supported and it has transparent and opaque modes. There is a plot positioning window and dashed lines can be produced.

Plotters up to A3 size can be accommodated and for work on sizes above this Microspot have developed a MacPlot Professional program.

Macplot version 1.5 costs £99 and the professional program £249.

● *Microspot, 9 High Street, Lenham, Maidstone, Kent ME17 2QD. Tel: Maidstone (0622) 858753.*



Plot from MacPlot Version 1.5

### Assembly language library

HELPING the Apple user put the theory of assembly language into practice is a new book from Redlig of New York.

Called "Now That You Know Apple Assembly Language: What Can You Do With It?" it is intended for the Apple II series.

It takes the reader step by step through developing a library of useful assembly language sub-routines, delves into the mysteries of the 6502 stack and shows how it can be used to increase the power and versatility of programs.

Among the tricks taught is how to use the computer's built-in routines to minimise the amount of additional coding that must be done.

The book is written by Jules H. Gilder, a former editor of Personal Computing Magazine and author of eight other computer-orientated books. Price: \$19.95 plus \$2 shipping and handling.

● *Redlig Systems, Dept A, 9783 2068, 79th Street, Brooklyn, New York 11214.*

### Boost in storage

A FLOPPY disc controller which it is claimed will quadruple storage per disc for DOS has been launched by Lawtant.

It controls both 8in and high density 5.25in drives while double and single sided, and double and single density are supported under CP/M.

Provided with the controller are free software for two CP/M cards, the Softcard for the II+ and IIe, the Premium Softcard, and programs for DOS 3.3 to format and copy discs and to copy Applesoft DOS on to high density discs.

Card and software cost £150.

● *Lawtant, 6 Greenway, Campton, Shefford, Bedfordshire SG17 5BN.*



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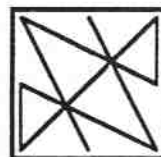
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# Graphics capability needed for Appleworks

I HAVE an Apple IIc with Imagewriter and Appleworks software. I am very happy with the software, particularly its ease of use. However, I wish it also had graphics capability similar to Lotus 1-2-3 or Symphony.

Are there any graphics software packages available that can use data directly from an Appleworks file?

I assume I can use the DIF file option as a method of storing information for use by a graphics program.

Though I haven't tried it, I suspect that PFS Graph might be able to do what I want, but it is somewhat expensive for home use. All I require is the ability to print basic line, bar and pie graphs.

I would also be interested to find out about any software that would allow my system to be used as a typewriter. It is somewhat cumbersome to use Appleworks to type envelopes and short notes. — Gordon Poss, Caterham, Surrey.

● None of us here use PFS so we cannot say whether it's what you want or not. Have you thought of modifying Peter Gorry's programs from his recent series?

Details of the structure of DIF files were published a few years ago in Byte. It is probably easier to get hold of the book "Apple Files" by David Miller, Reston Publishing Co (Prentice-Hall Co), 1982, ISBN 08359-0191-2 which has a chapter on DIF files.

Remember that while Appleworks is active in the word processor it is probably quicker to use the open-Apple-P direct print option than it is to exit Appleworks and start another program.

Max Parrott

## Text file DOS mod

REGARDING Allan Ogg's read-only existing text file DOS modification in the August 1985 Apple User why do you use such patches to change DOS if it is possible to do it with DOS?

Have you ever thought of reading a text file without opening it? Of course not, because you always read manu-

als very carefully. But it works.

You would now say "It won't", but under normal circumstances it really will. During the time I have been working with that has-been system there has never been any mistakes caused by reading without opening a file.

So try this program, it will give you a "File not found" error and you know how to handle this:

```
10 HOME
20 NA$ = "STUART"
30 D$ = CHR$(4)
40 PRINT D$;"OPEN";NA$
50 PRINT D$;"WRITE";NA$
60 PRINT "TEXT"
70 PRINT D$;"CLOSE";NA$
80 NA$ = "HOLLYWOOD"
90 PRINT D$;"READ";NA$
100 INPUT A$
110 PRINT D$;"CLOSE";NA$
```

I would be glad if you prove me wrong. Or have you already published something about it? — Stuart Hollywood, St. Leonards.

● What you say is correct for DOS, since READ and WRITE use common code, but a random access file will not be opened correctly because the length of a record is not then known to DOS. You must open a file for reading under ProDOS.

## Active printer

I HAVE every issue of your magazine and feel I must congratulate you on a consistently fine publication.

Thank you also for the new magazine Atari User, of the same standard. I hope you are going to hold a show similar to Apple 85 for Atari, because I have enjoyed every Apple show so far.

I hope you can help me with a couple of problems I am having

with some of my software. Firstly as you can see from this letter, when I am using Applewriter II the document always has the lines CLOSE and MAXFILES1 at the end of it.

The printer is also left active. Hence if I then select any of the menus from the program they are then echoed to the printer also. I find this very strange because I have many commercial programs, including Applewriter 1.0, that function perfectly.

The second problem concerns a disc drive I purchased at the Apple 85 show. I bought a Rana Systems Elite Three 560k drive from P&P Micros along with the software to give the high density in DOS, Pascal and CP/M. The DOS software works perfectly, but in Pascal I cannot get the installation correct.

I have managed to create a work disc as instructed on the disc. I have also managed to install the Rana system in the file SYSTEM.APPLE as described, but this will only work with a copy of the file SYSTEM.APPLE that has not been used for booting the system.

The next step is to format a high density disc, but this step will not work and just gives the error "No Rana Pascal system present".

If you or one of the readers could help me with these problems I would be very grateful.

My system consists of an Apple II Europlus, a U-Micro's 32k RAM card in slot 0, a Diplomat parallel printer interface in slot 1, a Centronics 737 printer, a Peanut Videx compatible 80 column card in slot 3, Apple disc interface in slot 6 with the Rana drive as the boot drive and a Disc II as drive 2. There is also an Apple PAL colour card in slot 7. — Peter G. Brown, North Walsham.

