POPULAR Computing WEEKLY

SPECIAL supplement

1986 June 19-25

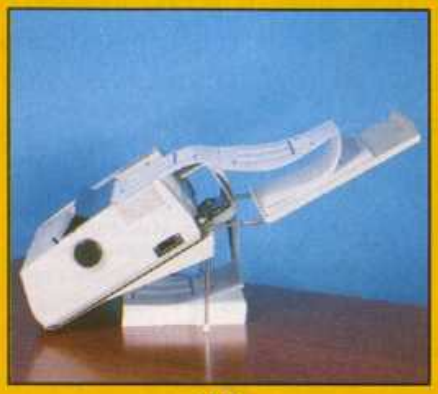
PRINTERS and HARD COPY

INSIDE

IV
Laser printing – will the latest technology fall to home micro prices?

VII
Bits and pieces – how to get more from your printer with new ideas

VIII
The popular printer guide – a selection of sub-£500 machines to choose from



XI
The Citizen Two-Colour printer – small is beautiful for CBM owners

The printer is one of the most important peripherals you can buy for your micro. It's the only way to produce permanent copies of data which don't rely on the micro itself when you need to re-examine them.

Rather than just giving you a list of suggested purchases – though you will find a popular printer guide on page VIII – we've tried to use this supplement to give you ideas on how you can make more use of your printer, and what you can expect to see in the years to come.

Our recent reader survey showed that 70% of you thought a printer was the first peripheral to buy.

Laser printing, desktop publishing, interfacing, budget printers, and money-saving ideas are all covered this week. We hope that you'll get some ideas, and start to use your printer more as a creative tool rather than just a listing machine! ◀

One mag per desk

PETER WORLOCK EXAMINES THE DESKTOP PUBLISHING CONCEPT: PUTTING YOUR PRINTER TO WORK PRODUCING YOUR OWN "MAGAZINES"

Desktop publishing is the buzz phrase of the year in computing circles. And it's odd that such a booming subject should owe its success to Apple's Macintosh – hardly the world's most popular computer.

The idea of using a personal computer to create magazines, brochures, reports, posters and so on did not start with the Mac. Software programs that allowed you to mix graphics and different sizes of text have been around for years. The Macintosh made the breakthrough by being the first micro to offer different text sizes and styles, together with high-resolution graphics, as standard features of the machine. In other words, it was a natural for desktop publishing.

But it required another breakthrough of sorts to allow the boom to start. It came in the form of Apple's Laserwriter, arguably the best computer printer available. What makes the Laserwriter so great (apart from the £5,000 price tag) is the fact that it is a powerful computer in its own right, with a 68000 processor, 500k of Rom and 1.5 megabytes of Ram, and it can produce up to eight pages a minute with a resolution of 300 dots per inch. In comparison most dot-matrix printers produce a resolution of less than 100 dots per inch.

This means that the Macintosh with the

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Editor

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Welcome to the world of personal publishing on your BBC Micro!

FLEET STREET EDITOR gives you everything you need to produce professional-looking printed materials – in one package!

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A QUICK TOUR ROUND THE DEPARTMENTS

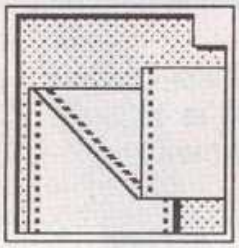
Each Fleet Street Editor page is constructed as a series of panels, with up to 8 panels per A4 page. Here's where you construct those panels:

GRAPHICS LIBRARY
200K (about 400 pieces) of ready-to-use art – illustrations, symbols, and display typefaces which can be incorporated into your own work.

STUDIO
Where you modify existing art from the Library or your own collection, or create your own. All the graphics in the Library were created here.

COPYDESK
Input your text here, using either the program's word processor or existing View or Wordwise files, and watch it wrap automatically round your graphics. Use different fonts, too.

PAGE MAKE-UP
Define the format for your page and construct it from the catalogue of panels you've built up. Some panels are provided ready-made for you to experiment with.



PREVIEW AND PRINT
Preview a reduced representation of your completed page on screen, approve it, and send it to your printer using one of the built-in printer-drivers – you can write your own, too.

ADMINISTRATION
Set up the program to suit your system configuration, format disks, integrate graphics from most Mode 4 programs, and further manipulate Fleet Street Editor files.

