

Don Lancaster's

RESOURCE BIN

selected reprints

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Book-on-Demand self-published using the *Apple IIe* computer and the *LaserWriter NTX*. All graphics were done in their entirety by *ProDOS AppleWriter 2.1*.

Resource Bin I

Introduction

In early 1992, the *Nuts & Volts* electronic shopper magazine decided to dramatically upgrade their editorial content and become a "full service" technical hobbyist magazine. Newly included would be construction projects and how-to info columns. Coverage would include the full spectrum of computers, communications, CB, ham radio, robotics, satellite and cable tv, antique collectibles, home entertainment, surplus bargains, and hobby electronics in general.

So, I started up my ongoing *Resource Bin* series of columns. As with most of my stories, almost anything at all is likely to appear. But the main focus would be "places to get stuff". It turns out there are some really outstanding hacker resources out there. Many are very low in cost or even free. A lot of them are virtually unknown. And pinning them down can really get tricky.

I base most of my stories on things I find personally interesting, useful, amusing, challenging, or potentially profitable. The chances are pretty good that if I happen to like something, lots of others may also find the topics of more than passing interest.

Backing up the ongoing columns would be this collection of bound Book-on-demand published hard copy reprints. Along with a no-charge voice helpline at (520) 428-4073. Free access to the *Synergetics Consultant's Network* referrals is included. A special area on my *GENIE* PSRT RoundTable has also been set aside for direct use by all of you *Nuts & Volts* readers. Offered on PSRT are electronic preprints and one-on-one contact with other *Nuts & Volts* subscribers.

My PSRT RoundTable is also set up to become a forum for *direct digital masters* of printed circuit layouts, dialplates, and such. Which should utterly and totally revolutionize hobby construction projects, since you can now start with absolutely perfect production artwork, rather than a third generation copy of a copy out of a magazine. When combined with the *direct toner* printed circuit methods, you can now quickly and cheaply make your own printed circuit boards at home. Device independently, using nothing but your favorite word processor or comm program.

The *Nuts & Volts* subscription number is (714) 371-8497. To access *GENIE* PSRT by modem, dial (800) 638-8369. Type HHH. After the U#, enter XTX99005,SCRIPT. For a free pair of insider secrets brochures, you can contact me through my *Synergetics* helpline at (520) 428-4073. ♦

About the Author

As he said in his classic *Incredible Secret Money Machine II*, Don Lancaster writes books. And quests *tinajas*.

Microcomputer pioneer and guru Don Lancaster is the author of 28 books, 2 videos, and countless articles. These include his *TTL Cookbook* and *CMOS Cookbook* internationally published million seller classics. Don is considered by some to be the father of the personal computer, for his early ground-breaking work with hacker digital electronics and low cost video terminal displays. He is considered by others to be the patron saint of the Walter Mitties of the World. And by yet others as the... Uh, I guess we better skip that one.

Don is the *Hardware Hacker* in *Electronics Now* (516) 293-3000, runs his *Resource Bin* in *Nuts & Volts* (714) 371-8497, and is the *Blatant Opportunist* in *Midnight Engineering* (719) 254-4558. Don is also the sysop for *GENie* PSRT, a leading Hardware hacking, PostScript, laser publishing, and money machine on-line resource. His *Ask the Guru* columns continue to be published electronically on PSRT. For fast *GENie* modem access, dial (800) 638-8369. Then HHH followed by XTX99005,SCRIPT.

Don is also the head honcho of *Synergetics*, a new-age design and consulting firm that specializes in computer applications, laser printing, PostScript development work, electronic prototypes, Book-on-demand publishing, technical writing, and innovative software design. His avocations include firefighting, cave exploration, bicycling, and, of course, *tinaja questing*.

