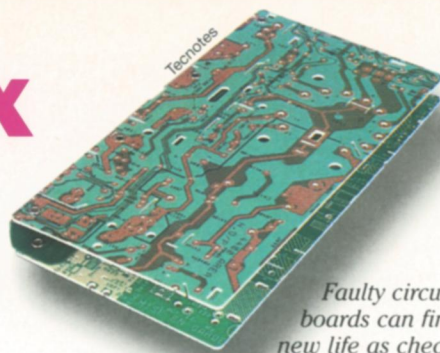


Computer Redux

Establishing new lives for castoffs is a growth industry

By JANET RALOFF



Faulty circuit boards can find new life as check-book covers.

Analysts expect personal computers to reign once again over the big-ticket gift market this holiday season. Sales may get an additional boost as people with home offices rush to buy PCs by the end of the tax year. Forty percent of these new acquisitions, in the United States at least, will replace existing slow or obsolete systems, according to Nikki and David Goldbeck, authors of *Choose to Reuse* (1995, Ceres Press).

While some of the castoffs will be passed on to other family members or used for games and educational software, most are expected to be mothballed—relegated to closets, the basement, or a corner of the guest room. Indeed, millions of PCs worldwide will have been retired from service already.

Although these units are too slow or limited to handle the computer enthusiast's burgeoning demands, most still have a lot of data-processing power left. It's because consumers recognize this latent value that they've been squirreling their discards away instead of putting them out with the trash.

When commercial users upgrade their PCs, even the trash isn't an option for the old ones. Because of the high content of heavy metals in computers, they qualify as hazardous waste, requiring costly, regulated disposal.

Increasingly, therefore, both individual and corporate computer users have begun looking for new homes for this hardware. Though not widely visible, many firms have sprung up to accept these orphans. Propelled by economics, environmentalism, and philanthropy, they offer a range of options for recycling cyberjunk.

Many of these recycling efforts were spearheaded by computer manufacturers seeking to manage their own discards as well as their customers'. For instance, explains Aaron Cobb of IBM's Somers, N.Y., office, "we have some equipment turn-in programs for customers—usually large ones buying new equipment." Since July, International Business Commodities (IBC) of Dedham, Mass., has been under contract to administer this trade-in program globally.

"When corporate accounts are ready to

upgrade to new IBM technology, we buy back their surplus IBM or non-IBM equipment," explains IBC director Melanie Kelfer. Computer dealers can deduct the value of a client's trade-in from the cost of new equipment, thereby reducing the customer's sales tax.

Though designed to help IBM customers find extra cash for new purchases, Kelfer notes, "there is no purchase required."

A customer or sales representative can fax IBC a list of used equipment and

bish other systems that IBM services.

Owners of all makes and models of PCs may find companies offering similar services in their own backyard—or phone book. Through any of some 3,000 outlets or brokers, the units these companies fix up can sell for a fraction of the price of a new computer.

A few refurbishers are gaining renown for their social conscience by guaranteeing that donated machines will be tax-deductible and will end up in an especially deserving organization.

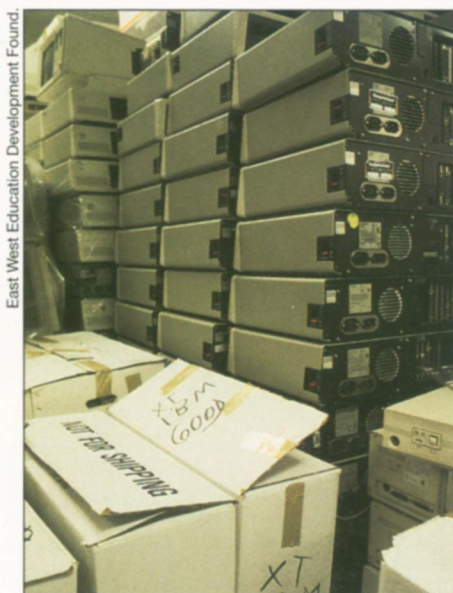
The East West Education Development Foundation, formed in 1990, is among the best known. Accepting "any PC equipment in working condition," the group "can handle a donation as small as a single mouse," explains Monica Graves. Donors need only deliver the hardware to the group's Boston warehouse. Computer Reclamation of Silver Spring, Md., offers the same nationwide service and will even take PCs that don't work.