"FLEET STREET EDITOR is THE package for anyone with access to a BBC Micro who wants to produce printed materials that include graphics... The Graphics Library is a marvellous idea... The Studio is a really creative area with all the tools you need... Without a doubt, this is a wonderfully powerful and flexible package... FLEET STREET EDITOR has been cleverly conceived and brilliantly executed."
– Dave Futcher, Educational Computing

WRITE FOR BROCHURE AND FURTHER DETAILS

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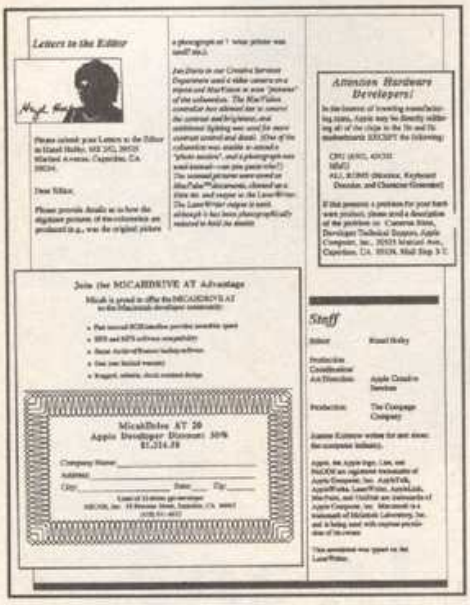
Laserwriter can produce pages that look very much like those in commercially produced magazines. But even without the Laserwriter, the Mac remains the best desktop publisher around. There are currently three programs available – **Macpublisher**, the cheapest at under £100; **ReadySetGo**, at about £120; and **Pagemaker** for about £400. As you go up the price range the programs become easier/faster/more flexible.

The examples shown here were created with ReadySetGo and printed on the Apple Imagewriter, a dot-matrix printer. A sample Laserwriter page is included for comparison.



Although you don't need to buy a Laserwriter (you can send your discs to a printer who will output your work on to a Laserwriter – much cheaper), the Macintosh desktop publishing system is beyond the means of most readers. However, the Mac's features will gradually become available on other computers – the Atari ST is a good bet. When that happens we can all become publishing tycoons.

In the meantime, publishing packages for the more familiar home computers continue to appear. The best-known so far are **Fleet Street Editor** from Mirrosoft, and **Pagemaker** from AMS, designed for use with the AMX mouse.

Both packages are available at the moment only for the BBC B, but both will be available for the Amstrad from July, and Fleet Street for the Atari 520 ST from August, and PCW 8256 from October.

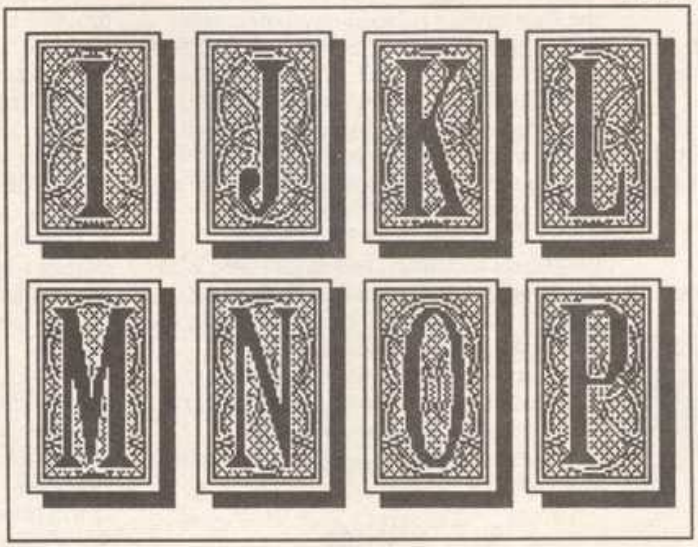
Fleet Street Editor is described as "the first of a new generation of one-step publishing packages". Divided into six different sections – studio, graphics library, copydesk, page make-up, preview and administration – Fleet Street Editor is designed to reflect the method by which real papers are put together.

The ring-bound manual is divided into sections covering the different departments, and includes a section on printing methods which gives you some ideas of the problems faced by journalists and printer in the days before computerisation!

The Graphics Library section is a file of images which can be used on your page. There are around 400 images, including illustrations, symbols and cartoons, and a selection of "fancy" alphabets which can be used to create "banner" headlines. Sports, computers, music, maps, heraldry, caricatures, animals, astrological signs and Christmas images are just a few of the subjects covered, and there are further library disks planned.

Panels

Panels from the graphics library are loaded into the Studio section of the program, where they can be edited to your taste. Alternatively, you can create your own graphics from scratch, using several Pen, Ink, Brush, Copy, Reflect, Reverse, Enlarge, Reduce, Fill, Rubber-banding and Align functions. It's very similar to conventional art packages, but without the colour functions.



After creating your images with graphics and large text, you go to the Copydesk to enter your "body copy". The Copydesk is a simple wordprocessor, which can use View or Wordwise files. There are four single-height and six double-height fonts available. After defining your text area you can enter text using a variety of justification and word-wrapping options.

