

Built to burn

Producing your own professional CDs and DVDs on the premises can be cost effective, practical and extremely useful. Michael Palamountain from the Enex Test Lab tests products that duplicate by the hundred.

Many businesses will find they are regularly distributing information packs, samples, reports, training videos, or software to clients, colleagues and partners. All of this information can easily be stored on a single CD or DVD. The potential savings in postage are tremendous, and while it is possible to disseminate much of this information via the Web, an optical disk has the advantage of fast data access, practicality, and at times it can simply be far more appropriate.

Given the potential value for packaging and distributing information in this manner, the key question is whether to publish in-house or externally. If this type of publishing is required on a regular basis it may well be economical for a company to have its own disk-replicating equipment.

But the idea of manually popping a couple of hundred disks, one-by-one, into a DVD burner and then affixing labels as they finish is not a

pleasant one. Fortunately there are affordable alternatives that can automate this process in a typical office environment.

In this review we look at CD/DVD copying or publishing devices that are capable of accepting a template disk and replicating it onto a stack of blank disks. These devices need no supervision once the information and media have been supplied, and in most cases they also have the capacity to automatically and professionally label each disk as it is burnt.

COPY, PUBLISH OR ARCHIVE

The potential users of disk copying/publishing devices are diverse. Many instances will require perhaps dozens or hundreds of copies of each disk, but there are situations where only one or two copies of a single disk is required.

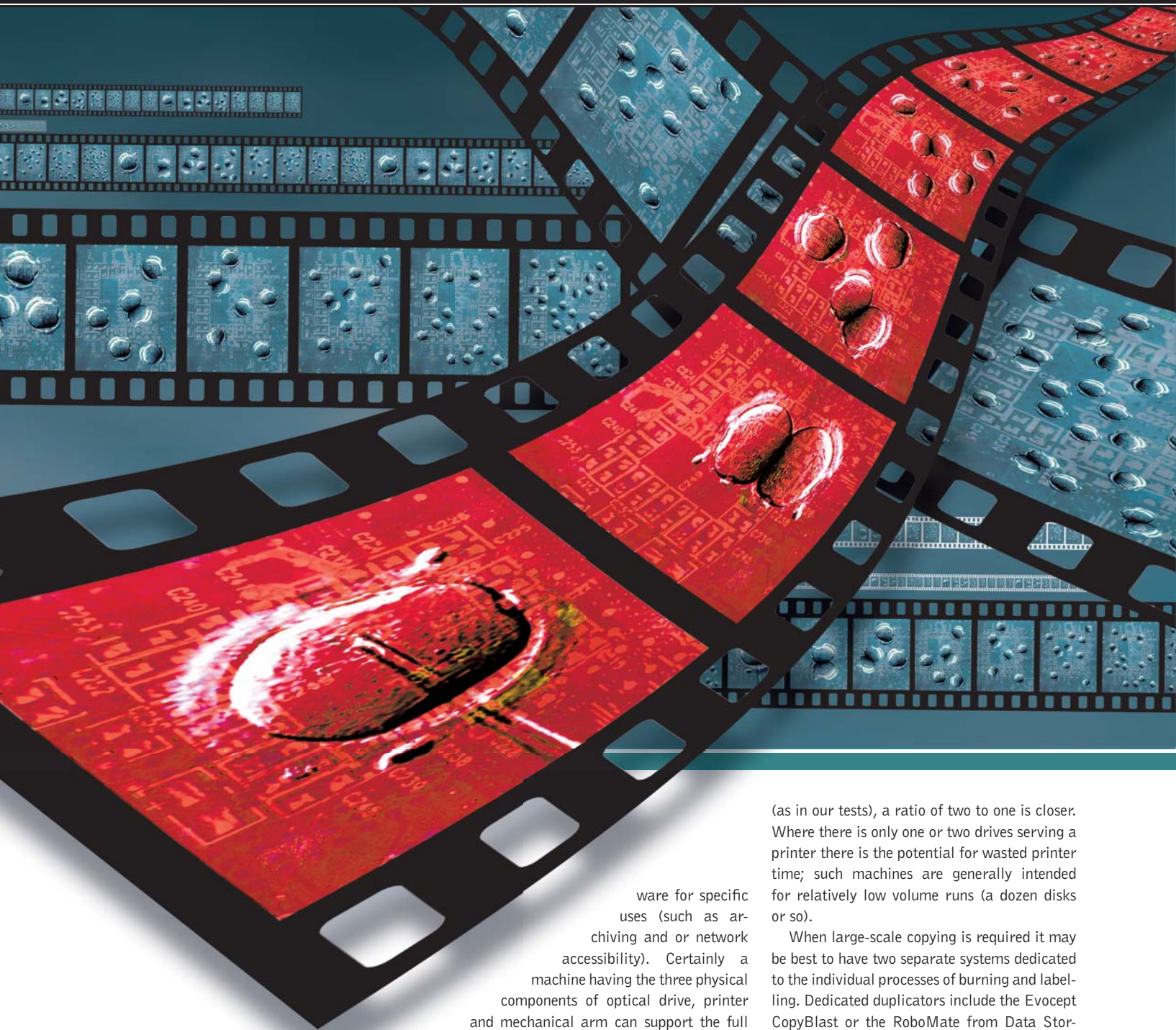
When we speak of publishing we are talking generally of situations where a new master is created. It may even be that only a small

number of copies are needed. Duplication refers to copying from an existing master and typically entails a large number of copies.