Don maintains a no-charge voice helpline at (520) 428-4073. He does welcome your calls and letters. The best calling times are 8-5 weekdays, *Mountain Standard Time*. Referrals to Don's *Synergetics Consultant's Network* are available through this same number. ♦

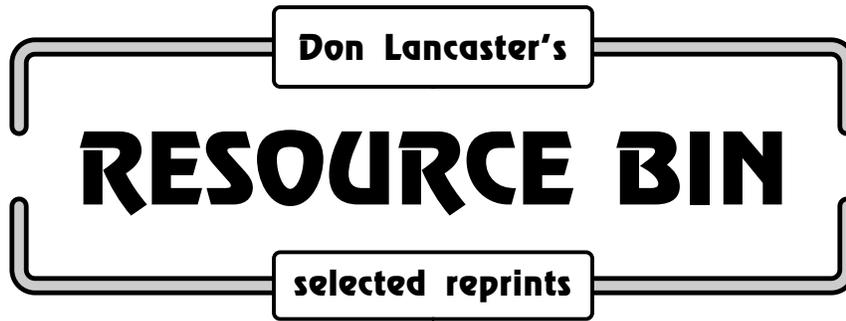


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Don Lancaster's

RESOURCE BIN

number one

Starting off your resource quest

Welcome to my brand new *Nuts & Volts* column. Our prime focus will be in pinning down hard-to-find sources, ideas, reprints, hardware, software, and publications. But just about anything is likely to show up. And probably will.

To make this much more than just a one-way column, I have now added a no-charge voice helpline that you can call at my *Synergetics* for possible help on nearly any tech resource topic. Or for consultant referrals. Or for tinaja quests or for off-the-wall networking. Your best calling times are weekdays 8-5 Mountain Standard Time.

I have also just added a brand new *Nuts & Volts Resource Bin* topic to my PSRT RoundTable on *GENie*. Call (800) 638-9636 (voice) for local connect info. The average file downloading cost on PSRT is around twenty one cents.

You can directly contact other *Nuts & Volts* readers on this forum. You can reach me via my [SYNERGETICS] email address, once again on *GENie*. Among its hundreds of other files, I now do have my master names and numbers list up on *GENie* PSRT as our #330 NAMENUMS.GPS. These names are also available in several of my ongoing Book-on-demand published reprints. And I have now got a free insider's top secret resources brochure waiting for you if you call or write.

Your best resource of all

I thought we might start off with the fundamentals of how to pick up info on anything. What is the single most important resource for nearly any *Nuts & Volts* reader? No, not an oscilloscope. No, not a soldering iron. Instead, it is a "magic" book that you have probably never even heard of.

It is known as *Uhlricht's Periodicals Dictionary* and you can find it on the reference shelf of your local library.

What Uhlricht's does for you is list 50,000 or so magazines. Many of these

are *trade journals*. And trade journals are where the ultimate action lies in any field. Directly, trade journals give you lots of up-to-date tech stories and bingo-cardable ads. Indirectly, they lead you to data books, catalogs, free samples, seminars, contacts, useful directories, and scads more.

Many trade journals are sent free to a highly selected group of insiders. This usually gets done to qualify for a special controlled-circulation postal rate. You might sometimes qualify by using nothing but a phone call or a properly laser-printed letterhead. To try, you ask them for a subscription qualification card.

A few examples of the electronic trade journals do include *E.E. Times*, *EDN*, *Electronic Design*, and *Electronic Products*. A pair of fine mechanical design trade journals include *Machine Design* and *Design News*. There are lots more where these came from.

To give you a further taste of the incredible variety of trade journals, a few I currently subscribe to include *Fire Engineering*, *Sensors*, the *Pollution*

tutorials, and specialty book sales.

There is also that oversize *Thomas Registry of Manufacturers* which can show you pretty near everybody that makes anything. But this tends to be overrated and is often out of date in fast-changing fields.

An extremely little known resource that is almost magic: It is called the *Science Citations Index*. Unlike other references, this one can let you move *forward* through time. Just start with any original "horse's mouth" author. Any time a newer paper mentions them in a bibliography or footnote, you've got a more recent reference.

For instance, anything new on active filters *has* to reference *Sallen and Key*. Anything related to unfocused solar collectors *has* to reference *Winston*, and so on.

You then use the new authors and the *avalanche effect* to generate newer and more current references.

But the library resource that I've found second only to my trade journal access is that...

Dialog Information Service

At two dollars per minute typical charges, *Dialog* might seem expensive at first glance. But, if used properly, *Dialog* is far and away your cheapest and fastest way to find out everything and anything on any scholarly topic. From untold zillions of international conferences and pubs.

Dialog gives you instant on-line access to thousands of data bases. A tiny corner of *Dialog* is *INSPEC*. This can give you a paltry twenty million up to date references to electronic, computer, and physics topics. You can also try *MATHSCI* and *COMPENDEX*.