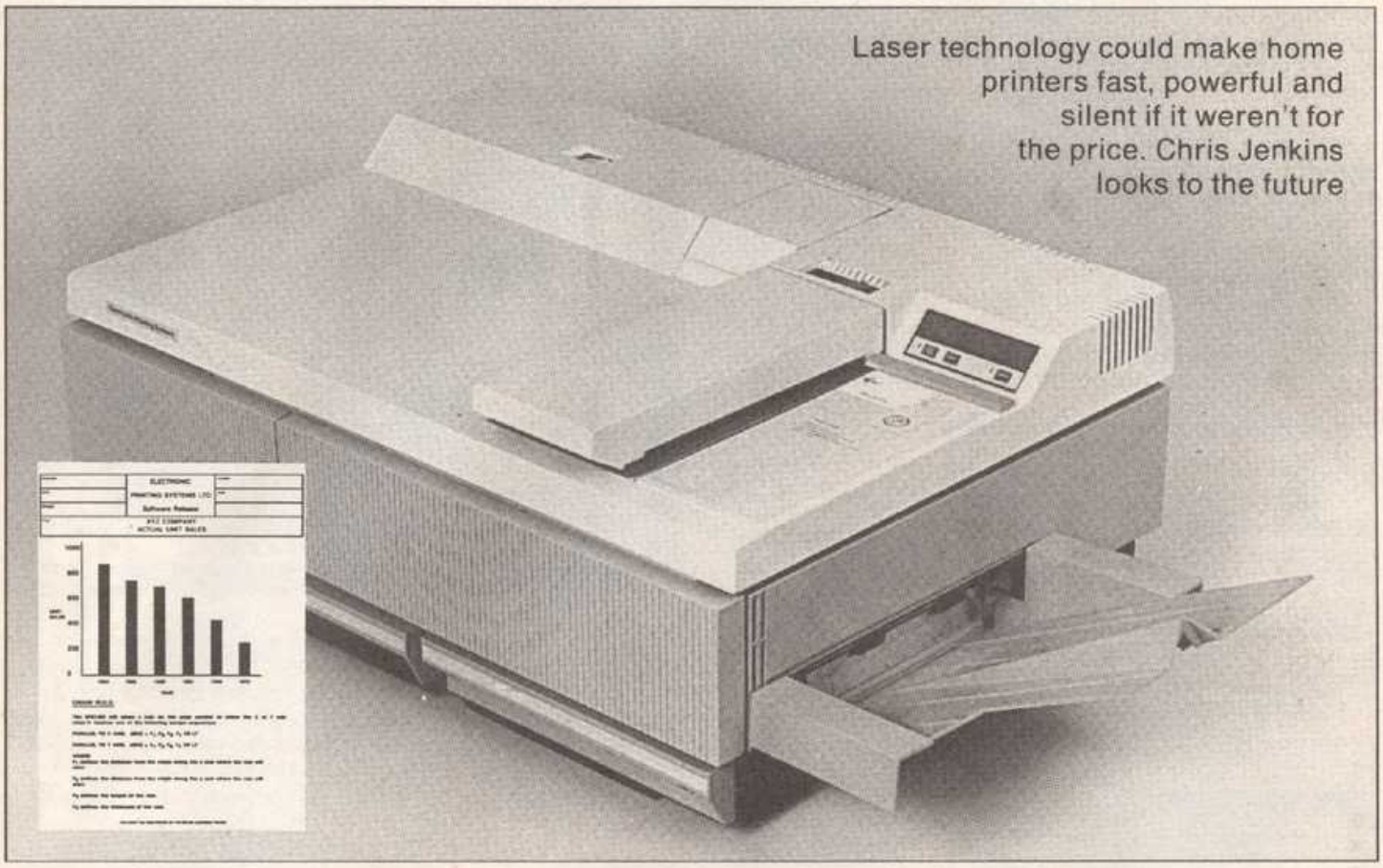
Page Make-up is the next section, where you pull all the text and graphics panels you have created into one display area, and space them out as you want them to appear on the page. In the Preview and Print department, you can examine the finished page and send it to the printer.

The final department, Administration, is not, as you may suspect from the title an excuse to put your feet up and have a cup of tea, but the area in which disk formatting, graphics mode transfer, printer drivers and other utilities are dealt with.

Don't forget, though, that with Fleet Street Editor, and other publishing packages, the story doesn't really end when you have produced your finished document. For a start, it takes around ten minutes to produce a page of finished print at the highest possible resolution, so the idea of running off several hundred copies is a bit daunting. Better by far to use a photocopier. Various useful tips on photocopying, as well as lithography, stencil and binding are included in the Fleet Street Editor manual.

Concept

Fleet Street Editor is the first of what will be several desk-top publishing packages for home micros. This article has been intended to give you some idea what the concept is about, rather than to review particular programs in depth. The best way to learn about desktop publishing is to try it for yourself – like the computer printer itself, you have to experience what it can do for you before all the applications become obvious.◄



Laser technology could make home printers fast, powerful and silent if it weren't for the price. Chris Jenkins looks to the future

Look out for the laser

While dot-matrix and thermal printers have become so cheap that few computer users are unable to afford them, business users can enjoy the benefits of much more powerful and sophisticated machines. These include daisywheel printers which offer very high quality and interchangeable type-faces, and, at the top end of the market, the laser printer. But is it possible that the price of laser technology will come down to home user levels?