● I'm sorry but I have no experience with Rana drives and I don't know anybody with one. I

think the best approach will be to write to Rana.

I wonder if the first problem is tied into the second — how do you boot Applewriter II? It looks as if a carriage return is not being sent to "output" before the DOS commands.

Max Parrott

## Listings switched

IN my &DOSFILE article in Apple User for October 1985, two listings have become transposed. The listing in column 2 on page 12 should be in column 3, and the one in column 3 should be in column 2.

Christopher Harding's problem with connecting an Olympia printer to an Apple Pascal system, also in the October issue, may well be due to the fact that in this system a linefeed character is sent immediately after each carriage return. His program line:

```
WRITELN (F2,CHR(27),
CHR(13),CHR(5));
```

will result in characters 27, 13, 10 and 5 being sent to the printer. This can be suppressed by running the LINEFEED program on the Apple3 disc, though it may then be necessary to reset switches on the printer to generate linefeeds locally. Incidentally, the line:

```
CLOSE(F2)
```

is not needed as part of this initialisation sequence, as it is not necessary to close the printer file before writing to the screen, as is done in Basic with PR#1 and PR#0 commands. — Peter Harris, Derby.

## Loading Basic

SHAME on you for telling Duncan Eadie (Feedback, October) that there is no easy way to



# Turnkey boot system

load a Basic program into a word processor!

My recollection is that the way is actually spelt out in the Applesoft Manual, though I can't cite chapter and verse since I no longer have one to hand. One way is to LOAD the program and add lines such as:

```
63000 D$ = CHR$(4)
63010 ? D$ "OPEN
      <filename>"
63020 ? D$ "WRITE
      <filename>"
63030 LIST 0-62999
63040 ? D$ "CLOSE":END
```

where, of course, 63000 is beyond the program's last line number.

Typing RUN 63000 then writes the program to disc as a text file. When editing is complete EXEC<filename> loads it back as an Applesoft program again - or had you forgotten? - **R. Teale, Sunbury on Thames.**

● We also had a letter from our old friend Dave Miller of Finchley reminding us of the same method. However, we read Duncan's letter to say that he didn't want to use text files.

You've both obviously read it differently, but we're pretty sure Duncan understands the EXEC method.

I HAVE recently tried to install a CP/M "turnkey" boot system on our Apple IIe using the information supplied in the article "A Turnkey Can Make Life Much Simpler", Apple User, July 1983.

However the details given in the article appear to be in error. The first mistake is in the location of the byte for the printer patch, which should be track 02, sector 0B, byte 2F and not sector 08 (an understandable printing error).

The second error is in the location of the command line word length byte. The article suggests this should be at track 00, sector 0D, byte 07 and the present value should be 00. This is not the case.

Ignoring this discrepancy and implementing the patch from byte 08 onwards just leads to crashing the CP/M operating system.

The version of the operating system I am trying to patch is CP/M 2.20B and I am using the Dakin's programming aids patcher routine to look at various track/sector bytes.

I would be very grateful if you

could investigate this problem on my behalf and perhaps publish the correct track and sector locations in your Feedback column. - **Dr. R.J. Taylor, Senior Physicist, Clinical Computing, Hope Hospital, Salford.**

● I think that confusion has probably been caused by the difference between logical and physical disc sectors although there is a mistake somewhere in the article.

The command line length byte is at the physical sector 07 of track 0, byte 7. If you are using a DOS-derived disc editing program then the logical sector is 04 of track 0.

At this byte offset (7) put the length of the command, follow it

with the command in Ascii with the high bit reset if you want to execute a CP/M non-transient command and follow this with a zero.

For example, to get a directory listing put a byte 7, 03 44 49 52 00. If you want to execute a COM file the high bit can be set or reset.

As far as I can see the disc area to patch is the same for Microsoft's CP/M v.2.20B (44 and 56k) and 2.23 (44 and 60k), the command area is followed by 'COPYRIGHT (C) 1979 DIGITAL RESEARCH' and on a non-patched disc it is filled with Ascii spaces (20H).

If you have an Epson 8132 printer interface card the disc bytes to change to accommodate it are:

CP/M	Version	Track	Sector	Byte offset	Original value	New value
2.20B	44K	2	B(11)	2F(47)	3E(62)	31(49)
2.20B	56K	2	B(11)	2F(47)	3E(62)	31(49)
2.23	44K	2	9(9)	50(80)	5F(95)	52(82)
2.23	60K	2	8(8)	59(89)	68(104)	5B(91)

(These are DOS 3.3 logical sectors with decimal values in brackets.)

Max Parrott

## ProDOS POINTS

I WOULD like to add a couple of points subsequent to my article on ProDOS and Applesoft. Firstly, although Peter Meyer's article in the July issue fixed the CHAIN problem, readers may like to know that ProDOS 1.1.1, (available from your Apple dealer as a free update) has the CHAIN problem fixed. As I said in the article, if you have ProDOS 1.0, it is worth getting the update.

The other problem concerns getting back to BASIC.SYSTEM from the Assembler. Users of the Assembler will know that to get back to Applesoft just type EXIT. This runs BASIC.SYSTEM.

The problem is that, having updated to ProDOS 1.1.1 and BASIC.SYSTEM 1.1, when you exit the Assembler the system gets stuck.

The problem seems to be with the interfacing between

leaving the Assembler and running BASIC.SYSTEM. It is nothing to do with ProDOS 1.1.1.

The way round the difficulty is this. When you get your ProDOS 1.1.1 update don't destroy your last copy of BASIC.SYSTEM 1.0. Put a copy of this on the disc that you normally use with the Assembler, so that you can exit to this version of BASIC.SYSTEM and all is well.