For instance, from just knowing the two words "magnetic refrigeration" to having the two dozen key abstracts in hand took only twelve minutes and only cost me \$24. This in an explosive and highly secretive new field that is

NEXT MONTH: How to find unusual or oddball integrated circuits.

Equipment News, *Powder & Bulk Solids*, and *Paper, Film, & Foil Converter*.

One ploy that usually works to pick up a copy of nearly any magazine or trade journal is the *SCAR* technique. Just ask for a sample copy and their ad rates from their ad department.

Other library stuff

There are several other obscure library tools that you just might find useful. The *Encyclopedia of Associations* shows who is doing what in your field of interest. Many of the groups listed will also have trade shows, seminars,

new from
DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. **\$19.50**

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. **\$24.50** each.

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. **\$18.50**

LANCASTER CLASSICS LIBRARY

Don's best early stuff at a bargain price. Includes the CMOS Cookbook, The TTL Cookbook, Active Filter Cookbook, Micro Cookbooks I & II, newly revised Incredible Secret Money Machine II, and those Hardware Hacker II reprints. **\$119.50**

LOTS OF OTHER GOODIES

Ask the Guru I or II or III \$24.50
Hardware Hacker II or III \$24.50
Book-on-Demand Resource Kit \$39.50
PostScript Beginner Stuff \$39.50
Intro to PostScript Video \$39.50
GENie PSRT Sampler \$29.50
PostScript Reference II \$28.50
PostScript Tutorial/Cookbook \$16.50
Whole works (all PostScript) \$349.50
PostScript Secrets Brochure **FREE**
Hacking Secrets Brochure **FREE**

POSTSCRIPT SECRETS

A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. **\$39.50**

BLATANT OPPORTUNIST I

The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. **\$24.50**

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GENie PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Call (800) 638-9636 for connect info.

FREE VOICE HELPLINE VISA/MC

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Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

as much as fifty times more efficient than conventional refrigeration.

While you can subscribe to Dialog yourself, it is usually much faster and cheaper to work closely with your

local librarian. The costs for all of the manuals and reference materials get out of hand otherwise. And carefully worded searches can easily save you lots of big bucks.

Dialog has now introduced their quarter price late evening rate. At \$25 per hour, this is only somewhat more expensive than many of the other BBS services. Dialog is also available on CD ROM. Check your local university for more access details.

Getting reprints

I get dozens of calls a week from people living in "such a remote area" that they "just can't find" any way to get a reprint on any technical info. Since two of these "remote areas" have included Cambridge MA and Palo Alto CA, I've decided there are those of you out there who couldn't find a pig in a dishpan.

In reality, it is trivial to pick up any reprint from anywhere. I'm sitting here on my sand dune smack in the middle of the Upper Sonoran desert, and have never had any trouble at all getting reprints on anything from anywhere. Even for research literally done up on wilderness fire towers or even underground by carbide light. So please don't give me any of this "remote" bull.

There are three useful sources for reprints. These vary bunches in speed and price. Your cheapest usually gets called the *Interlibrary Loan Service* and is available at any library. All you have to do is ask.

The best all-around reprint source is *UMI*, who used to call themselves *University Microfilms*. They stock one each of everything. You do, of course, have to know the exact journal, page numbers, and author.

Finally, you can get many reprints directly from Dialog, either instantly on line or in a few days via fax or mail. But this costs more than UMI.

Technical books

Technical books place a very distant third behind all the trade journals and Dialog. But these certainly can be a valuable resource. As you may have noticed, libraries tend to only have older and usually non-paperbound texts. And mall storefronts having a "bookstore" sign in front of them often end up less than useless.

Instead, you want to keep your eyes out for obscure specialty direct mail bookstores. Who, for one reason or another, have some vested interest in

stocking all of the best tech books in a narrow field. From all the available publishers in the field.

For instance, *Lindsay Publications* can't be beat for their machine shop reprints and early radio titles. The *MIX Bookshelf* is far and away the best place to go for electronic music info. For automotive electronics, it's *SAE*.

For off-the-wall and utterly bizarre perpetual motion and free energy stuff, *High Energy Enterprises*.

Or, for one of the very few walk-in bookstores in the world that has an unlisted address, try *Singing Wind* for Southwest literature, lost mine lore, and assorted eclectic arcania.

Well, maybe one hint. Go north on Ocotillo road out of Benson, Arizona until it feels about right. Then hang right just past the seventh cow.