Both groups provide a training ground in computer repair and maintenance for area schools. East West has some paid labor, but Computer Reclamation relies exclusively on donated labor and parts to refurbish up to 400 computers a month. "We're always in need of more memory [chips]," says Michael Wiggins of Computer Reclamation, noting that people often remove these chips from computers before donating them.

Each group places its orphaned computers with nonprofit organizations or social service agencies. Because East West's donors usually specify their recipients, the foundation doesn't take requests from needy organizations unless such organizations have a sponsor offering East West at least \$250 per 286-microprocessor computer to be delivered (\$400 per 386 system).

Recent recipients of East West computers include the Seafarer's Union of Burma, the National Endowment for Democracy in Washington, D.C., a group in Peru that helps public interest groups interact with businesses, and Russian classrooms selected by the Gorbachev Foundation in Moscow.

Computer Reclamation's donors—of hardware, cash, or time—can suggest



Orphaned computers in East West's Boston warehouse await needed repairs. These rejects will ultimately find homes throughout the world.

hear back within 24 hours what the program will pay. IBC buys PCs with 386-microprocessor technology or better (or their Macintosh equivalents), mainframes, test equipment, and even parts. In fact, Kelfer notes, "more than half of our business today is in components."

Though the company accepts older units, even those employing 8088 microprocessors, it doesn't pay for them. Instead, it cannibalizes them for parts to refurbish discontinued IBM products.

IBM runs its own 2.5-year-old "demanufacturing" facility in Endicott, N.Y., Cobb notes. It takes in older units from company facilities or lease programs, dismantles them, and uses salvageable parts to refurbish

homes for their castoffs. Recipients are asked to ante up \$25 per computer to help cover the cost of parts that the group typically places in each machine. Moreover, Wiggins argues, "when you give people something for free, they don't really take ownership." If they have to hold a bake sale or car wash to collect \$250 for 10 computers that will be used by 30 inner-city children in an after-school program, he says, they will cherish the machines.

Even floppy disks can find new life. These small, ubiquitous data-storage units have been quietly adding to the world's wastes. GreenDisk of Preston, Wash., cites industry estimates that PC users worldwide throw away enough disks to form a pile "as high as the Sears Tower [110 stories] every 21 seconds." GreenDisk has begun a pilot recycling program that collects disks from big companies for recycling into raw materials. The program may be expanded next year to include drop-off boxes in computer and office supply stores.

To date, however, this 2.5-year-old company—one of a handful in the field—has focused on recycling unopened boxes of obsolete software, which include everything from instruction manuals to disks carrying computer programs. From the 20 million pounds of boxed software it has processed, GreenDisk has mined more than 10 million professional-grade disks.

Explains Avery Pahls, "manufacturers sell their best diskettes to software publishers," who pay a premium for such professional-grade disks because they are more reliable. "If you're going to put a \$500 program on [a disk], you want it to have the [lowest failure rate] possible." GreenDisk erases previously stored programs, slaps a new label over the software manufacturer's old one, and retails the disks through major computer stores.

Five weeks ago, the company unveiled a line of partially recycled disks. The recording media inside are made from virgin materials, the jackets from recycled. Owing to limited supplies, GreenDisk plans initially to market these recycled disks exclusively to software publishers.

Apliance manufacturers include computers among the items with no residual value that they send to more conventional recyclers—companies that break the machines down into raw materials for sale to manufacturers and wholesalers of glass, metals, and plastics. Envirocycle offers this service for all electronic devices, from razors to mainframe computers. However, says Greg Vorhees, "the only material we're truly recycling [in-house] is cathode-ray tube (CRT) glass" from television picture tubes and the 250,000 computer monitors his company will process this year.

"Many customers just send us CRTs,"

he notes. Because of its high lead content, this glass "is their biggest problem environmentally." Envirocycle expects to recycle 12 million to 15 million pounds of CRT glass this year at its Hallstead, Pa., facility. That's up from 3.6 million pounds last year.

The company currently sends circuit boards to so-called refiners to recover the lead, gold, silver, and platinum in them. To date, Envirocycle has processed more than 3 million boards. Because most computer companies don't want their old chips wired into a competitor's product, they usually instruct Envirocycle to destroy them during this metal scavenging, Vorhees says.