Since when going to and fro from the Assembler means that you are developing a machine code program, having the old version of BASIC.SYSTEM in use shouldn't cause any problems.

Another wrinkle to using /RAM to store the Assembler is to move BASIC.SYSTEM 1.0 to it. Just alter the file -/MOVED to do it, in the same way to moving EDASM.SYSTEM.

You can find the length from the directory, of course. Type EXIT/|RAM/BASIC.SYSTEM to

get back to Applesoft in a slow blink of an eye. - **Chris Payne, Stoke Mandeville.**

## Trouble with forms

I OWN an Apple II and also have the 80 column card which I use for writing letters with Applewriter II as well as the Applewriter I which I originally used.

I find the Applewriter II adequate but when I try to fill in forms this proves impossible because I cannot line up the typewriter with the form.

I would like to be able to fill in a copy of the form for trial purposes and then save the final version for future use.

I get over this difficulty by writing a small program which alternatively allows typing (80 col mode) to the screen and then typing on the printer, but the process is rather slow and I am unable to reproduce from a

saved copy.

It would seem that I could use the lower case 40 column chip which you advertise and by using PR#1, type on the screen simultaneously but I could not save the result.

Is it possible to modify Applewriter I or II to enable this to be done?

Another problem which concerns me from time to time is lack of memory on Applewriter II (48k). Is it possible to increase this to say 64k? - **W. Williams, Llanerchymedd, Anglesey.**

● The lower case chip will not solve your problems. If you are filling in different forms all the time then frankly a normal typewriter would be better. If it is a standard form to be filled in many times I suggest you find out how to move your printer head horizontally in small increments and your paper vertically in small units.

The codes could then be put verbatim (Ctrl-V) into Applewriter when you have calculated

## FEEDBACK

your movements from a standard point on the form.

The document can then be saved and re-used many times, even with editing.

Alternatively the same codes could be incorporated into a Basic program which inputs the text lines and PRINTs them to the printer.

I don't know how to squeeze more memory out of AppleWriter II, the IIe/c version with a 128k machine has more.

**Max Parrott**

## AppleWriter loading

I WRITE to comment on the letter from F.S. Robertson of Kelso on Page 55 of your September issue. I can't understand his problem with loading the program. He must have a faulty copy.

But what about his backup disc? Is this faulty too?

However the best answer is to buy AppleWriter 2.0. This is the ProDOS version of AppleWriter and it loads and saves files much faster than the earlier DOS 3.3 version.

Moreover, it features just the thing he needs, a line counter. Hold down the Control key and press the underline key and a message appears at the foot of the screen telling you the page number and line number.

There is just one snag. It seems to ignore embedded .ff commands to start a new page.

I agree with him that AppleWriter is by far the best all round word processor. I gave up Wordstar years ago. — **E.G. Wood, Stockport.**

## If all else fails...

I OWN an Apple IIc and I like to type in programs that appear interesting.

One of these was the Pie Graphics in the May issue of Apple User.

Do you realise that there is a shortage of lines in this program?

I think it is very bad to print a program and not proofread it properly. Usually there are

corrections in later issues but by that time I became too cautious to waste my money on another copy.

Examples:

```
LINE 110 GOSUB 42400????
LINE 120 GOSUB 40000????
LINE 150 GOSUB 40200????
LINE 160 GOSUB 40400????
LINE 180 GOSUB 43470????
```

In my copy there are lines to 320 and the next one is 45200. I don't know how many other mistakes there are but I would guess there are lots. — **I.T. Miller, Kerikeri, New Zealand.**

● This isn't the only letter of its kind that we've received.

The golden rule is: READ THE ARTICLE FIRST.

Peter Gorry is always at pains to stress that his routines build on earlier routines.

It's clearly there on page 10 of the May issue, for example, which was plainly labelled as Part XIII of a series.

We now offer the complete set of Graphics Library routines on disc. See Page 26 for details.

## HRCG and ProDOS

I AM an Apple IIe user and have the Applesoft DOS 3.3 Toolkit which contains Programmers Assistant (renumbering, merging files) — APA and — High Resolution Character Generator which allows text on graphics page — HRCG.

My interest lies with the HRCG program and I also want to avail of the extra ProDOS functions, so I tried converting, but did not succeed.

I then got myself the Applesoft Programmers Kit for ProDOS, which I found very helpful and also happened to contain the APA program.

Would you be able to tell me if HRCG is available in ProDOS or if the DOS version can be converted to ProDOS? Also are there any other similar kits available. — **Pauline Nyhan, Co. Cork.**

● I do not know if HRCG is available under ProDOS but the DOS 3.3 version is convertible. The reasons HRCG will not run as it is under ProDOS are that it is a relocatable file which involves RBOOT and RLOAD to load it. These interface with

DOS, also HRCG itself "hooks" into the DOS I/O vectors.

To make matters worse, HRCG tries to sit in memory under HIMEM: which is where ProDOS sites its buffers.

If you are willing to forgo the possibility of relocatability it is easy to move HRCG across.

I think the easiest approach is to permanently put HRCG underneath the hires pages and load your Basic programs above them using the usual POKE 16384,0:POKE 103,1:POKE 104,64 approach when using ProDOS and hires page 1.