Here at my own *Synergetics*, I try to stock autographed copies of all my books and reprints, along with only the best of PostScript titles from other leading authors.

Your trick, of course, is to collect all of these specialty bookstore catalogs and mailings ahead of time. Your own resource files should always be your first place to look.

Networking

Networking is simply asking others for help. These can be real people in the case of work associates, technical hotlines, community college courses, ham radio clubs, or computer user groups. Local or national.

Or you can pick the electronic BBS route. There are tens of thousands of electronic bulletin boards up today. With general or special interests that can apply to pretty near anything or anyone. These are by far the fastest and cheapest way to link yourself up with experts in just about any field, technical or otherwise.

There are four electronic boards which are head and shoulders above the rest. The first two of these are *GENie* and *CompuServe*. *GENie* alone has nearly 125,000 files and programs available for your downloading at costs averaging around twenty one cents each.

Besides my own PSRT RoundTable on GENie, other areas here that you will find of more than passing interest do include MAC, IBM, RADIO (for its useful tech downloads), HOSB (for home office and small business) and DTP (for desktop publishing). There are many hundreds more.

A third superb BBS is *The Well*. This

online Whole Earth offering is now very heavy into the areas of alternate energy, small-is-beautiful, and similar right livelihood topics.

And finally there is *UseNet*, which forms the greatest piracy cove in the known universe. The time from when someone decides to keep some code a secret till the time a fully decrypted, explained, and the greatly improved version appears on UseNet is usually measured in nanoseconds. In several cases, the response time clearly has exceeded the speed of light. To gain free UseNet access, you will have to ask around at your local university. UNIX-based UseNet is also known as *Anarchy 101* among its denizens.

Two magazines

There is at least one magazine set up specifically for new computer and technical startups. This is *Midnight Engineering*. You'll find bunches of stuff here that is flat out not covered elsewhere on the perils and pitfalls of any new product development and introduction. Free sample copies are available on request.

I do author my *Blatant Opportunist* column here which looks at emerging technical happenings suitable for any small scale startups.

A second quarterly journal that no researcher can afford to be without is the *Whole Earth Review*. Their original "access to tools" charter remains alive and well after several decades of their outstanding reporting. And just about an essential tool itself.

Establishing credibility

The deck gets very much stacked against independent and small scale research to start with. So you certainly don't want to make things any worse than they already are.

In much of the real world the way things are perceived are accepted as reality. Thus, you definitely *do not* want to volunteer to anyone that you are a student, a startup, or lacking in "accepted" credentials. You definitely *do* want to use your own laser printed letterhead, have a properly registered company name (\$15 or so in typical states and trivial to do), and always answer your phone in a professional and business-like manner.

For some strange reason, most large technical firms tend to treat apparent higher volume customers better than any random callers. So, cause them to think they heard what they thought they wanted to hear.