In the case of publishing there is a need to create the disk image (or edit an existing one) prior to burning, so it is necessary to use a device that can be linked to a PC. PCs will also be necessary where there is a need to perform labelling in conjunction with the copying or publishing process—the LCD screens provided on the publishing device itself are hardly suited to editing labels.

Single-copy or short-run publishing will be more typical of data archiving where, for example, medical institutions might wish to store medical records, including images, in a durable format for individual patients. Photographers may also need to produce individual photo disks for each client.

Fairly standard data that can be replicated satisfactorily by a simple copying process can



benefit from publishing processes. An example of this could be a personalised installation disk which greets the customer by name upon loading.

The different functions of devices depend greatly on the software provided with it. Potential buyers should carefully investigate the range of functions available to a given machine and whether it is necessary to buy extra soft-

ware for specific uses (such as archiving and or network accessibility). Certainly a machine having the three physical components of optical drive, printer and mechanical arm can support the full burning and labelling process required by publishing, but also the simpler requirements of straight data reproduction. But should a machine intended for publishing be used for large scale duplication?

Typically the burning process takes significantly longer than the label-printing process—some suggest that it takes about four optical drives to keep up with one printer. This is probably reasonable for DVDs, but with CD copying

(as in our tests), a ratio of two to one is closer. Where there is only one or two drives serving a printer there is the potential for wasted printer time; such machines are generally intended for relatively low volume runs (a dozen disks or so).

When large-scale copying is required it may be best to have two separate systems dedicated to the individual processes of burning and labelling. Dedicated duplicators include the Evocept CopyBlast or the RoboMate from Data Storage Solutions (DSS), while dedicated printers include the Primera BravoPro Autoprinter or the DSS PrintMate. It doesn't particularly matter if labelling occurs before or after burning (except that any failed burn may be labelled unnecessarily) so both devices can be run at full capacity.

Besides ad-hoc copying there is the potential to use disk publishing equipment for regular data archiving. Essential databases or other

files could be scheduled for burning on a regular basis and have a dated label applied automatically so that an administrator can come into work on Monday morning and pick out the new disk and store it away safely. Obviously this type of feature requires the system to be tied into the office LAN.

SPEED

In some cases the user will be able to specify the speed at which burning takes place. Normally a device will try to run at its maximum speed, but copying is more accurate at lower speeds. It is normally recommended to burn audio CDs at x16 speed; it is best to play it safe since error checking is not a feature of this disk format. For machines that depend on an attached computer there are extra considerations. The administrator needs to ensure that there is space for the disk-image caches and that these caches are suitably located. When burning at high speeds throughput may be limited if the computer's operating system and the images are being run from the one physical drive. To maximize speed, caches should be on separate physical drives to each other and the operating system.

LABEL PRINTING

To make professional-looking CDs or DVDs you must have an attractive printed label. Scrawling the title of the report on the disk with a CD marker will simply not cut the mustard if any-

one outside of the company is going to see the disk. There are, of course, stick-on labels that can be printed on using an ordinary printer, but this is not the best solution; a pre-printed label is very hard to apply with perfect alignment and the poor alignment can have further ramifications. Furthermore, a wonky or poorly adhering label can affect the balance of the disk which can have serious consequences in high-speed drives, and there is the possibility that the disk or the drive itself may be damaged. It is also very difficult to automate a labelling process involving an adhesive label.

For this reason the ink-jet printers used by CD/DVD publishing devices print directly onto the surface of specially coated disks. (Inkjet printable disks have a white surface and the prices are not horrifying. We paid \$27 for a spindle of 50 CDs whereas normal disks were \$17.) There is generally a requirement to align the printer initially, but thereafter it should be perfect. One notable downside of integrated printers is that they can require the use of proprietary ink cartridges for which you will be likely to pay an arm and a leg for.

Ink price and usage are also very serious considerations. Where there is a need to apply colour printing across the full surface of the disk it is possible to spend 50c or more per disk just to label it! The worst situation occurs when one colour is used predominantly. Combined CMY colour cartridges are mainly used, and so when one colour is finished the cartridge is use-

less despite the fact that most of the other ink colours are still available. Over-use of black ink is generally not a problem since this comes in its own cartridge.