To this end put on to a DOS 3.3 disc the files RLOAD, RBOOT, and HRCG. Type in the following and run it:

```
10 HIMEM: 8192
20 ADR = 0
30 PRINT CHR$
   (4)"BLOADRBOOT": CALL 520
40 ADR = USR (0), "HRCG"
50 FOR I = 6141 TO 6148
60 READ C: POKE I,C
70 NEXT
80 PRINT : PRINT CHR$
   (4)"BSAVE
   HRCGPRODOS,A6141,L#803"
90 DATA
   216,76,24,25,216,76,116,24
```

If all goes well a binary file called HRCGPRODOS will be saved to disc. Convert this to ProDOS using CONVERT. This will now work under ProDOS as long as it is set up by a segment of program such as:

```
10 D$ = CHR$ (4)
20 PRINT D$"BLOAD
   HRCGPRODOS"
30 PRINT D$"PR# A$17FD"
40 PRINT D$"IN# A$1801"
50 HGR : CALL 6194
60 PRINT "READY"
```

I have not tested this extensively but as far as I can see all works well. The only proviso is that in place of the Ctrl-O Ctrl-P option to send to the printer you should use PR# ASC100 to switch on the printer and PR# AS17FD to return to the screen. Note that the start address is now 6141.

**Max Parrott**

## Hidden hooker

WHEN editing my Appleworks database recently I changed information in a category by deleting information from it. The category was included as an item in a labels-style report and was in fact part of an address that was sometimes required, other times not.

Appleworks printer options for the label-style report allows deletion of the line on the printout if no information exists under the category heading, alternatively it will print a dash. Great, it works fine unless you don't reintroduce the dash for a "no entry condition" in the original database category.

I frustrated myself for quite some time trying to get printouts without a gap, until I noticed that any original information I had entered on the database responded to the printer format controls, that is the original default dash was left, if one did not enter information in a particular category.

I have re-read the AppleWorks manual several times, but can not spot any reference to this little hooker. — **Maurice Allenden, Swindon.**

## ALS graphics dump

I AM using an Apple IIe and Epson LX80 printer with Printermate interface (Advanced Logic Systems). Unfortunately the manual for the interface does not give any information on obtaining a graphics dump to the printer.

Do you know if any details have been published on the use of this particular interface? — **J.F. Martin, Ayr.**

● If the manual does not mention it then presumably the firmware does not have the necessary code. Software to drive Epsoms and dump hi-res graphics has been previously published by Basug and probably others but not by Apple User.

You would probably have to slightly adapt code written for another interface to take account of the locations used.

# apple classifieds

**PARALLEL PRINTER CARD** W/32k buffer as new, £85 ono. Apple Silentye printer, only few months old, new £200, selling for £120. Tel: 041-332 7969 evenings.

**APPLE II** lookalike 48k Plus 16k Ramcard, upper and lower case built in. Any trial, £160 ono. Call 021-747 2073 afternoon or evening.

**APPLE IIe** software. Omnis version 2.04 BAA, £100. Thinktank, £80. Mastertype, £15. Tel: 01-937 1184.

**APPLE III** software required particularly Access III and other communication packages. Tel. Paul (0245) 440102.

**128k RAMCARD** for Apple II includes manual and Pseudodisk software (DOS, CP/M, Pascal), £90. Phone 031-336 4434.

**APPLE II+** 64k twin discs database word processor games colour paddles, parallel printer card. All genuine Apple parts, perfect, £500. No offers. Bath 0225 835799.

**APPLE SOFTWARE**, Art Master design package, 12,000 shape combinations, MIX upper/lower text with graphics, joystick controlled, design pictures, charts the easy way, disc, manual only £9.95. Tel: 0494 39283 evenings.

**320K EXTENDED RAM CARD** including software and manual for Appleworks 5530 database records. 235k desktop,

auto segments file larger than the disc. Speeds up Appleworks. Easily upgradeable to 768k, £275. Accelerator 2E (Titan), £240. Enhanced Apple IIe, £350. Extended 80 col card, £40. Monitor III, £75. Two Apple disc drives, £90 each. Mouse, £70. Z80 card, £25. Apple disc controller, £20. 10" Imagewriter printer, £225. Super serial card, £45. Pace Nightingale modem, £50. Juki Daisywheel (6100), £250. Apple IIc disc drive, £75. Apple IIc monitor and stand, £80. Additional IIc power supply, £5. Loads of original software at a third P&Ps price. Phone for list or more details on Blackpool 0253 56361 evenings.

**APPLE IIe TWIN DRIVES** 64k extended to 128k, Monitor plus Applewriter IIe word processing program plus Quickfile IIe plus Multiplan, bargain 1984, £700. Phone 01-409 0418.

**APPLE PRINTER PAPER**, £100. 80 col card Apple, £20. Tel: 0344 484736.

**APPLE II+** (64k), 2 drives, serial and colour cards, joystick, paddles, 100+ discs, £500 the lot. Phone (0742) 362208 weekends only.

**APPLE II+** new 16k RAM card, Z80 card, 80 column card, speech synthesiser card, £35 each. Disc controller card, £30. Eprom Blower card, £50. 128k RAM card, £95. IC tester, £90. Clock

card, £50. Tel: 07073 35408. Ask for Chris.

**APPLE II+**, 64k, disc drive, monitor and lots of software, £500 ono. Phone Geoff evenings 340 7103.

**PRINTER** Centronics 737, manual, Apple intelligent parallel interface and cable, £110. Apple Silentye thermal graphic printer, interface, cable and manual, £50. Louis Pillet 01-242 0737.

**SOFTWARE APPLE II+**. Latest Visicalc, £40. Visifile, £40. CCA/DMS database, £35. Easywriter, £40. Visicalc 13-sector, £20. Excellent condition. Manuals or £120 lot. Louis Pillet 01-242 0737.

**APPLE II+** twin discs, 128k, RS232, Language UHF, green monitor, paddles, joystick, manuals, discs. Will split, £825 complete. Tel: 0527 42183.

**APPLE IIe** with extended 80 col card, duo disc, monitor, parallel printer card, Appleworks software, Epson RX80 F/T printer, plus all cabling, £1,500 ono. May split. Tel: 01-568 9191, ext. 2579. Ask for Farhad.