IMPORTANT RESEARCH RESOURCES

CompuServe

5000 Arlington Center Blvd.
Columbus, OH 43220
(800) 848-8199

Design News

44 Cook Street, #210
Denver, CO 80206
(303) 388-4511

Dialog Info Service

3460 Hillview Avenue
Palo Alto, CA 94304
(415) 858-2700

EDN Magazine

275 Washington Street
Newton, MA 02158
(617) 964-3030

EE Times

600 Community Drive
Manhassat, NY 11030
(516) 365-4600

Electronic Design

611 Route #46 West
Hasbrouck Ht, NJ 07604
(201) 393-6060

Electronic Products

645 Stewart Avenue
Garden City, NY 11530
(516) 227-1300

Encyc. of Associations

835 Penobscot Bldg.
Detroit, MI 48226
(313) 961-2242

GENIE

401 N. Washington Street
Rockville, MD 20850
(800) 638-9636

High Energy Enterprises

PO Box 5636
Security, CO 80931
(719) 475-0918

Inspec/IEEE

445 Hoes Lane
Piscataway, NJ 08855
(908) 981-0060

Lindsay Publications

PO Box 538
Bradley, IL 60915
(815) 468-3668

Machine Design

1100 Superior Avenue
Cleveland, OH 44144
(216) 696-7000

Midnight Engineering

111 E Drake Road #7041
Ft Collins, CO 80525
(303) 491-9092

MIX Bookshelf

6400 Hollis Street #12
Emeryville, CA 94608
(800) 233-9604

Paper, Film & Foil

29 N. Wacker Drive
Chicago, IL 60606
(312) 762-2802

Polution Equipt. News

8650 Babcock Blvd
Pittsburgh, PA 15237
(412) 364-5366

Power & Bulk Solids

PO Box 640
Morris Plains, NJ 07950
(201) 292-5100

SAE

400 Commonwealth Drive
Warrendale, PA 15096
(412) 776-4841

Sensors

174 Concord Street
Peterborough, NH 03458
(603) 924-9631

Singing Wind

Ocotillo Road, Box 2197
Benson, AZ 85602
(520) 586-2425

Synergetics

Box 809
Thatcher, AZ 85552
(520) 428-4073

Thomas Registry

1 Penn Plaza
New York, NY 10119
(800) 222-7900

Uhlricht's Dictionary

1180 Americas Avenue
New York, NY 10016
(212) 916-1600

UMI

300 North Zeeb Road
Ann Arbor, MI 48106
(800) 521-3044

The WELL

27 Gate Five Road
Sausalito, CA 94965
(415) 332-4355

Whole Earth Review

27 Gate Five Road
Sausalito, CA 94965
(415) 332-1716

Just do remember that sincerity is everything. Once you have that faked, all else follows.

I've gathered most of our resources together into a new *Names & Numbers* sidebar. Be sure to check here before calling our technical hotline.

A Contest

Bunches more on pinning down useful resources appears in a newly revised second edition of my *Incredible Secret Money Machine*. By one of those absolutely astonishing coincidences that seem to infest this column, I just happen to have autographed copies waiting here for you when you call the helpline below.

Let's have a contest here. To enter, just tell me about any little known or unusual resource. There will be a dozen or more autographed *Incredible Secret Money Machine* prizes, plus an all-expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best entry of all.

If possible, include a catalog or put me on their mailing list. Do be sure to send your written entries to me at the address below, and not to the *Nuts & Volts* editorial.

As with most of my contests, your chances of winning something are very good. Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. He now maintains a no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is the sysop of GENIE PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can call GENIE at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number two

Finding unusual or outdated integrated circuits.

Welcome back once again to a new Nuts & Volts column. As before, our main focus will lie in pinning down hard-to-find ideas, hardware, software, reprints, sources, and publications.

To make this much more than just a one-way column, I have now added a no-charge voice helpline that you can call at my *Synergetics* for possible help on nearly any tech resource topic. Or for consultant referrals. Or for tinaja quests or off-the-wall networking. The best calling times are weekdays 8-5 Mountain Standard Time.

I have also just added a brand new *Nuts & Volts Resource Bin* topic to my PSRT RoundTable on *GENIE*. You can directly reach the other Nuts & Volts readers on this forum. And you can reach me via [SYNERGETICS] email.

A reminder here that I have got a no charge insider's secret resources brochure waiting for you if you call or write per the end blurb.

Finding Oddball Chips

Where can you find the key parts for any unusual electronic projects? Or to service or repair an older piece of equipment? Or simply to find an alternate source?

Naturally, we would hope that you would start off by using our many fine *Nuts & Volts* advertisers. Who have all gone out of their way to make many semiconductors and integrated circuits available to you in small quantities, with quick delivery, and at reasonable prices. Start with the ads, and then use the bingo cards to collect working catalogs.

Here's where I go to locate the really hard-to-find stuff...

ECG and NTE

Two large firms that specialize in replacement semiconductors are *ECG Philips* and *NTE*.

Both firms offer fat technical guides

and full cross reference manuals for around \$4. Zillions of semiconductors are indexed. Yes, they stock suitable replacements for most parts.

There are many other firms which address the MRO or "maintenance and repair" markets. The older SK series parts are now still offered by way of *Thomson Consumer Publications*.

Need to find a 2000 volt 1500 amp thyristor for your locomotive? For this and lots of other "big mutha" power electronics, try *Galco*.

And I just got a brand new catalog from *Dalbani* which now lists 45 fine print pages full of semiconductors.

Parts Express also has a pretty good selection for replacement consumer electronics, especially VCR parts.

Radio Shack

While your local Radio Shack is not even remotely in the same league as ECG and NTE whenever it comes to oddball replacement parts, they do have two resources that you may find both handy and useful.

