

COPIERS OF THE FUTURE

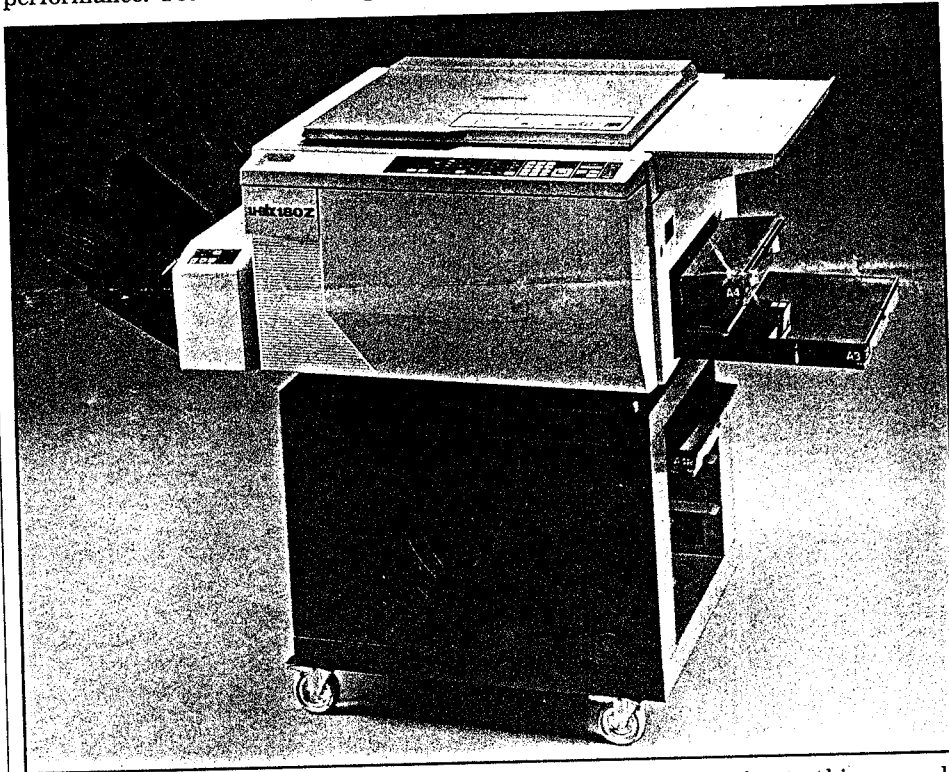
You may think today's copiers are hightec.

You Ain't Seen Nothing Yet.

There are many people in the reprographics industry who are confident they know how we will be performing the reprographic act at the end of the century, despite the fact that two years is a long time in modern technology and 15 comparable to eternity. The main prediction is for a vast increase in machine sophistication, involving construction as well as performance. Yet the small, simple

automatic by-product. Thus you type out a document, copy it, maybe send it physically around the building or via conventional mail or facsimile to remote locations. Wherever it starts and in all the places the original or the various copies end up it is likely to be filed. It may even be microfilmed as well!

But this is an age of convergent technology, and converging job functions and organisation. Copying



copier is likely to survive, they say.

A contradiction? No, because although the fundamental electrostatic principle of plain paper copying is not destined to change, most of the technology by which it is applied will. The effect of the *new*, new technology is likely to be a virtual return to the first principle of copying—which is essentially to *communicate* rather than merely memorialise.