**AXLON RAMDISC 320k** for Apple II, £300. Equivalent to two superfast standard disc II driver. Complete with manual and software. Under two years old. Tel: Malcolm 0622 39030.

**APPLE II** 128k, monitor, disc drive, Z80 language communication cards, 16bit

port joystick, 75 key keyboard, all 90% new with manual, software plus 30 books and discs, DOS C/PM, integer word processing, Pascal, data file, Logo, Locksmith games, £1,500 quick sale, split. Tel: 0380 2513.

**APPLE II+ 64k**, disc, printer, comms card, speech card, monitor, joystick, many games, books, £800 ono. Phone 09552 3918.

**QUICKFILE** Apple IIe, original documentation, £35 + VAT. Tel: (0539) 24555, ext. 221.

**LOTS** of used Apple software from computer club to clear well below half price. Send £1 for big list Air-Mailed, write to: Albert Lee, Towner POB, 310 Singapore 9132.

**APPLE II+ 64k**, Silentye, disc controller, super serial I/F, speech, parallel I/F, £200. 8 port serial I/F, suitable DIY network controller, etc, £35. Tel: Crewe 780608.

**SYMBFILE 5mbyte HARD DISC**, interface card, cable, manual, Opsydiscs for Apple II+/IIe, £500 as new. Tel: 0908 677306 evenings or Helen 0908 660364 day. Delivery.

**APPLE IIe**, Videx 80 column card, £50. 16k RAM card, £30. Super serial card, £50. Parallel card, £35. Z80 card, £30. Tel: 01-349 2498.

## apple classifieds

- Classified ads can only be accepted from private readers, not companies.
- The cost is 20p per word, with a minimum of 10 words prepaid.
- Your ad will be printed in the next available issue of Apple User.
- Your accompanying cheque should be made payable to Apple User.
- Ads can only be accepted on this form (or a photocopy of the form).
- There is no maximum to the number of words you include in your ad.
- Ads too long for the form should continue on a separate sheet of paper.
- Ensure your phone number or address is included in the ad.

					10 words £2.00
					15 words £3.00
					20 words £4.00
					25 words £5.00
					30 words £6.00

Cheque enclosed for £ \_\_\_\_\_

Name \_\_\_\_\_ Address \_\_\_\_\_

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

### August 1982

Games review (Bandits, Suicide, Swashbuckler, Fly Wars) - Instruction file editor - Teach yourself Morse, Part I - VisiCalc section - Pstext II review - Asynchronous data transfer, Part II - Omnis review - A melody from your micro - Summary of 10 utilities - Make your own user port, Part II - Mah Jong - Number sorting - Elements of the Apple, Part V - Guidelines for buying a school Apple - Educational programs reviewed - PLUS four pages of Compucopia and two Apple-tips.

### February 1983

Think Tank - Interactive editor-assembler, Part III - Development of Scrabble on the Apple - VisiCalc's storage command DIF - Games reviews (Escape from Rungistan, County Fair, Snake Byte, Snack Attack) - Software reviews (Structured Basic, GrafForth, VisiScheduler and Lisa and the Ile - Pascal Pointers - Network analysis - Handling interrupts - Makeweight grading system - Date-stamping DOS - Educational game (listing) - Formatted Applesoft, PLUS four pages of Compucopia and seven Apple-tips.

### September 1983

Games reviews (Evolution, Wayout, Aztec, Crisis Mountain) - First impressions of Lisa - Think Tank - Reviews (Apple Interactive Data Analysis, File-Fax, Storyboard) - Replicating with VisiCalc - Printers Daisywheel v. dot matrix, maintenance contracts, stationery, Pipeline printer buffer and Fingerprint reviewed, new products, printer jargon, A-Z guide to printers, plotters and intelligent interfaces - Apples and youth training - PLUS three and a half pages of Compucopia and 11 Apple-tips.

### April 1984

Reviews (TKI Solver, Rapid Reader, Homework, Pen-Pal, Cache 16/64 printer cards) - Macintosh software flashes - Build your own graphics package Part III (Shape Tables) - Developing ProDOS programs - Pascal Tutorial Part IV - 16-page guide to Apple extras - from typist to Apple User - Games reviews (Wizardry III, The War of the Samurai, The Spy Strikes Back) - Encoding routine - Book reviews (VisiCalc for the Apple II Plus, The Elementary Apple) - PLUS News, New Products, and Letters.

### November 1984

Apple in a primary school - Games (Flight Simulator II, Drol, BC's Quest for Tires) - Graphics Part IX (including review of Cat Graphics) - Pascal Tutorial: Introduction to Pascal Operating System - Macintosh languages: MacForth, MacBasic, MBasic & Instant Pascal - Two Macintosh books reviewed - Communications Part III: Software - Loading DOS Toolkit assembler onto language card - Software reviews (Digisolve's Pixel Paint, Hilderbay's Payroll) PLUS Letters: News and New Products.

### May 1985

Sports Day runs smoothly with Apples - Graphics DIY Part XIII (pie charts) - Reviews (The Workbench, Macpunter II, 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) - Bin-search in Forth and Basic - Reaction Timer - Apples in Hungary - Fun & Games (Smart Shopper, Plantin' Pal, Micro Cookbook) - PLUS News, New Products, Letters and Apple-tips.

### October 1982

Games reviews Knight of Diamonds (the second wizardry scenario) and Pig Pen - Think Tank (with listings) - Med-res graphics, Part II (filling in shapes) - Lisa assembler language review - Magic of VisiCalc - VisiCalc Business Forecasting Model review - Cross reference listing program - Apple-vox speech synthesiser review - Morse Code, Part III - Computerised flash card for schools - French Verb program review. PLUS four pages of Compucopia and seven Apple-tips.