Plastics remain the most troublesome aspect of recycling, because manufacturers don't like to buy mixed-plastic wastes. Computer monitors can contain any of eight or nine different plastics, and "until this year, none labeled the type they were using," Vorhees says. What's more, computer makers sometimes switch plastics in a given model over the course of a year.

Though manufacturers of original equipment make up the majority of Envirocycle's customers, the company offers its recycling services to others, including individuals, for a fee. Costs are based on volume and tend to be about \$8 for a monitor and \$1.50 for a keyboard.

Envirocycle is vying for a contract to process electronic equipment collected through a New Jersey municipal recycling program slated to begin Jan. 1. The Union County Utilities Authority currently incinerates its wastes. "But we wanted to lower our lead and cadmium levels," says Steven Stanaback of its Rahway office.

If successful, the program could be expanded, explains Michael Winka of the Department of Environmental Protection in Trenton. Besides cutting back on toxic metals from incinerator emissions, he notes, a statewide program should spawn a new generation of jobs—recyclers and refurbishers—for depressed areas.

Minnesota is considering a similar program for electronic equipment discarded by its residents. "The question is not if we will manage these appliances, but when and how," notes an August report from the Office of Environmental Assistance in St. Paul. (A national directory of appliance recycling and reuse firms appears at the end of the report.)

The costs will not be insignificant. "[M]anaging a medium-sized television set may range from \$20 to \$35," an amount well in excess of the market value of its recoverable materials. Neighboring Hennepin County, which contains Minneapolis, has run a municipal electronics recycling program since 1992. This year, it expects to process 200 tons of orphaned appliances, including computers.

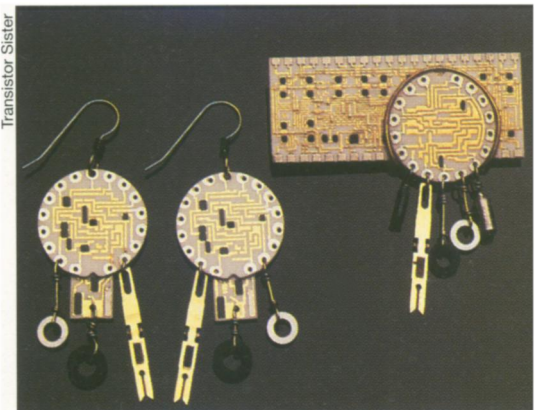
Mitch Davis typifies the small band of entrepreneurs taking computer recycling in another direction: retail. Tecnotes, the 7-year-old Sag Harbor, N.Y., company he bought last year, converts industry wastes into consumer products. Davis does this with little additional energy or raw materials.

Three to 5 percent of circuit boards, for example, don't meet industry standards. Such rejects once went straight to a landfill or refiner. Today, 30 to 50 tons of never-used circuit boards find their way into Tecnotes' three-ring binders, clipboards, checkbook covers, clocks, coasters, and key rings.

On the West Coast, Seattle artist Susan Grzadziewski of Transistor Sister & Co. each year transforms a few dozen circuit boards and additional would-be components—typically 1,000 capacitors, 3,000 fuses, and 5,000 resistors—into earrings, cuff links, string ties, and brooches.

When design changes require hardware assemblers to reconfigure components, the old ones are discarded. Grzadziewski's brother Steve, who runs their 10-year-old company, scavenges those leftovers for jewelry. The resulting wares have been marketed through such high-profile outlets as the Smithsonian Institution in Washington, D.C., and the Museum of Modern Art in New York.

Within another decade, according to *Choose to Reuse*, 150 million computers



Some salvaged electronic components dazzle as jewelry.

will have been abandoned in the United States alone. The Goldbecks cite a study indicating that this cybertrash would fill a hole 1 acre in area and 3.5 miles deep. Transforming this waste into a resource, they argue, must be viewed as nothing less than a necessity.

Readers interested in reaching the recyclers in the story can call *International Business Commodities* (617-320-0123), *East West Education Development Foundation* (617-261-6699), *Computer Reclamation* (301-495-0280), *GreenDisk* (206-222-7734), *Envirocycle* (717-879-2862), *Minnesota's Office of Environmental Assistance* (612-215-0206), *Tecnotes* (800-331-2006), or *Transistor Sister* (206-938-5373).