Apple

Laser printer technology is perhaps most familiar through machines such as the Apple LaserWriter, which, in combination with the MacIntosh, forms a complete "desktop publishing"system. Indeed, Apple would claim to have invented the whole desktop publishing concept.

However, the Mac/LaserWrite system still costs around £7,000, so the facilities it offers are not really available to the amateur. Paul Smith, MD of Electronic Printing Systems, thinks that this might change soon.

EPS is in the forefront of laser printer technology, and Paul Smith is well aware of the possibilities of the "budget" market. At the moment EPS sells hardware and software to a market composed of about 25% mainframe users, and 75% PC users. A typical product is the EPS 1000, which at £4,995 is within the price-bracket of most medium-sized companies with heavy photocopy/printing requirements.

Yes, that read PHOTOCOPY – because the laser printer is based on photocopier technology, and the EPS 1000 will function as a photocopier as well as a printer. The EPS 1000 is a highly-volume desktop machine. In the laser printer market this means a 10 page per minute device, about the same size (and physically similar to) a photocopier, at 27 × 21 × 10 inches.

The EPS 1000 offers RS-232 and Centronics interfaces, and so can used with most popular PC's including IBM, Wang, DEC, TI, HP and so on. It features landscape or portrait printing, margin set, tab, alternative fonts, shadowprint, underline, justification, variable line spacing, subscript and superscript, line drawing, and a resolution of 300 dots per inch horizontal and vertical.

Silence

Until you have seen the output of a laser printer you cannot really imagine how much better it can be than the product of even the best daisywheel. The added advantage of laser, of course, is that it can mix fonts, combine text and graphics, print up to around 48 point-size text, and, not least, operate in almost total silence!

At the moment EPS's Paul Smith can only see one major obstacle to this sort of technology coming within the home-user price range. "The laser printer is based on much the same technology as the photocopier, and photocopiers have not dropped below £600-£700 because of the basic cost of the 'engine'. The price of this is stuck at around $900, and until there's an OEM (Original Equipment Manufacturer) who can offer the 'engine' (the actual laser device to which the manufacturer adds the RAM, ROM and operating system) at a lower price, laser printers will be high-priced."

This situation is, hopefully, going to change when the demand for better quality printers makes high-volume sales of laser printers economical.

Volume

Paul Smith predicts that within two to three years we may see laser printers at around £1,200-£1,300 which will produce 4 pages per minute, and will beat the quality of the present-day inkjet devices such as the sub-£1,000 Hewlett Packard Thinkjet, which can offer colour facilities, but cannot compete on speed or resolution with the laser.

Perhaps we will see some high-volume sales outlets – such as, perhaps, Amstrad – adopting the concept of laser printing within the next couple of years. If so, it may not be long before the current crop of noisy, inky, tardy printers are replaced by silent, speedy, powerful printers at affordable prices. ◄

Pick yourself a printer

The Popular Computing Printer Guide is intended to help you choose the right printer for your needs. We've set a limit of £500 but bear in mind that you may need to spend extra to get an appropriate interface for your micro.