A second issue is that the cartridge itself is thrown away when empty. The PrintMate2 from DSS, for example, deals with both issues by using continuous ink feed from refillable reservoirs. The vendor estimates approximately a tenfold reduction in ink costs using this method. Enormous savings can still be achieved by only applying ink to a portion of the disk, or by using lighter shading. Another advantage of lighter colours is that they reduce the amount of ink overflow which can bleed onto the non-printable area of the disk. Many situations (particularly disks for in-house distribution) may be served quite adequately with just a small logo and a few words of black text.

We have been speaking mainly of inkjet devices but there are also B/W (black and white) thermal and dye-sublimation printers. Dye-sublimation printers are colour thermal printers that cover the printed surface with a clear, water-resistant laminate. While the print durability is superior to inkjets there are substantially higher running costs associated with replacing dye-sub printer ribbons.

NETWORKING AND OTHER ISSUES

The need for an attached PC or Mac also determines whether a device will possess its own onboard hard drive. A HDD is used to store a disk image from a master prior to copying. This leaves all optical drives free for the burning process. If a computer is attached to the device, the computer's hard drive can be used, but standalone systems will naturally need their own HDD.

Manufacturers vary in regards to the software included with products. Data Storage Solutions includes networking, archiving and API (application programming interface) software (for connectivity with third-party applications) with all of its products—others are not so kind. Some of the products distributed by Region4 have API and networking capacity, and although none have archiving functions natively, third-party applications are available for this.

There is a potential piracy issue, however, with machines of this nature. Some devices will allow the copying of disks with CSS (Content Scrambling System) protection; other vendors simply warn the user that copying should be



What to look for

- **Multiple optical drives:** More drives reduce the time taken for publishing since each drive can burn the CD or DVD simultaneously. Can the machine copy direct disk to disk without hard drive caching?
- **Printer:** A built-in or attachable printer allows disks to be automatically labelled after burning. Some machines make use of proprietary ink cartridges which can be expensive to replace and are only available from the device manufacturer.
- **Formats:** Ensure that the drives are capable of burning both CDs and DVDs in the range of formats you are likely to require.

Eg: CD-ROM, CD-DA, DVD+RW, DVD-R.

- **Connectivity:** Does the machine have options for stand-alone operation, connection to single PC and network connectivity? Is it possible for third-party applications to integrate with the device? Is the interface easy to use?
- **Software and licensing:** Where there is network connectivity it may be necessary to purchase extra software licenses to allow all necessary users access to the machine. Additionally, networking and archiving software may not be standard with all machines.

How we tested

Our testing methodology has two main thrusts. We considered the overall speed of the copying process for single and multiple copies with a breakdown into the components: loading, burning, unloading and, where applicable, label printing. Clearly, multiple disk copying should give an advantage to systems where there are more optical drives present so we have attempted to quantify this advantage. This process is carried out using a 589MB data CD. Furthermore, a second short test is done to assess the time taken to copy a data DVD containing 4.36GB of data.

The second major consideration is the merits of the robotics used to transfer the disks between reservoirs, drives and printer. Any mechanical process leaves room for jams and sloppiness which reduces efficiency. A description of each process will be given with comments about possible weaknesses which may apply to each. Product manufacturers have to weigh up the merits of the number

of moving parts—more moving parts increase the risk of machine failure and will also allow for gentler handling of media.

Testing was done using a desktop PC featuring an Asus P4S800-MX motherboard, 2.6GHz Pentium 4 processor and 512MB RAM. We ran the first test (CD duplication) under a Windows 2000 Server. For the DVD duplication we gave the machine a second HDD to separate the OS and image caches, and we also changed the OS to Windows XP Pro—the Rimage machine was not comfortable with Win 2000 Server.

We allowed the devices to automatically select the appropriate maximum speeds for reading and writing wherever possible. (Prospective buyers should note that higher speeds can reduce accuracy.) Also, additional facilities to validate copies were not turned on since these would further slow down disk processing.

Where applicable we will comment on the quality of the printing and how the printing process integrates with the burning process.

restricted to material for which the legal right to do so applies. Managers should be aware of the potential abuse of this technology and make provision for limiting who has access to it.

THE PRODUCTS

The physical appearance of these devices are all quite different; first impressions are of printers, or kitchen-appliances, with collections of spikes, that are endowed with mechanical arms. Whatever the appearance there are some basic features common to all. First there must be a reservoir of blank disks and a data source.

ers so that simultaneous copying can occur. The source disk is normally read into an onboard hard-drive, thus freeing up all optical drives for writing. Once each disk has been written it must be picked up, and in most cases transferred to a label printer, before finally being set down with all the other completed disks. Failed media is dumped in a separate repository.

For this review we sought products in the \$2000 to \$7000 price range. The entries we received were from: Datatronics, Evocept, Primera, Rimage and R-Quest. These brands are all distributed in Australia by Region4. We also tried to get hold of a RoboPublisher from Data Storage Solutions—a small Melbourne-based company—but unfortunately stock was unavailable. We have, however, been able to make some observations based on meetings with the vendor and observations of related products.