The first one is their *Semiconductor Reference Guide*, that now lists nearly 100,000 substitutions for their stock

NEXT MONTH: Don explores Hacker-friendly printed circuit alternatives

carded parts. Secondly, Radio Shack also offers a locator service via their main office and plant. You ask at your local store for further details.

The IC Master

There's one chip directory that is head and shoulders above all of the others. Which is the *IC Master* from *Hearst Business Publications*. This three volume set has just about any and all integrated circuits listed. At \$170, this directory is rather pricey. But it can

pay for itself after only a few uses.

Sadly, freebie general electronics directories are ending up few and far between. The *Electronic Design Gold Book* and the *Electronics Buyers Guide* are no more. But Hearst still publishes a companion to the IC Master called the *EEM Master*. This lists everybody who makes everything electronic. Do note that the IC Master and the EEM Master are different pubs.

Electronic Phone Books

The old *Electronic Industry Telephone Directory* from *Harris Publications* is quite handy, since it lists the phone numbers for just about everyone else in electronics. It costs around \$45 per year, and is my number two helpline resource, second to my own files.

Speaking of which, I do have my own personal 1800 entry *Names and Numbers Directory* which I've built up over the years. These do have all of my secret sources of supply, and are heavy in hardware hacking and the desktop publishing resources. You can get these as appendices to my *Ask the Guru I, II, or III*, *Hardware Hacker II, or III*, or *Blatant Opportunist I* reprints. You can also electronically download the same from *GENIE PSRT* as my file #330 NAMENUMS.GPS.

Another possible directory from a local library is the *Thomas Registry of Manufacturers*. But its not all that great for new technical stuff.

Electronic Distributors

Semiconductors have traditionally been sold through parts distributors. Today, you'll find two distinct types of distributor available, the new age firms, and the old line traditionalists.

The new age firms are usually lean and mean, have low minimum orders, and do aggressively seek out hacker or hobbyist lower volume business. While you should find many of these listed right here in *Nuts & Volts*, four

new from
DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. **\$19.50**

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. **\$24.50** each.

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. **\$18.50**

LANCASTER CLASSICS LIBRARY

Don's best early stuff at a bargain price. Includes the CMOS Cookbook, The TTL Cookbook, Active Filter Cookbook, Micro Cookbooks I & II, newly revised Incredible Secret Money Machine II, and those Hardware Hacker II reprints. **\$119.50**

LOTS OF OTHER GOODIES

Ask the Guru I or II or III	\$24.50
Hardware Hacker II or III	\$24.50
Book-on-Demand Resource Kit	\$39.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
GEnie PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
Whole works (all PostScript)	\$350.00
PostScript Secrets Brochure	FREE
Hacking Secrets Brochure	FREE

POSTSCRIPT SECRETS

A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. **\$39.50**

BLATANT OPPORTUNIST I

The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. **\$24.50**

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GEnie PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Call (800) 638-9636 for connect info.

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(520) 428-4073

of the best include *Mouser*, *Jameco*, *Digi-Key*, and *Active*.

The old line traditionalists include such firms as *Allied*, *Newark*, *Cramer*, *Arrow*, *Hall-Mark*, and others. These

outfits tend to be anti-hacker. They'll often have very stiff minimum orders, expensive and non-available catalogs, ridiculously long delivery times, and unreturned calls. Plus other similar hassles that make it quite clear that you are not welcome as a customer.

Unfortunately, the traditionalists may end up your court of last resort. Since they are full service distributors, they are required to provide all of a company's products, not just the hot best sellers. If you work with them, save them for last and expect heavy duty hassles.

Dealing Direct

In theory, most chip sources have local sales reps. Most of the local reps are even more anti-hacker than the old line distributors are. After playing this game for nearly four decades, not once has any involvement with any local sales rep been anything except a monumentally frustrating waste of time and money.

Usually, the rep will ignore you if there is nothing in it for him. And will hound you if there is.

But working directly with the home office is another story. I've found that professional inquiries made directly to applications engineering at the main office and plant to nearly always yield prompt and courteous ap notes, databooks, and useful samples.

A lot of the semi houses are now offering data on disk and on CD ROM. Either free or at nominal costs. While Motorola was one early leader here, around half the firms offer electronic catalogs of one sort or another.

A very few of the more enlightened integrated circuit houses are belatedly beginning to discover that the old line distributors are their worst possible enemy. The *Dallas Semiconductor* folks are to be highly praised for their great no-hassle, no-minimum direct order line at (800) 336-6933.