PRINTER	Price	Speed	Paper width	Matrix size	Feed	Descenders	NLQ	Interface	Graphics	Supplier	Comments
Citizen 2-colour	49.95	65	2¾	6×7	F	N	N	S	Y	2	Reviewed this issue
Alphacom	75	100	8¼	6×7	F	N	N	C/R/S	Y	5	Thermal printer
Samleco DT-80	115	30	8½	11×9	F	Y	N	C/R	Y	13	Very cheap dot matrix
Brother HR-5	160	30	8	9×9	F	Y	N	C/R		15	HR5-C Commodore version
Smith/Corona 80	195	80	11	8×9	F/T	Y	N	C/R	Y	13	Tractor feed extra
Centronics GLP2	199	100	8½	9×9	F/T	Y	Y	C,R	Y	3	Tractor feed extra
Seikosha 100	228	30	10	5×7	P/F	N	N	C	N	17	Similar to CBM 801
Shinwa CP-80	228	100	10	9×13	T,F	Y	N	C,R	Y	6	QL version available
OKI Microline 80	229	80	9½	7×9	P,F	N	N	C,R	N	16	Tractor feed extra
Shinwa CP80	229	80	10	13×9	T,F	Y	N	C/R	Y	6	RS-232 extra
CBM MPS-801	230	50	10	6×7	T	N	N	S	Y	4	Descender ROM available
Smith/Corona TP1	235	17	15½	–	F	–	–	C	–	13	Daisywheel
Smith/C D100	253	120	11	9×9	T,F	Y	N	C,R	Y	13	RS-232 extra
Samlec DX85	256	120	10	9×9	T,F	Y	N	C,R	Y	13	RS-232 optional
Seikosha 250X	270	50	10	5×7	P,F	Y	N	C	Y	17	No tractor option
Star NL 10	278	120	10	9×9	T,F	N	Y	C,R,S	Y	14	Plug-in interface cartridges
Riteman A1	286	120	10	9×9	P,F	Y	N	C	Y	6	RS-232 extra
Riteman C+	287	105	10	9×9	P,F	Y	Y	C,R	Y	6	RS-232 extra
Epson LX-80	293	80	10	9×9	P,F	Y	Y	C,R	Y	11	Badged as CBM MPS 1000
Mannesman/T 80	299	80	10	9×7	T,F	Y	N	C	N	11	No RS-232 option
Riteman Plus	299	120	10	9×9	P,F	Y	Y	C	Y	7	Tractor feed extra
Epson RX-80	320	100	10	9×9	T	Y	N	C	Y	11	RS-232 extra
Daisy Step 2000	332	16	13	–	F	–	–	C	–	6	Daisywheel
Samleco DX-086	343	120	10	9×9	P,F	Y	N	C,R	Y	13	RS-232 extra
Canon PW1080	366	160	10	11×9	T,F	Y	N	C,R	Y	13	RS-232 optional
Epson RX80F/T	366	100	10	9×9	T,F	Y	N	C,R	Y	11	RX80+friction feed
Dyneer DW16	378	16	10	–	T,F	–	–	C/R	–	16	Daisywheel
Silver/Reed	378	12	10	–	T,F	–	–	C,R	–	12	Daisywheel
Taxan KP810	389	140	10	9×9	T,F	Y	N	C,R	Y		RS-232 extra
Centronics H80	392	160	10	11×9	T,F	Y	Y	C,R	Y	3	RS-232 extra
OKI Microline 82	402	120	9.5	9×9	F,P	Y	N	C,R	Y	16	Tractor extra
Smith/C D200	402	160	11	9×9	T,F	Y	Y	C,R	Y	13	
Samleco DX135	429	120	15	9×9	T,F	Y	N	C,R	Y	13	RS-232 optional
Brother HR15	445	13	12	–	T,F	–	–	C/R	–	15	Daisywheel
Star SG-15	447	120	15	9×11	T,F	Y	Y	C,R	Y	14	RS-232 extra
ACT Writer 10	454	120	10	9×7	T,F	Y	N	C	Y	1	Cheapest ACT printer
Juki 6100	459	17	13	–	F	–	–	C,R	–	6	RS-232 optional
Riteman 2	477	160	10	9×9	P,F	Y	Y	C,R	Y	7	RS-232 extra
Seikosha 700A	488	50	8½	5×8	P,F	N	N	C,R	Y	17	No tractor option
C. Itoh 8510	494	120	10	9×7	T,F	Y	N	C,R	N	10	RS-232 extra
Epson FX-80	503	160	10	9×9	T	Y	N	C,R	Y	11	RS-232 extra

1 **ACT**, Shenstone House, Dudley Road, Halesowen, West Mids. 021-501 2284
2 **Citizen**, Citizen House, 97 Uxbridge Road, London W5. 01-579 2042
3 **Centronics**, Petersham House, Harrington Road, London SW7. 01-581 1011
4 **Commodore**, 1 Hunter's Road, Weldon North Ind Est, Corby, Northants. 0536 205555
5 **Dean Electronics**, Glendale Park, Fernbank Road, Ascot, Berkshire. 0344 885661
6 **Keyaki**, Enterprise House, 42-44 Terrace Road, Walton-on-Thames, Surrey. 0932 242777
7 **Kode**, Station Road, Calne, Wilts. 0249 813771
8 **Mills Assocs**, Unit 6, Wilford Ind Est, Ruddington Lane, Wilford, Notts. 0602 818222
9 **Micro Peripherals**, 69 The Street, Basingstoke, Hants. 0256 3232
10 **Newbury Data Recording**, Hawthorn Road, Staines, Middlesex. 0784 61500
11 **Peripheral Hardware**, Unit 13, Monkspath Business Place, Shirley, West Mids. 021-745 3033
12 **Star**, Unit 6, Worton Grange Ind Est, Reading, Berks. 0734 752273
13 **Samleco Computer Services**, Dedworth Road, Windsor, Berks. 0753 854717
14 **Star Micromics**, Craven House, 40 Uxbridge Road, Ealing, London. 01-840 1800
15 **Thame Systems**, Thame Park Ind Est, Thame, Oxon. 084 421471
16 **X Data**, 750-751 Deal Avenue, Trading Estate, Slough, Berks. 0753 72331
17 **Seikosha**, DRG Business Systems, Lynx Cres, Winterstoke Road, Weston-super-Mare. 0934 419914

KEY:
► In the FEED column, **T** = tractor feed, **P** = pinfeed and **F** = friction feed. In some cases tractor feed is an optional extra for which you will have to pay more.
► **C** = Centronics, **R** = RS232, **S** = Serial interfacing.
► **NLQ** = Near Letter Quality.
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The video digitiser consists of a compact plug-in interface attached to the Spectrum and a suit of software.
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USES
If you are writing your own games, this is for you. This system will put professional digitised pictures into your games directly from your posters or video film.