DATATRONICS PRONTO PLUS

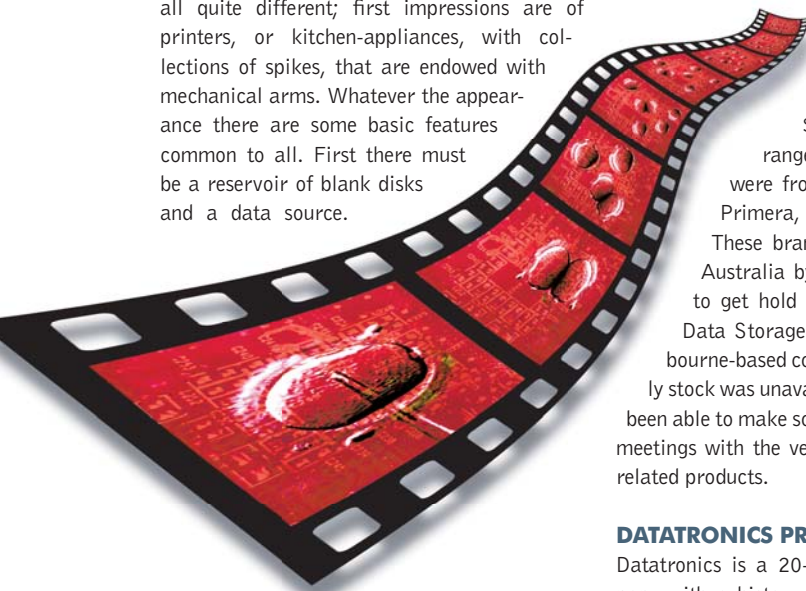
Datatronics is a 20-year-old Taiwanese company with a history of building various types of modem. It has diversified into small stand-alone and PC-dependent disk copiers suited to small-scale duplication needs.

The Pronto Plus is the smallest and least

expensive of the products tested in this review, having only a single CD/DVD burner. It is similar in shape and size to a food processor although it is a little friendlier towards optical media. There is no integrated printer with this device. The front-mounted LCD status display has four control buttons. It is a stand-alone-type device which copies a master disk to its internal hard drive before burning the image onto each blank in turn, without needing the support of a PC.

The disk-loading mechanism for this device is unique in that three screw-threaded wheels hold the blank media in place. A single rotation of these wheels allows one disk to drop down into the waiting optical-drive drawer. After burning, an arm swings around, picks up the completed disk and drops it onto an output spindle. Reject copies are dumped in a bin below the input mechanism. Placing media in the top-mounted 100-disk-capacity reservoir is a bit dangerous—if disks are angled at all when inserted they will fall right through to the bottom.

The limited mechanical control results in each disk being dropped twice during the copy process, increasing the potential for damaged media. The alignment of the output spindle on our test unit was poor, which meant that the disks missed when dropped and we had to adjust the spindle manually to avoid scattering disks all over the bench.



Various mechanisms exist—usually a mechanical arm which picks up individual disks and places them into a DVD-burner drawer. Most devices actually have two or more burn-



Product	Datatronics Pronto Plus DA7830
Vendor	Region4
Phone	03 9585 8383
Web	www.region4.com.au
Price	\$2149

Interoperability ½
No networking, basic text interface.

Futureproofing ½
Many disk formats but robotics a little clumsy, slow.

ROI ½
Easy to use, basic model, fair price.

Service
Standard one-year warranty with extension available.

Rating ★★★



Product	Evocept CopyBlast DVD
Vendor	Region4
Phone	03 9585 8383
Web	www.region4.com.au
Price	\$4999

Interoperability ½
No networking, basic text interface.

Futureproofing ½
Many disk formats, and robotics reasonable; fast.

ROI ½
Fast and easy to use, price reasonable.

Service
Standard one-year warranty with extension available.

Rating ★★★½



Product	Primera BravoPro Duplicate
Vendor	Region4
Phone	03 9585 8383
Web	www.region4.com.au
Price	\$5799

Interoperability
Good GUI, networkable, useful range of OSes.

Futureproofing
Many disk formats and quality robotics.

ROI
Easy to use and reliable; cheapest print-capable device.

Service
Standard one-year warranty with extension available.

Rating ★★★★

The Pronto took two times longer to process 15 CDs than any other machine tested—hardly surprising given its single optical drive. The loading and unloading time, however, was very fast (around 30 percent faster than the Evocept on a per disk basis) but both lead and burning

time are very slow. DVD copying is also very slow. (An attempt was made to copy a DVD at the speeds achieved by the other machines but the copy failed.)

This machine is slow, even allowing for the single burner, and the reservoir is difficult to

load. It does have some redeeming features though such as the ability to load masters and blank media into the disk reservoir to let the machine continue duplicating a master until the next master is reached.

A basic 12-month warranty applies and

TEST BENCH

Interoperability

OSes supported, networking, replicating without connecting to computer.