Other firms with no-hassle direct order lines include *Hewlett Packard* for printer parts and manuals.

Wholesale Surplus Sources

You'll find lots of great ads here in *Nuts & Volts* for retail surplus sale sources which may or may not have what you are after. But there is an entire other surplus world out there consisting of *wholesale surplus sources*. These are wheeler-dealers who buy and trade in bulk lots.

With a wholesale surplus source, everything is done by fax, and gets

sold by the lot and with rather stiff minimum orders. There is absolutely no hand holding or technical support whatsoever. And the order of the day is "no screwing around". Turnover is usually measured in hours.

On the other hand, if you know exactly what you want and if they happen to have it, and if they have only as many as you need, the unit prices are often unbelievably low. Say one penny for an LED or a dime for a jelly bean integrated circuit.

Wholesale surplus sources form a sort of netherworld. The players come and go with the economy. You will often find their ads in the classified section of *Electronic Buyers News*.

One wholesale surplus source I like is *Surplus Traders*. More on all these outfits in a future column.

Older Military Stuff

A few semiconductor houses have set themselves up specifically to stock mostly the oddball and out-of-date components needed to maintain older military electronic systems. Since they will often have the only remaining stock in the world of these parts, they will charge whatever they darn well please for them.

But, if the part is old, and if it has or had some mil market, these outfits are definitely worth checking. One leader in this area is *Rochester Electronics*.

Electronic Trade Journals

As we found out last month, there are lots of trade journals now being published. Trade journals are aimed at qualified industry insiders, and are often available at zero charge. They never appear in newsstands, and only rarely show up in libraries.

These do include *Electronic Design*, *EDN*, *E.E. Times*, *Electronics*, *Electronic Products*, and the *Electronic Component News*. Directly, you will find "focus" stories that include sources for key component parts, manufacturer's ads, selection guides, and bingo card info. Indirectly, trade journals lead you to data books, ap notes, free samples, and special parts offers.

For much more on trade journals, or on your independent research and development in general, check into my newly republished *Incredible Secret Money Machine II*.

Asking For Help

Have you thought about asking any others for help? Such as someone at a local ham radio club or a computer

user group? Or a counterperson at a local surplus store? Or our helpline?

I've also found technical editors of hobby magazines, the trade journals and all the scholarly pubs to be really useful sources for offbeat information. If they do not supply an immediate answer, the chances are that they can put you onto someone who does.

There's also thousands of electronic bulletin boards out there. And the largest have millions of subscribers. Start with the RADIO board on *GENie*. Many magazines also have their own BBS systems as reader services.

And, of course, you can use a *Nuts & Volts* classified ad to buy parts as well as sell them.

Still Having Trouble?

If you have gone through most of these sources and still can not find what you are after, there's a message here. Chances are the part is so off the wall or so old that "we just don't do things that way anymore."

Sadly, a lot of low priced electronic project books are ancient and list lots of parts that just aren't that easy to find any more. Others originally come from Australia or England, making the problem even worse.

Some parts, such as vacuum tubes, tunnel diodes, unijunction transistors, the germanium power devices, RTL integrated circuits, large zener diodes, and others are largely extinct.

A lot of great electronic music and digital sound effect chips that existed years ago are simply no more. Owing to having been shot out of the saddle by sampled sound techniques and new digital signal processing chips.

Two sources to try for oddball older music and analog synthesizer chips might include *PAIA Electronics* and *Devtronix*. The older *Solid State Music* line of integrated circuits still remains available through *PMI*.

If your part proves impossibly hard to pin down, there is a hidden lesson here: Find a newer way of doing the same task. There is probably a good reason why nobody wants to use this part any more.

Foreign semiconductors

This gets tricky fast. Many foreign substitutions are listed in the Radio Shack, ECG, and the NTE directories. Such firms as *Philips/Signetics*, *Rohm*, *Samsung*, and *Thomson/SGS* inherently give you foreign substitutions.