Create superb visual effects by taking a stored digitised picture, and running it through a spectrum drawing program.
Use it for scientific analysis.
It can be used for promotional purposes.

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On screen picture signal analyser.
All settings fully software controlled.
Location of Digitised picture, is adjustable within incoming picture.
Save and retrieve high resolution 256 x 192 x 4 bit picture for later analysis in your own program.

TECHNICAL DESCRIPTION
The digitiser will operate with any 625 line composite video output. e.g. as from video camera, or video recorder on still frame. Digitises a full 256 x 192 x 4 bit, picture. Displays this on your computer screen. Automatic adjustment of levels for best use of incoming video signal. The selection of slice and grey scale levels, can be made after digitising to achieve the best picture. Pictures may be dumped to cassette or microdrive for use in your own programs, or with one of the spectrum drawing programs. Fully menu driven and very simple to use, supplied with a comprehensive manual. Amstrad version available soon.

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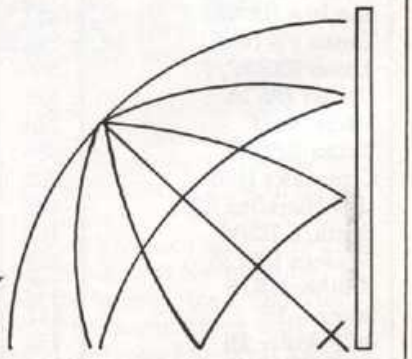
Chris Jenkins, POPULAR COMPUTING WEEKLY

"Is the friendliest Wordprocessor I have used. It has everything you require with a host of extras - a remarkable programming feat."
John Gilbert, SINCLAIR USER

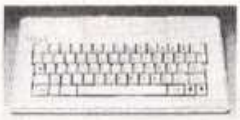
With a database and spreadsheet to follow soon, when it comes to word processors we have The Last Word.

CLASSIC

▶ **The Last Word** - Sinclair User Classic Award. £13.95.



KEYBOARDS



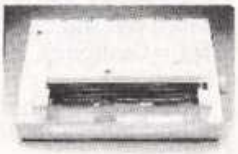
▶ **Saga 1 Emperor** - "Good looks ... works remarkably well..." Sinclair User. £39.95.

▶ **Saga 3** - "The best." Chris Jenkins, Popular Computing Weekly. The Last Word available with it free. £69.95. Direct Entry Keys

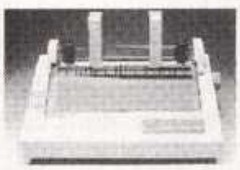
▶ **Saga 2** + - "Well done, Saga." Sinclair User. £54.95. Direct Entry Keys

▶ **Saga 2001.** Infra red remote transmission, out of this world. The Last Word available with it free. £119.95.

PRINTERS



▶ **LTR1 Printer.** Letter quality printer for only £119.95
Prints in ink on paper.
96 characters including Underline



▶ **The Citizen 120D** Precision dot matrix, with 2 year warranty. "The 120D is an excellent printer." Sinclair User. £235.00

▶ **The GLP** (Great Little Printer)
Dot matrix printer, 100 cps, letter quality mode. £199.95

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Printer plotting

NEW IDEAS FOR MAKING THE MOST OF YOUR COMPUTER PRINTING SYSTEM

If your greatest worry is that the cost of continually replacing printer ribbons is bringing your company to its knees, there's a solution which – though it sounds expensive – should be a worthwhile investment.

The Inker, from Applied Technology, can save businesses a packet simply by re-inking old fabric ribbons. The idea is based on the fact that fabric ribbons run out of ink long before they are too worn to use – but hammering an ink-starved ribbon is the quickest way to wear it out.

Applied Technology is the UK distributor of the American Inker, and the company's own offices use the product to save a fortune on ribbons. The Inker consists of an ink reservoir and a drive shaft, with a mounting adaptor which can be chosen to cope with all kinds of ribbons; Epson, Olivetti, Hewlett/Packard, DEC and so on.

The savings which can be made in offices which might have anything up to twenty printers are astounding – one Health Service branch apparently managed to save £11,000 per year by using The Inker.

An added advantage is that Applied Technology can supply blank ribbons, and coloured inks in five varieties, so that you can customise your printer output to suit your needs.

Only really heavy printer users are likely to find The Inker profitable, since it costs £195 + VAT. But for businesses which spend a fortune on replacing ribbons which could well serve for years, The Inker represents a clever money-saving method.◄

Applied Technology, FREEPOST MI 135, Stockton-on-Tees, Cleveland, 0642-672268.