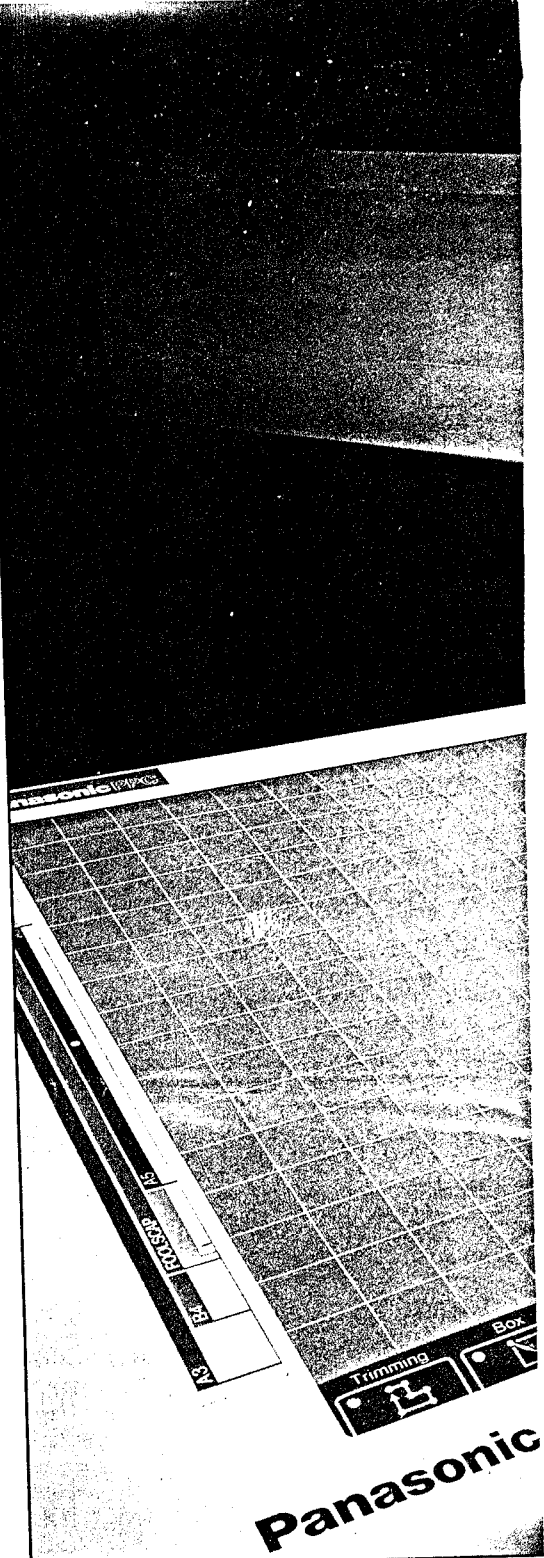
Meanwhile, in an odd way, the plain paper reprographic act as it is still today is, in concept, less sophisticated than making old carbon copies, ie: it has to be done as a separate and subsequent function, not as an

will not be an exception to this general trend.

Hitherto the copier, for all its development, has done little to affect the way offices are organised and businesses run. But copier technology in the future, involving communication and storage and, above all, digitalisation, is destined to change all that.

STEPS TOWARDS THE FUTURE

Standard modern plain paper copiers use variations on the *indirect* (xerographic) electrostatic process. In essence this process places a fugitive



Above: Seen at the LBES: Panasonic's E2S, a step towards the interrogatable copier, though a keyboard or screen/mouse arrangement will surely replace the lightpen.

Above left: Copying in a choice of colours has been the most obvious 'features enrichment' of copiers in recent years. The U-Bix 180Z automatically selects paper up to A3 size, has both zoom enlargement in one per cent steps and fixed reduction ratios. Copies in black, green, blue.

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Above: Canon say only of the launch of their laser copier that it will be soon: it will introduce the age of the communicating or 'remote copier.

which are much less dependent on service engineers than hitherto. Quite simply small, cheap copiers do not justify as many service calls from expensive engineers.

According to figures from Xerox, users making 10,000 copies per month 10 years ago experienced around 100 failures per million copies: the figure today, Xerox says, is half as much.

And yet for all that, it is remarkable how the same fundamental concepts apply to plain paper copiers as of old. The copy is still made by shining a light source onto the original document and reflecting it onto the photoconductive drum or web. The latent image is still an analogue of the original; the photoconductors depend on the same old exotic, pollutant metals: notably selenium and cadmium on aluminium substrates. And the reprographic act remains a case of slapping the original down, keying in the copies and carrying them away afterwards, collated and stapled as may be.