### March 1983

Darts game listing - Think Tank - Beginner's look at System Master - Games reviews (Blade of Blackpool), Banner Magic, Free Fall, Computer Scrabble) - Lower case displays in Basic - Buying a financial spreadsheet - Reviews of Multiplan; Applewriter III; Geometry and Measurement, Drill and Practice; CLIP - News about Lisa and the Ile - Applesoft error handling - Interactive editor-assembler, Part IV - Apple on a pig farm - Fickle Finger proofing, Part I. PLUS four pages of Compucopia and four Apple-tips.

### October 1983

Games reviews (Ultima II, Pot O'Gold Plus, Sherwood Forest, Juggler) - Think Tank - In-Circuit Emulation Part One - Lisa (emergency planning with the N.W. Health Authority, developing Busifile) - reviews (Basicode 2, Metacraft's Forth) - Graphics (Digisolve Vector Graphics board and Apple Business Graphics) - VisiCalc v. BeebCalc - Training (DIY course selection, what is training, computer-based training) - Package Deal game listing - improving life for the disabled. PLUS Compucopia and Apple-tips.

### May 1984

Special report on the Apple IIc micro - Preview of Appletips - Lisa mapping - Using DOS within Basic - Who should buy Multiplan? - Grandad gets his Apple - Graphics Package Part IV - Games reviews (The Missing Ring, Color Me, Black Death) - Game Listing: Apple Raid - Pascal Tutorial Part V - Macintosh: the Sand Project - Semi-standard letters with Appletips' WPL - Reviews (PaperGraphics, Transitions, Mem/DOS, Ultraterm), PLUS News, New Products, Letters and Apple-tips.

### December 1984

Games (Spare Change and Gumball) - Desert Island Discs with Pam Fisher - Pascal Tutorial (final look at the Operating System) - Spreadsheet (VisiCalc command table) - Lisa 7/7 Software - Macintosh games (Pensate and Frogger) - How Macintosh helps an actress - The world of the 6809 Pt. I: the Rehaflex board - Escher game listing - Graphics DIY Part X (including review of Sweet-P plotter) - Hilderbay SSP software review - Communications - PLUS News, New products and letters.

### June 1985

Apples keep track of music companies and Macintosh designs record sleeves - Fun and Games (Music Construction Set, Song Writer, Music Readiness) - Pascal Tutorial: start of a new series looks at records - Reviews (Tick-Tack translation package for Apple II+/Ie, Musicworks for Macintosh) - Graphics (three books reviewed) - Mugraph: light dependent resistors making sounds - Ampersound; routines for making music and sounds from Basic - PLUS all the latest News, New Products and Readers' Letters.

**Catch up on the articles you missed by sending for earlier issues. And when your collection is complete, keep it in one of our attractive binders. You can order by mailing the coupon on the right - or by phoning 061-480 0171 quoting your credit card number.**

### April 1983

Games reviews (Type Attack, Microwave, Tubeway) - Word Processing (Supertext, Executive Secretary, Wordstar, Word Handler) - economics of using electronic worksheets - Fishing (game listing) - Apples in the pet foods and film slides industries - Anatomy of the Ile - Beginner's programming - Reviews (Omnis, Strobe 100 Plotter, Hilderbay Bookkeeper, Turnkey CP/M) - Programming for the classroom - Fickle Finger Proofing Part II. PLUS four pages of Compucopia and six Apple-tips.

### November 1983

Think Tank (Pascal Blockwrite/read, fast data-logging, input validity checking, date verifying) - Games reviews (The Alien, New World, Crime Wave) - Neat Pascal listings - Interactive Video at American Express - Reviews (CP/M Card, Disc-o-doc, The Graphics Magician) - In-circuit Emulation Part 2 (Rovino ICE II card) - Graphics (Super resolution, hi-res text strings) - Graphs from VisiCalc - Lisa's Cullinet mainframe link - Logo Part I - schools' software library. PLUS Compucopia, News, Letters and Apple-tips.

### June 1984

The Steve Jobs interview - Pascal Tutorial Part VI - Arbitrary byte patterns in memory - Graphics package Part V - Spreadsheet: VisiCalc's @LOOKUP function - Compile and solve crosswords with Appletips' WPL - British games reviewed (Derby, Soccer Manager, Election, Necromancer, Mekbulu) - Modems, micros and bulletin boards - Program for marking schoolwork - Reviews (Pixy plotter, TG Track Ball, C/WP colour modulator) - Logo round-up. PLUS News, New Products and letters.

### January 1985

John Sculley's View of 1985 - Games (Gelfing Adventure, Story Maker, Stellar 7) - Application: Apples down on the Farm - Cloze Technique (Plus review of Clozmaster) - 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, Apple-tips and Letters.

### July 1985

Apples at the heart of Papworth Hospital - Fun & Games (Secret of Arendarvon Castle, Antagonists, Fahrheit 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 (Flow-charting, Preview of Guide) - Book reviews (Business Basic, Epson printers) - Reviews (FingerPrint and PrintInterrupt) - Graphics DIY Part XIV - DOS patches - PLUS News, New Products, Letters and Apple-tips.

### May 1983

Think Tank (VisiCalc Magic, Appledarts sound, hi-res routines) - Games reviews (Spy's Demise, Teleport, Beer Run, Prism, Bug Attack) - Moans about manuals - To copy or not to copy - The outdoor Apple - Reviews (Wildword, Apple Circuit, Personal Data Analysis) - Date conversion - Understand the Epson Part I - VisiCalc Review of Vergecourt 128k RAMcard and Cdex VisiCalc training course - Graphics (generating bar indicators with listing) - Standing Wave Plotter. PLUS Five pages of Compucopia and seven Apple tips.