If you need new ideas on how to use your printer, and a useful reference guide to control codes and word processing, you might like to look out for *Getting the most from your Printer* by J W Penfold.

Published by Babani, this 84 page bookette costs £2.95, and is aimed at owners of all the popular home computers and printers. Sections include an explanation of ASCII, control codes, sending codes to the printer, dealing with features such as bold and emphasised printing, line feeding, density modes and so on.

The section on word processors covers some popular packages such as Quill and Visawrite.◄

Berhard Babani Publishing, The Grampians, Shepherds Bush Road, London W6 7NF, 01-603 2581.

Turn your printer to a whole new application with the **Underware Transfer Ribbon** from Banbury Business Computers. If you are fed up with listings, bored with word processing and tired of art packages, how about making T-shirts?

The Underware Transfer Ribbon, developed by the American Diversions Corp, allows design to be printed out on normal printer paper, then ironed down on to a T-shirt. At the moment the Epson version only is available, but Banbury are hoping to make Canon, Kaga, and other makes available.

Any screen image, using hi-res, low-res or text, can be prepared on your machine, then flipped over to produce a mirror-image for printing (if you have appropriate art software). The design is then ironed onto the shirt – polyester works best, while 100% cotton shirts tend to provide a less washable image.

The black only ribbon costs £12, while for £19 you can get a set of coloured pens using the same special ink, to hand-colour your screen dumped design.

For quick, cheap, "disposable" T-shirt designs for events such as shows, sports days, open days, or whatever, the Underware Transfer system seems to be another ingenious application for the humble home computer and printer.◄

Banbury Business Computers, 3 Schofields Way, Bloxham, Banbury, Oxon, 0295 720812.

Users of the Amstrad PCW machines, who require more facilities than those provided by the printer supplied with the system, will be interested in two bundling deals offered by Wilding's.

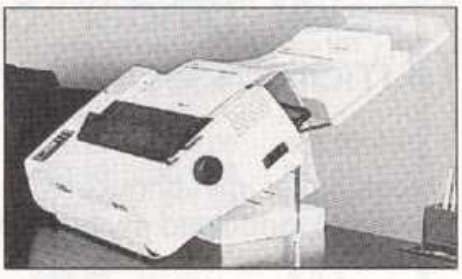
The Amstrad PCW 8256 is being offered with either a Brother HR10, or a Silver Reed EXPD 500 daisywheel printer. The printers cost £199.95, while the cables and driving software, which includes New Star's New Word processor and a spelling checker, costs £149.95. Both the printers are standard Centronics devices, and the prices include VAT.◄

Wildings Office Equipment, 303 High Holborn, London WC1, 01-405 9104.

If space is at a premium in your home computer set-up, one thing you can do without is the problem of where to put a stack of printer paper.

Now PW Engineering has come up with a paper management system which solves most of the problems in one go.

The hardware is produced in sturdy sheet steel, finished in beige acrylic – particularly suited to the BBC computer for which the system was first designed. It consists of a



base plate on which the printer sits at an angle designed to allow the user to examine the print-out as it appears, a set of legs and a removable rear paper tray.

There's a combined cable protector and paper shield to prevent paper becoming entangled with your mains and computer cables, and the system is available in two sizes; for 80 column dot matrix printers at £34.75 plus VAT, or for larger daisywheel printers at £43.44 plus VAT.◄

PW Engineering, Churchill Road, Bicester, Oxon, 0869 253226.

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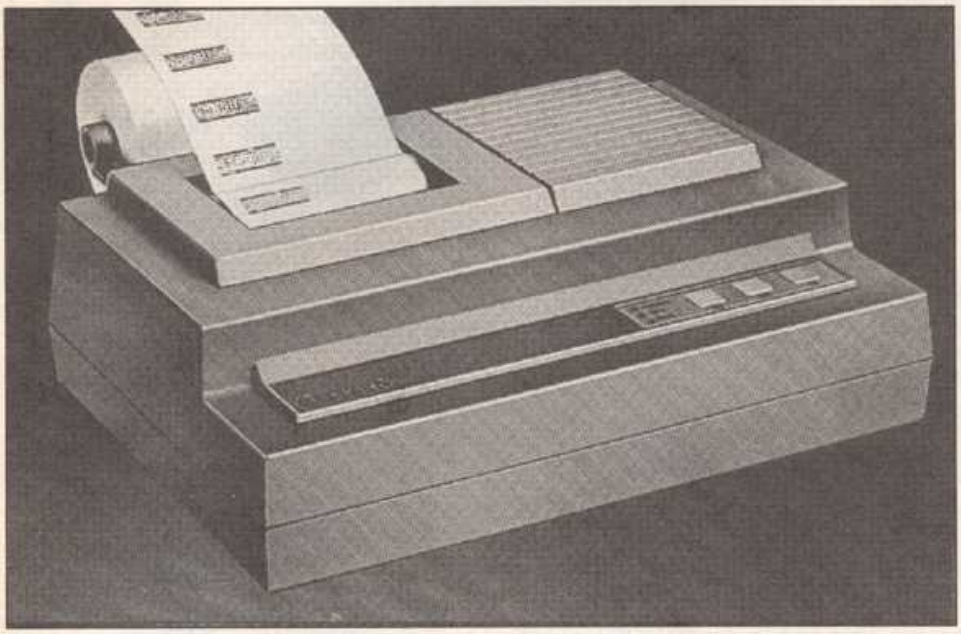
COMMODORE MICRO OWNERS CAN'T AFFORD TO IGNORE THE £50 CITIZEN TWO-COLOUR PRINTER, SAYS CHRIS JENKINS