ENTER THE NEW, NEW TECHNOLOGY

Now copying technology is on the move. A whole new breed of copiers is on the way.

The principal elements of this new generation of plain paper copiers will be as follows.

- 1 Low-power lasers producing digital copying
- 2 Communications facilities permitting 'workstation' or 'terminal' copying
- 3 Use of image-storage media, such as the micro-floppy and above all its optical disk
- 4 New photoconductive materials for longer-lasting copying drums

magnetic image on a photoconductor, showers it with carbon 'toner' combined with a magnetisable carrier (iron oxide) then uses a more powerful charge to drag the latent image off the photoconductor and onto the paper.

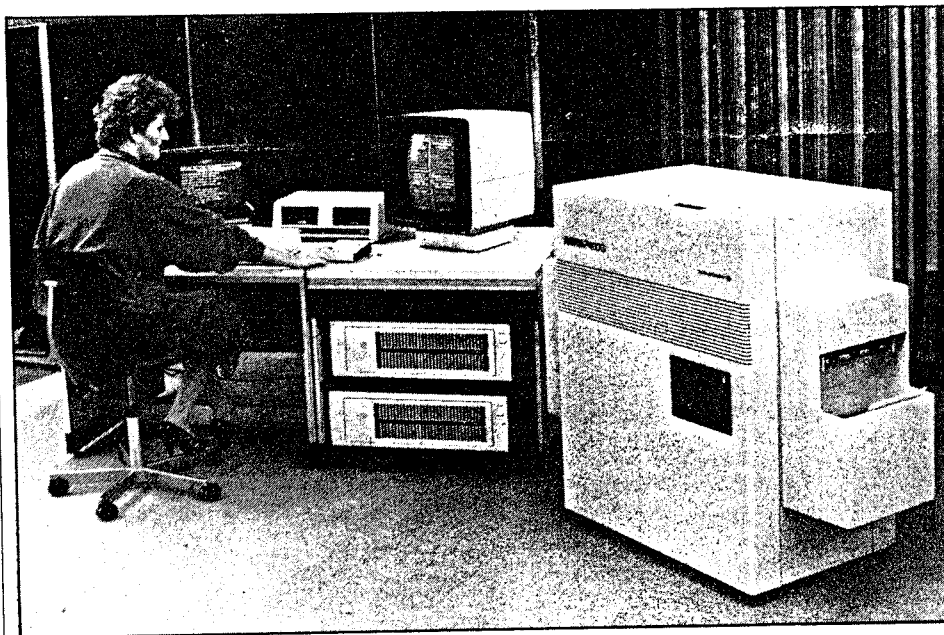
All sorts of refinements, involving chemistry, physics, mechanics, have been incorporated into machines over the years. But the greatest influence recently has been electronic—in the use of microprocessors and, in general microtechnology to eliminate many of the moving parts and to perform and monitor most of the functions. As a result machines have become more reliable (fewer moving parts means less

to wear and to wear out). It means that machines have become physically smaller and lighter. It means they have become quicker and easier to mass produce, and therefore cheaper. It has led to the provision of vastly more sophisticated features on smaller and smaller machines, which have become quieter and more house-trained so that they can be located in workstation situations.

It has brought about the design of copiers to have short, flat paper paths (fewer paper jams and far more easily rectified). And perhaps most basic of all, it has made it imperative for copier manufacturers to design machines

together with the coms facilities this will mean the emergence of the - genuinely 'intelligent' copier. Laser-imaging will turn copying into a digital process. As such it will be easy to communicate and store the image as an electronic signal. Meaning that copies 'imaged', ie: scanned, in one place could be printed out in another. Meaning that copy-information could be stored on disks, and to a certain extent edited and adapted under software control, probably via a keyboard or 'mouse'. This editing could be limited to selective enlarging or reducing of parts of an original, on selective printing of parts in varying quantities and on different paper stock. Equally it could trespass on the realms of word processing and optical document filing. Communication will promote the development of the *terminal copier as a sort of local area network of copying machines.*

Thus users could elect *not* to make a copy at all, but simply leave the 'document' on the disk, reading it off a screen or printing it out as required. In other words the low-cost versions of the likes of Philips Megadoc, the Panasonic Panaflex or Olivetti's FileNet may turn out to be glorified terminal copiers.