### December 1983

Think Tank (memory dump in Forth; shape filling) - Games Reviews (Dark Crystal: Dawn Patrol; Minit Man; Flip Out; Snooper Troops 1 and 2; Dragon's Keep; Troll's Tale) - Reviews (Word Juggler; Koala Pad Touch Tablet; Wildcard Plus) - How to choose software for your business - Talking to dolphins - Write your own adventure games - Estate Agency with a network of Apples - Lander Game Listing - VisiCalc cash flow projections - Drawing with Logo. PLUS News, Letters and Apple-tips. Compucopia.

### July 1984

Capitol CAD package - Automating CP/M with Pseudo disc drive - Wordstar on Epson printer - Relational Databases - Games (Lode Runner, Coveted Mirror, Crypt of Medea, Queen of Hearts, Quiz Listing) - Screensplicer - Ile super-res graphics - Pascal tutorial part VII (defining procedures) - Volume control for Apple II - Appletips review - Lisa helping visually handicapped - Calculating mortgage repayments with VisiCalc - PLUS News (including report on Apple '84), New Products and Letters.

### February 1985

Steve Wozniak talks about Apple II developments - Quicksort algorithm in Forth and Basic - Games (Deadline, Witness, Planetfall, Enchanter, Scorerer, Expedition Amazon) - Graphics DIY part XI - Targeting with 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.

### 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 Apple-tips.

### June 1983

Think Tank - Games reviews (Pie Man, Asteroid Field, Star Thief, Cyclotron, Star Blaster, Warp Destroyer) - Security with Data Encryption - Product reviews (Routine Machine, List Handler, Apple III CP/M Softcard, Savvy, Apple Project Manager and Micronet) - Apple '83 preview - Screen editing for beginners - Understanding the Epson Part II - Book review (Create Word Puzzles with Your Micro) - More Apple Pilot facilities. PLUS five pages of Compucopia and eight Apple tips.

### January 1984

Hi-res text generator - Game listing (Patience) - Games reviews (Apple Cider Spider; Theuseus and the Minotaur; Thunderbombs; Buzzard Bait) - Lisa Workshop - Logo in the US - Pascal Tutorial Part I - Pascal PEEKing and POKEing - Reviews (Bit Stik version 2; CIA utility; Nano 6502 Assembler; Aviette FDD 820 disc drive; KGP-40 printer; AK-GC Joysticks; Praxis 35 typewriter/printer; VisiCalc Advanced) - Appletips word counting. PLUS News, New Products, Letters and Apple-tips.

### August 1984

Communications - Apple in a haulage company - Book Review (Apple Basic Data File Programming) - Reviews (Scribe 3D CAD package, Sage CP/M Database, Codewriter IIe, Ramdrive IIe, ShortCuts) - Games (Plasmania, Bouncing Kamungas, Pinball Construction Set) - Graphics package part VI (text handling by machine code) - Lisa organising meetings - Pascal Assembler - Speech input via Voice Input Module - Multiplan helps with cricket scores PLUS News, New Products, Letters and Apple-tips.

### 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 Apple-tips.

### September 1985

Appletips spreadsheet eases home 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 Apple-tips.

### November 1982

A beginner's guide to PEEKs and POKEs. Part I - Games review (Galactic Wars Night Mission Pinball, Raster Blaster, David's Midnight Magic and three Quick Spins) - Think Tank (with listings) - Three 80 column cards evaluated - Visicalc: Brush up your algebra - Bit Stik graphic system reviewed - Pitfalls in producing educational software - Treasure Islands educational game reviewed - Med-res graphics, Part III (Ampersand routine). PLUS four pages of Compu-copia and six Appletips.

### July 1983

Apple '83 review - Think Tank - Games reviews (Zork I, II and III, Hitch-hiker's Guide to the Galaxy, Wavy Navy, Shuffleboard) - Using a printer with DOS - Reviews (Micro Planner and The Spreadsheet) - Visicalc potpourri - Beginners' PEEKs, POKEs and CALLs - Creating a turnkey system - Atomic research Apples - File organisation methods - Insurance broking with an Apple - Pilot Animation - Tip for using both sides of a disc. PLUS five pages of Compu-copia and seven Appletips.

### February 1984

Macintosh Revealed - Apple in the clothing industry - Book Review - Reviews (ProDOS, Apple's new operating system; Bank Street Writer; Keystar for Wordstar; Word Weaver III) - Logo: manipulating human language - Lisa Workshop Part II - Build your own graphics package - Games (The Quest, Story Machine, Repton, Sammy Lightfoot) - Date Manipulation - Voice Darts - Pascal Tutorial Part II - Pascal Animation - Visicalc cashflow models. PLUS News, New Products, Letters and Appletips.

### September 1984

How an Apple helps police hero - Updating Apple graphics and arcade design - Serial data transfer - Games (Early Games Music, Learning with Leeper, Fuzzwomp, Hallow'een) - and DIY Graphics Part VII (including review of Doublestuff) - Macintosh (journalist's view of MacWrite, Software Development, Transylvania, Linking Lisa to ICL mainframe) - Pascal Tutorial - Pilot Interpreter - Spreadsheet (including bug in VAV) - Reviews of Graphpak and Format-80 Enhanced - News, New Products and Letters.

### April 1985

Apples in the dental surgery - Adding graphics commands to Applesoft - Using the VBLANK signal - Getting to grips with software - Reviews (Speedemon 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.

### 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.

### January 1983

Think Tank - Book reviews (Apple Graphics and Arcade Game Design) - Games reviews (Wizard and Princess, Transylvania) - Six-page guide to memory storage (guide to disc drives, new bubble memory, 128k RAM cards; disc back-up, mini-Winchester drives, new Apple drives) - Walt Disney's TRON - Graphmag review - Installing Wordstar - Business cash flow with Visicalc - Pilot review - Interactive editor-assembler, Part II. PLUS four pages of Compu-copia and eight Appletips.