The sheer bulk of most dot-matrix printers, along with the not inconsiderable cost, is enough to dissuade many potential purchasers from making the investment. If your home set-up is limited to a small area, the problems of fitting in a printer, with all its attendant wiring and paper stacks, can be just too much hassle.

Commodore computer owners now have the perfect solution, in the form of the excellent Citizen 2-Colour Commodore Printer.

Priced at an incredibly low £49.95, the Citizen is deceptively small and unobtrusive. At first sight, the natural assumption would be that it was some form of plotter, similar to the Commodore 1520, or maybe a thermal paper printer. But nothing could be further from the truth; it's a full function dot-matrix device, which, although it can only print on 2¾" "till-roll" paper, is incredibly efficient and useful.

Serial

Measuring only 240 × 176 × 81 mm, and weighing in at 2Kg, the Citizen is so small that it will fit on the most cluttered desk (and I should know!). It's mains powered – none of the worries over power failure associated with battery devices – and comes with a built-in Commodore serial interface for complete compatibility with the Vic 20, CBM 64, SX-64, C128, Plus/4 and C16.

Controls are kept to a minimum. On the back are the ON/OFF switch and the serial port (just the one). On the front, three LED's; red for ALARM, in case of paper jamming or data error, and green for ON LINE/OFF LINE and POWER; and three buttons, LINE FEED, SELECT (online) and DESELECT (offline). That's all there is to it. The paper "till roll" mounts on two arms which clip to the back of the printer, and feeds through under the cover and across the print head. There's a tensioning arm to keep the paper taut.

Addresses

In operation, the Citizen is like most other Commodore-compatible printers, except for the two-colour capability. The manual, which is surprisingly full and clear considering the low-end market at which this device is presumably aimed, explains all the business of device numbers, addresses, secondary addresses and control codes needed to operate any Commodore printer.

Several useful extras can be accessed by using simple CHR$ messages. The line spacing, normally set to 5.5 mm, can be altered using a secondary address of 6, and you can select either the upper/lower case or upper case/graphics mode using SA 7. Most usefully, the width of the characters printer can be doubled using CHR$(1), changing the matrix size used from the normal 7 × 6 to 7 × 12. There's also an INVERSE printing function.

Printing in red is achieved using CHR$(20). You can't mix red and black on one line. The red/black ribbon used is a standard size which shouldn't be difficult to obtain when you need a replacement.

Bit image programming allows you to define your own graphics characters using simple Basic commands, and there are also commands for paging, carriage return and line feed. The print produced is remarkably clear, although obviously limited to 40 column width. This can be an advantage if you are printing out program listings, since the printout appears in exactly the same format as the listing on the screen.

With a print speed of 65 characters per second (48 lines per minute in 40-column mode), the citizen is by no means slow. While it might lack the refinements of some printers – multiple serial ports, fancy paper feeds, compatibility with a wide rage of non-Commodore machines, and the like – the Citizen is absolutely ideal for producing listings, programming notes, financial figures, and so on. It wouldn't do for word processing because of the paper size; but just for the hell of it, I tried it with Paperclip software and got faultless results.

CITIZEN
TWO COLOUR
DOT MATRIX PRINTER
hello
HELLO BIGGER
HELLO IN RED

```
10 OPEN4,4
15 PRINT#4,CHR$(1)"    CITIZEN"
16 PRINT#4,CHR$(20)CHR$(1)"    TWO COLOU
R"
17 PRINT#4,CHR$(1)" DOT MATRIX PRINTER"
18 PRINT#4,"■■■"
20 PRINT#4,CHR$(129)"HELLO"
30 PRINT#4,CHR$(1)"HELLO BIGGER"
40 PRINT#4,CHR$(20)"HELLO IN RED"
50 PRINT#4,CHR$(18)"HELLO REVERSED"
60 OPEN1,4
70 CMD1
80 LIST
```

At this price, any Commodore micro owner without a printer could hardly afford to ignore the Citizen. In fact, even if you already own a printer, wouldn't you like to go one better than the Joneses and own two? The Citizen Two-Colour Printer makes it a distinctly interesting proposition. ◄

Product: Citizen Two-Colour Printer.
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