Futureproofing

Speed and range of formats. Quality of the mechanisms and construction.



ROI

Features, reliability, simplicity versus price (incl. ink).



Service

Period and type of warranty offered with the device.





Product	Rimage DTP 2000i Publisher DVD
Vendor	Region4
Phone	03 9585 8383
Web	www.region4.com.au
Price	\$6299

Interoperability 🛠️🛠️🛠️½
Possible hardware compatibility and usability issues.

Futureproofing ⌚⌚⌚⌚
Many disk formats, and quality robotics.

ROI 💰💰💰½
Very good product, but can be difficult to set up.

Service 🛠️🛠️🛠️
Standard one-year warranty with extension available.

Rating ★★★½

there is the option of purchasing an extended warranty. This product will be very handy for small-scale copying needs. We do have some reservations about the robotics, though as loading the hopper being the biggest of these. But this is by far the least expensive machine reviewed at \$2149. At this price you can't expect the same range of functions or speed found in higher-priced models.

EVOCEPT COPYBLAST

Evocept build both manual and automatically loading disk duplicators as well as a tiny thermal label printer. Fully automated publishing products are not available from this company.

Having five optical burning drives, the CopyBlast duplicator is well setup for fast disk copying, however, there is no integrated printer for



Product	R-Quest TCP7200D8F (with Flashjet printer)
Vendor	Region4
Phone	03 9585 8383
Web	www.region4.com.au
Price	\$7599 with Flashjet printer (\$5799 without)

Interoperability 🛠️🛠️🛠️
Stand-alone option is good, typical OS range and GUI.

Futureproofing ⌚⌚⌚⌚½
Many disk formats, and quality robotics, but slow.

ROI 💰💰💰💰
Expensive, but very good features, cheaper ink.

Service 🛠️🛠️🛠️
Limited two-year warranty (one-year on printer and drives).

Rating ★★★½

labelling. It consists of the optical drive stack and three media reservoirs mounted around a central robotic arm; all these are mounted on a slim chassis. Towards the front is an LCD status display with three control buttons. Being a straight duplication device it has no need for an interface with a desktop computer.

A mechanical arm carefully controls the placement of disks at all times, but we doubt the mechanism is as forgiving of bumps as some other examples in this review. Input/output reservoirs are trays, rather than spindles. This allows disks to be picked up and placed down without the need to drop disks from a height. Each of the three reservoirs has a 100-disk capacity, enabling 200 copies in one run

(the second tray doubles as input and output reservoir to save space). Vertical motion of the disk-handling arm is belt driven and while belts tend to wear they are quite easy and inexpensive to replace. The belt on this unit is wide and sturdy. A small spindle in front of the optical drive stack accepted failed copies.

The Evocept managed the CD copying process about 35 percent faster than the Primera, and this difference is not affected by label printing as done by Primera. Both Primera and Evocept use simultaneous copying but the Evocept has five burning drives as opposed to the Primera's two. No speed advantage was observed in the DVD copy test.

An extended warranty can be purchased but otherwise a standard 12-month warranty applies. While not print capable this is a speedy, stand-alone machine which easily beats all others on the 15-CD duplication test. Priced at \$4999 this is an excellent product for high volume needs; copy runs can be initiated easily with only a few moments training required.

PRIMERA BRAVOPRO

Primera is a large company based in Minnesota, US, with major market share across 85 countries. It builds small and large copying and publishing machines (including the first Blu-ray duplicators) as well as disk and sticky-label printers.

The Bravo Pro looks a little like a large inkjet printer—and in part it is. Opening the hood reveals two 50-disk reservoirs (one input and one output) and two optical drives set below the print mechanism. This machine relies on a PC or Mac for operation (only two buttons, including power, are found on the machine itself). Control of labelling and design must reside on a USB2-attached PC, as does the disk image to be copied. Network support can be achieved via the PC. Setting up the burning and printing software is very easy.

The rail which takes the print head also supports the disk-handling arm which is an efficient use of both space and parts, but there could be repair issues as the manufacturer could claim it is simpler to replace the whole print/arm assembly in the case of one part failing—the integration between the two is quite close. At the front of the machine, overhanging the desk, is the reject tray into which disks are allowed to slide. While this is of no concern for rejects there is the option of using this tray as

the main output with the two upper trays both serving as input reservoirs—this is a little disturbing. (Disks are inclined to flip and land upside down, which could lead to the smudging of labels and ink being transferred to the data side of previously copied media.) Masters may also be dumped in this receptacle. Disk handling to and from the upper trays is, by comparison, quite gentle.

As with the Pronto and RoboPublisher, it is possible to have streamed jobs where the device copies a master to available blank media until a new master is found, then this is used as the source for subsequent blanks. Unfortunately this mode does not allow disks to be printed as part of the process which makes a separate print-only run necessary.