### August 1983

Reviews (The Accelerator Board - tripling the speed of an Apple II; Micro-planner Part II; The Ramview 80 and Vision 80 80 column cards for the IIe; SuperPilot - does it set a CAL standard?) - Games reviews (Kabul Spy, Super Taxman 2, Succession, Jaw breaker, Spectre) - III or IIe? the Apple III's place in the market - Use indices for What If? analysis with Visicalc - Basic editing for beginners - Pascal Disc Directory - PLUS five pages of Compu-copia and six Appletips.

### March 1984

Games listings (Noughts and Crosses; Twenty Questions) - Pop music Apple - Reviews (Studentdata, Sidevise) - Games reviews (Facemaker, Police Artist, Microbe, Adventures in Flesh, Dungeon!) - Pascal Tutorial Part III - Lisa (Launch of Lisa 2 series; SunAccount ledger system) - Graphics pages in memory plus two histogram routines - Indexing Forth discs - Critical Path Analyses with Visicalc PLUS News (More after Macintosh: multiplying mice; Lisa wins; Rital), New Products, Letters and Appletips.

### October 1984

Appletips (drive cleaning, DOS, REMs and Lists) - Apples in a clothing factory - Book reviews (games programming, Pilot, Apple IIc) - Games (Gruds in Space, Cherryspin, Aquatron) - Graphics Part VIII (including review of Spectrogram colour card) - Mac software reviews (MacForth, Click Art and Mac the Knife) - Simulation of radioactive decay and Einstein solids - Pascal tutorial - Flashcalc - Reviews of Blackboard printer card and CW/P drive - PLUS Letters, News and New Products.



### 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 1st Mac upgrade - ProDOS gives Applesoft new lease of life - Review of Critch CPM Plus system for IIc - Apple word processors compared with MS-DOS counterparts - &DOS-FILE: two more routines added - Pascal tutorial: parameter passing - extra tracks on discs - Fun & Games (Suspect, Karateka, Dazzle Draw) - PLUS News, New Products and Letters.

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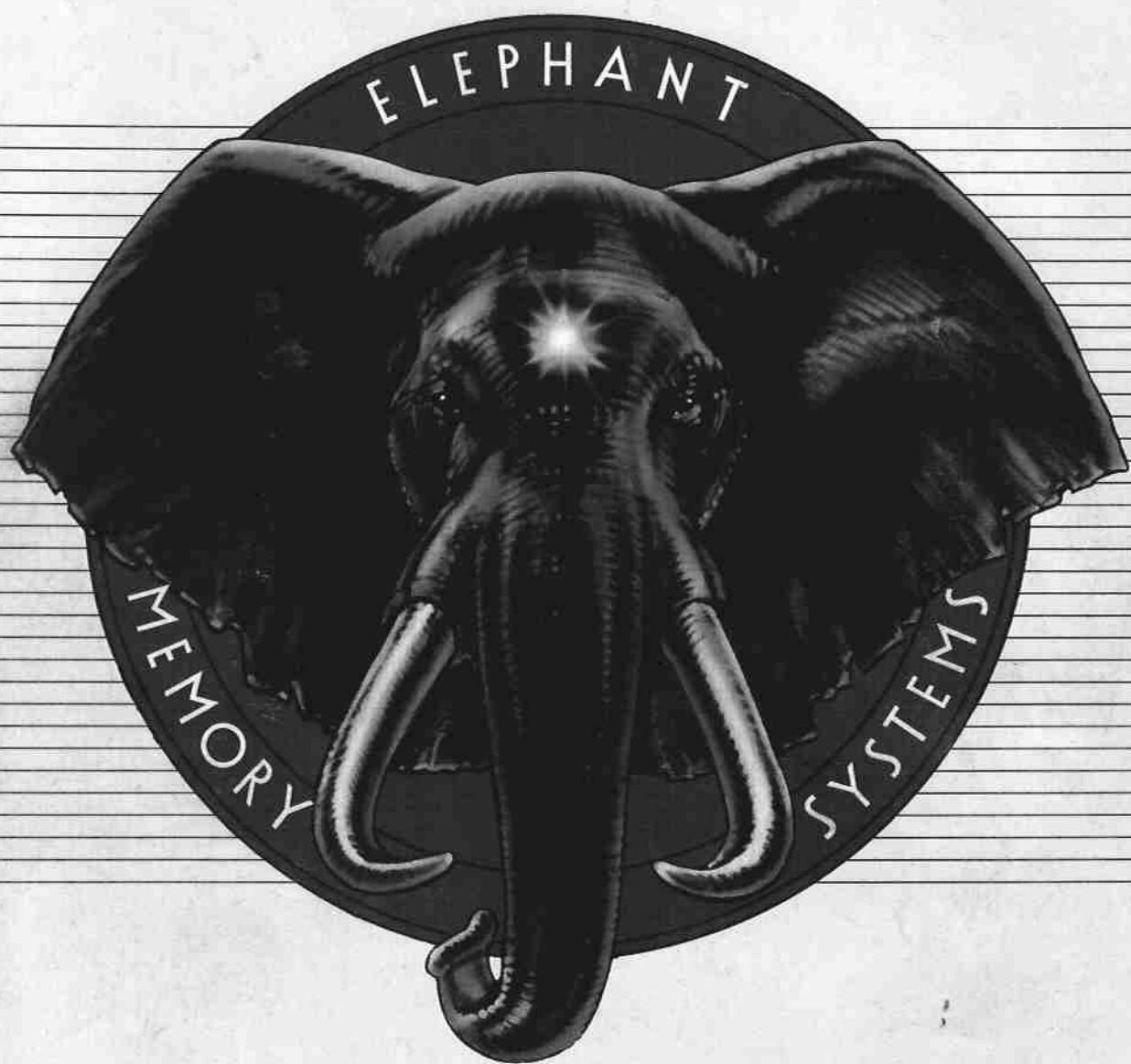
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