Agfa's A-400G printer (right, above) uses a matrix of light emitting diodes (leds) rather than a laser. Expect to hear of some exciting applications hybrid applications involving this equipment soon.

As a class the purpose of the new photoconductive materials will be to increase the lifetime of copier drums to match the life expectancy of the copier, particularly the laser copier, as a whole. Expect one million and more copies off a single drum.

The new photoconductive materials will be much harder-wearing than those used today. Non pollutants will also be

preferred. The first use of such photoconductor materials to make its commercial debut is likely to be the amorphous silicon drum on Canon's new laser copier (not to be confused with the Canon laser printer which has a conventional drum) in place of their usual CdS material. It is likely that other suppliers are also pursuing the use of this material.

Another breakthrough is possible in toners, now at the peak of their development insofar as the use of ferric oxides as the magnetisable carrier element is concerned. Very fine toners are difficult to handle since they begin to dust off (in which condition they could also become dangerous, remote though the possibility of actual explosion is). Magnetisable alternatives, like chrome cobalt alloys are available but too expensive.

Among the other new technologies featuring in the copiers of the future are likely to be flat lcd arrays either as an alternative light source to lasers (as used already by Agfa in its A-400G printer; Panasonic is another company developing this technology) and flat lcd screens and non-wired (ie: infra-red or sonic) keyboards communicating with the copiers either to 'edit' copies or 'interrogate' files.

There will always be small businesses, and newly started businesses, able to afford or sensibly use nothing more elaborate. It is thought that the area most likely to suffer will be the current medium-heavy or heavyweight areas, because the 'pull' will be towards smaller, sophisticated machines on one hand and super sophisticated terminal-type machines on the other.

By the end of the decade there will be more colour copiers. After Canon and Xerox, Toshiba showed a digital (laser) prototype at the last Hanover Fair.

As for whom will be making them all, it is likely to be the same group of Japanese manufacturers as today, with the proviso that no company can remain in the race without getting into the whole area of general, converging electronic technologies.

CONVERGENCE

Much of the developments foreseen for future copiers involves a convergence not just of technologies currently associated with other types of *equipment* but with other types of *office and communications functions.*

The most obvious of such convergencies is with facsimile. On the face of it, a terminal copier which scans documents, and communicates them to other terminal copiers is functioning as a fax transceiver. Will that mean the end of fax as we know it? The likes of NEC, Panasonic and Canon say, confidently, No. The strength of the modern fax is in software which suppresses white space at the sending end and recreates it at the receiving. Such software, would be redundant on copiers and only make them unnecessarily expensive.

However, the tantalising possibility of the copier going into active, communicating, partnership with the filing system gets a general thumbs up from the industry.

It will be truly ironical however if that old dream, the paperless office, comes as close to realisation as it is ever likely to be through the intervention of the great Paper Mill itself—the plain paper copier!

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The following suppliers are known to have laser- or led-based copying/ printing products in production or preparation.

Agfa Gevaert	151
Canon	152
Minolta	153
Mita	154
Ricoh	156
Sharp	157
Toshiba	158
Xerox	159

MARKET AND SOURCES

All the betting is on appearance of a new breed of copier, the terminal or workstation copier, capable of sophisticated input/output, store-forward functions as well as conventional slap-it-down and run-'em-off copying. It is likely to be a small or medium-sized unit, not a dinosaur that needs a lair of its own. Elsewhere the small, fast, 'features-rich' copier will be standard, and there is general agreement that the small, simple copier, intended for 1-5 off copies at a time, will still have a place in the office