Primera requires customers to purchase two proprietary ink cartridges, one black and one coloured. These will set you back about \$200 (according to Region4), although the colour cartridge is bigger than those of the Rimage machine and the R-Quest Flashjet.

Primera market this same device without optical drives to operate solely as a disk-labelling device which can be used after copying disks with another device.

CD copy speed is just a little slower than the Rimage (despite the lower lead time before copying begins). Per disk, loading speed is similar to that of the Rimage; the robotics show good economy of movement.

Two disks can easily be printed during the burn process, so there is no delay caused by the burner waiting for the printer to be made ready, as is the case with the Rimage (though the Rimage does make up time with its asynchronous copying).

Disk handling is quite efficient as is the printing process, and this interferes little with the burning process. An optional extension on the basic 12-month warranty is available.

The Primera Bravo is the least expensive (\$5799) of the devices we tested, featuring full-label printing capacity. It is a neat little unit which is a little easier to use than the larger Rimage. Print quality is a little behind the Rimage and R-Quest, but is still of fair quality.

RIMAGE DTP2000I PUBLISHER

Rimage, like Primera, is a big player in optical disk publishing. It too is based in Minnesota. It is mainly concerned with high-end disk publishing machines.

Many Rimage products have built-in dye-sublimation printers, though the 2000i, being a desktop model, is inkjet based.

The Rimage 2000i is the largest and heaviest of the machines tested. It has a very neat mid-grey exterior with two media trays at the front beside the disk-handling arm. The front panel above the media trays features two optical drives and a print bay. As with the Primera Bravo, this machine needs access to a computer for label design and hard-disk access. Likewise, it can be networked via a PC. Both USB and Firewire ports are present. A firewire/USB card is supplied for PCs not already provided with both port types. API/SDK software is not included but is available free from Rimage.

A rotating threaded rod drives the disk-grasping mechanism up and down; a rod is generally more durable than a belt but it can suffer badly if not protected. The reservoir nearest the handling mechanism is for input. When being lifted, a disk must pass an intervening slide-way; the slide-way pivots up, out of the way, and then flops back ready to receive the disk after burning and printing. Disks drop up to six inches from the slide but are at least relieved of the strain of hitting the reservoir's side wall by a layer of foam padding.

It is specified that only authentic Rimage ink cartridges can be used in this machine, and B/W or colour cartridges cost about \$187.

Clear instructions are provided for the setting up of hardware and the alignment of the printer prior to use. The Quickdisk interface for label design and disk copying is well produced and easy to use. We had a little trouble getting the initial production process off the ground.

The hardware interface, however, interfered with another application which we had to remove before successfully operating it. A second issue was the printer settings changing unexpectedly which resulted in failed copies being correctly labelled as "rejects" but successes left blank. We cannot be sure if the fault was ours or the software's, but it was easily remedied. We were required to manually stop the "production server" prior to changing media type for the second test. We feel this is an unnecessary task for the user and, furthermore, we had to search for a solution on the Rimage website. Jobs can be queued provided that all jobs involve only CDs or only DVDs.

There is often a small delay before disks can be loaded or unloaded from the optical drives

because it must wait for the print process to finish. As it progresses the printer drawer gradually protrudes into the path of the robotic arm, meaning it must wait. The delay is typically about 30 seconds but this is not really a concern since the printer itself is the bottleneck in the process.

Independently driven burners allow each drive to load and burn without waiting for the other—more than making up for its printer delays.

The Rimage is slightly faster than the Primera Bravo but significantly slower than the Evocept and much faster than the Datatronics Pronto. We were unable to copy a DVD from a master or even from files already on the hard drive, this is possibly due to incompatibility with the PC motherboard we were using. The vendor is aware of cases where Asus motherboards have not interacted properly with Rimage equipment, and unfortunately all PCs available at time of testing were served by this brand of board.

As with any new equipment, there is likely to be some teething problems. We would suggest running a couple of single-disk procedures so that problems can be ironed out before larger runs are performed.

Overall the price is reasonable for a product of this nature but ink pricing is a worry. Reasonably priced at \$6299, this product does have a good range of features and processes disks quite efficiently. The software can be a bit touchy and is greedy for HDD space, but overall it works well with the most serious criticism being the need to manually reset the software when swapping between CD and DVD operations. Print quality is very good. The buyer has the option of an extension on the basic 12-month warranty.

R-QUEST TCP7200D8F (WITH FLASHJET PRINTER)

R-Quest builds its products from scratch, designing its own circuitry and operating systems specifically for the needs of disk duplication. Both duplicating and publishing systems are available. R-Quest is clearly concerned with mass production of disks—some devices have reservoirs holding up to 1000 disks! Clearly, function is valued over form which is admirable, but failing to enclose the mechanical arm and disk reservoirs means it is wise to use these products in clean environments only.

The R-Quest machine can be purchased alone or with a choice of printer types—inkjet thermal (as tested here) or dye-sublimation. Stand-alone duplication is an option with this machine but to take advantage of label printing and full publishing capabilities it is necessary to link up to a PC or Mac. The R-Quest is also accessible via the network; it has its own Ethernet port.

Combined with a printer this device falls a little outside of the price range preferred for this review, but the range of operational modes makes it an interesting product to consider. The user interface is simple in appearance and operation. Label-design software works well and has plenty of options; as with all design products it takes a little time to get used to.

Batch mode allows for several masters and sets of blanks to be processed automatically as a stand-alone machine. Alternatively, job queues can be sent to the machine via the network interface.

In terms of operation, the R-Quest has much in common with the Evocept CopyBlast. A central tower with the disk-grasping mechanism is surrounded by a stack of two CD/DVD burners surmounted by the printer and a small forest of rods which act to confine the disk stacks (rather than using a bin or central spindle). One rod serves as a spindle for reject disks. These components are mounted on a base about 100mm high. As per the CopyBlast the raising and lowering of the media-holding mechanism relies on a belt drive. The robotics have been well made and seem more forgiving of bumps than the similar Evocept machine.

The R-Quest was reviewed in combination with a Flashjet inkjet printer. When setting up this printer we would advise seeking assistance from somebody with very small hands—the hatch that enables access to the power and data ports is small. Calibrating the arm to recognise the printer position was a little harder than necessary because we were sent the wrong version of the manual, but nonetheless it was a fairly simple task (though the automated process of the Bravo was the best).

Two ink cartridges, one B/W and the other colour, total to about \$86. As with the Rimage, a photo ink cartridge is also available and various combinations of these three cartridges can be used depending on individual needs.

While there is overlap between the print and burn processes this machine still manages to take almost as much time as the single-burner

Pronto to process 15 CDs; the printer is very slow, taking about three minutes per label and the burners match this pace. One advantage of the slowness should be copy-accuracy. Network speed is 100Tx and this provides perfectly adequate speed uploading data prior to burn. Initially we were unable to complete a DVD copy process in network mode (an issue with the latest version of the device's firmware; but it should be resolved by the time this review is printed). We therefore copied in stand-alone mode and then labelled via network as a separate process.

A later attempt to copy a DVD via network (a workaround involving an inline Netgear hub) was able to complete the DVD burn, but it took about an hour, which is twice the time taken by other machines. Interestingly, the CD-copy mode disabled the long file names of Windows; this did not occur copying a DVD in stand-alone mode.

The R-Quest has a two-year warranty, except for drives and printer which have only 12 months—most machines have a one-year warranty as standard. This is a machine for heavy

duty, though it is a little slow. It has the capacity to run stand alone or networked. The R-Quest isn't cheap, at \$7599, with the Flashjet printer (\$5799 without) but it is a sturdy and flexible product which could well serve higher capacity needs. Print quality is also very satisfactory.

FINAL WORDS

After testing begun we discovered that our test DVD was faulty; since we didn't want to slow down test times with error checking this led to some odd initial results. Having made the discovery we made a new master before proceeding with the test. Clearly, this highlights the importance of very carefully checking all masters before copying. Copying to the computer HDD will quickly show up any problems; alternatively the master ISO-image could be based on the hard-drive.

Many buyers may find that the machine sits unused for most of the day. With this in mind it is worth giving thought to all the uses for such a device. For example, some devices have the capacity to automatically archive emails and other files on a regular basis. ■

SCENARIO

A business frequently has the need to produce a variety of different CDs and DVDs for its customers, potential clients, promotions and so on.

It is looking for a solution that will enable it to create batches of CDs or DVDs ranging from just a few copies upwards to several hundred. It would be desirable (but not necessary) that the

unit can address labelling—however, the company is willing to consider this in a separate unit. It would also be desirable (but again not mandatory) that the device is network ready.

Approximate budget: \$2000—\$7000.

Concerns: Ease of use, cost, performance, output capability, future-proofing and warranty.

(((EDITOR'S CHOICE)))

Primera BravoPro



The Primera BravoPro is a compact machine well suited to the office environment. The robotics are well protected behind a translucent shield, so there will be no excess dust in the works. The machine

is convenient to set up and the software is user friendly. Of the products tested this is the least expensive up front, though ink prices could be better. Printer alignment is automatic and we found no software faults or incompatibility issues. We just wish it displayed a little more control over disks sent to the low front tray.

Product	Datatronics Pronto Plus DA7830	Evocept CopyBlast DVD	Primera BravoPro Duplicate
Vendor	Region4	Region4	Region4
Phone	03 9585 8383	03 9585 8383	03 9585 8383
Web	www.region4.com.au	www.region4.com.au	www.region4.com.au
Price	\$2149	\$4999	\$5799
Warranty	One-year RTB, optional extended	One-year RTB, optional extended	One-year RTB, optional extended
Optical drive	NEC	LiteOn	Plextor
Number	1	5	2
CD formats	CD-ROM, CD-XA, CD-DA (CD Audio), CD Extra, Video CD, Mixed Mode, PhotoCD, Hybrid, TAO, DAO, ISO 9660, UFS, HFS	CD-ROM, CD-XA, CD-DA (CD Audio), CD Extra, Video CD, Mixed Mode, PhotoCD, Hybrid, TAO, DAO, ISO 9660, UFS, HFS	CD-ROM, CD-XA, CD-DA (CD Audio), CD Extra, Video CD, Mixed Mode, PhotoCD, Hybrid, TAO, DAO, ISO 9660, UFS, HFS
DVD formats	DVD Data, DVD Video, DVD-R, DVD-R DL, DVD+R, DVD+RW	DVD Data, DVD Video, DVD-R, DVD-R DL, DVD+R, DVD+RW	DVD Data, DVD Video, DVD-R, DVD-R DL, DVD+R, DVD+RW
Speed	CD x 32, DVD x 16	CD x 48, DVD x 16	CD x 48, DVD x 16
Disk capacity	100	200	50
HDD capacity (GB)	40GB	80GB	(attached PC)
Printer	No	No	Yes
Resolution	N/A	N/A	Up to 4800 x 1200dpi
Ink cartridge	N/A	N/A	Primera FAR293 + FAR294
Cartridge volume	N/A	N/A	24ml CMY 19ml K
Physical			
Size (mm)	300 x 410 x 410	520 x 420 x 430	452 x 447 x 279
Weight (kg)	9kg	20kg	12.5kg
Operating temp (°C)	6°C - 30°C	5°C - 50°C	N/A
Standalone operation	Yes	Yes	No
Network enabled	No	No	Yes - via PC
Network licenses	N/A	N/A	5
API/SDK	N/A	N/A	Included
Archiving functions	N/A	N/A	3rd party products
Autoloading masters	Yes	No	Yes
Ports	Serial	None	USB2
System requirements (attached system minimum)	N/A	N/A	700MHz Pentium III or Mac G4, 512MB RAM, 10GB HDD space
Operating system	N/A	N/A	Windows 2000/XP; Mac OS X 10.4



Rimage DTP 2000i Publisher DVD	RoboPublisher	R-Quest TCP7200D8F (with Flashjet printer)
Region4	Data Storage Solutions	Region4
03 9585 8383	03 9874 2499	03 9585 8383
www.region4.com.au	www.datass.com.au	www.region4.com.au
\$6299	\$6599	\$7599 with Flashjet printer (\$5799 without)
One-year RTB, optional extended	One year	Two-year RTB (One on drives and printer)
Plextor	Pioneer A11	NEC
2	4	2
CD-ROM, CD-XA, CD-DA (CD Audio), CD Extra, Video CD, Mixed Mode, PhotoCD, Hybrid, TAO, DAO, ISO 9660, UFS, HFS	CD-R (Type 74, 650MB / Type 80, 700MB), CD-RW (including HS, US, US+)	CD-ROM, CD-XA, CD-DA (CD Audio), CD Extra, Video CD, Mixed Mode, PhotoCD, Hybrid, TAO, SAO, DAO, ISO 9660, UFS, HFS
DVD Data, DVD Video, DVD-R, DVD-R DL, DVD+R, DVD+RW	DVD-R, DVD-R DL, DVD-RW, DVD+R, DVD+R DL, DVD+RW	DVD Data, DVD Video, DVD-R, DVD-R DL, DVD+R, DVD+RW
CD x 48, DVD x 16	8x	CD x 48, DVD x 16
100	4.7GB, 8.5 GB	110
(attached PC)	(attached PC)	80GB
Yes	Yes	Optional
Up to 4800 x 1200dpi	Up to 4800 x 1220 dpi	Up to 4800 x 1200dpi
Rimage RB1 + RC1 or RP1	Lexmark Black 16, Lexmark Color 26	HP #56 + #57 or #58
17ml CMY 19ml K	Continuous ink system under evaluation	17ml CMY 19ml K
508 x 400 x 533	Main unit: 400 x 375 x 275 + printer; robot: 200 x 260 x 480	762 x 610 x 483 (not including printer)
26.31kg	approx 16kg	22.7kg (not including Printer)
16°C - 35°C	5°C - 40°C	5°C - 35°C
No	No	Optional
Yes - via PC	Yes	Yes
Unlimited	Unlimited	5
Free	Included	N/A
3rd party products	Yes	3rd party products
No	Yes	Yes
USB, Firewire	Serial, Firewire, USB	Ethernet (Parallel + Serial to printer)
Celeron 2.0GHz or Mac G4, 512MB RAM, OfficeNet, 36GB HDD space	P4 or similar. At least 512MB RAM. Dedicated separate hard drive.	N/A
OfficeNet: Windows 2000, XP Pro (Clients: Windows 2000/XP/Server 2003, Mac OS X 10.3)	Win XP, Server 2003	Clients: Windows 2000/XP; Mac OS X 10.4