There are some trade journals that specialize in international semis and

RESOURCE BIN NAMES & NUMBERS

Active Electronics

11 Cummings Park
Woburn, MA 01801
(800) 677-8899

Dalbani

2733 Carrier Avenue
Los Angeles, CA 90040
(800) 325-2264

Dallas Semiconductor

4350 S. Beltwood Pkwy
Dallas, TX 75244
(800) 336-6933

Devtronics

6101 Warehouse Way
Sacramento, CA 95826
(916) 381-6203

Digi-Key

701 Brooks Avenue South
Thief River Falls, MN 56701
(800) 344-4539

ECG/Phillips

PO Box 3277
Williamsport, PA 17701
(717) 323-4691

Electronic Buyers News

600 Community Drive
Manhasset, NY 11030
(516) 562-5000

Electronic News

Box 1051
Southeastern, PA 19398
(215) 653-0951

Galco

26010 Pinehurst Drive
Madison Heights, MI 48071
(800) 521-1616

GENie

401 N. Washington Street
Rockville, MD 20850
(800) 638-9636

Harris Publishing/EITD

2057-2 Aurora Road
Twinsburg, OH 44087
(216) 425-9000

Hearst/IC Master

645 Stewart Avenue
Garden City, NY 11530
(516) 227-1300

Heathkit

PO Box 1288
Benton Harbor, MI 49022
(616) 982-3200

Jameco Electronics

1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097

Mouser Electronics

11433 Woodside Avenue
Santee, CA 92071
(800) 346-6873

NTE Electronics

44 Farrand Street
Bloomfield, NJ 07003
(201) 748-5089

PAIA Electronics

3200 Teakwood Lane
Edmond, OK 73013
(405) 340-6300

Parts Express

340 East First Street
Dayton, OH 45402
(513) 222-0173

Philips/Signetics

PO Box 3409
Sunnyvale, CA 94088
(408) 991-2000

PMI

1500 Space Park Drive
Santa Clara, CA 95052
(800) 843-1515

Rochester Electronics

10 Malcolm Hayt Drive
Newburyport, MA 01950
(508) 462-9332

Rohm

Box 19681-631
Irvine, CA 92713
(714) 855-0819

Samsung

3725 N. First Street
San Jose, CA 95134
(408) 434-5400

Solid State Music

2076-B Walsh Ave
Santa Clara, CA 95050
(408) 727-0917

Surplus Traders

Winters Ln Box 276
Alburt, VT 05440
(514) 739-9328

Synergetics

Box 809
Thatcher, AZ 85552
(520) 428-4073

Thomas Registry of Mfrs.

1 Penn Plaza
New York City, NY 10119
(800) 222-7900

Thomson Consumer Pubs.

2000 Clements Bridge Road
Deptford, NJ 08096
(609) 853-2417

Thomson/SGS

1000 East Bell Road
Phoenix, AZ 85022
(602) 867-6259

Trade Winners

PO Box 2868
Vancouver, WA 98668
(206) 694-1765

parts, especially the far eastern ones. Unfortunately, the only one I do know enough about to even suggest is *Trade Winners*. This is sort of a Hong Kong answer to *Computer Shopper*.

A Contest

For this month's contest, just tell me a good way of finding substitutions for foreign semiconductors. Or any other resource you can think of that simplifies finding and actually buying oddball, out-of-date, or any otherwise off-the-wall semis.

There will be a dozen autographed *Incredible Secret Money Machine* prizes, along with an all-expense paid (FOB Thatcher, AZ) *tinaja* quest for two going to the very best entry of all.

If possible, do include a catalog, a sample issue, or place me on their mailing list. Do be certain to send

your written entries to me at the address below, and not to *Nuts and Volts* editorial.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 27 books and countless articles. He now maintains a no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can call GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number three

Hacker-friendly printed circuit alternatives.

A reminder here that our ongoing *Resource Bin* is really a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers. You'll find some superb technical downloads and lots of tutorials here.

Finding effective and useful ways to build up one or two printed circuit prototypes can get tricky in a hurry. Some commercial outfits now charge \$125 or even more for four identical prototype boards. With month-long turnaround times. And many of the tools and techniques for doing your own homebrew boards are outdated or second rate solutions which often cause more problems than they solve. Ferinstance, spray-on photoresist and ferric chloride etchant are inexcusably lousy homebrew tools. Some others that look good may end up horribly overpriced. Much better solutions are available if you just know where to look for them.

So, for this month's resource bin, I thought we might review some of the more hacker-friendly ways to do your own custom prototyping and limited production circuit boards. We'll first start with some of these...

Circuit Board Fundamentals

Printed circuit boards are used to simplify and unify electronic circuits. Besides supporting components, their "locked in" patterns minimize wiring errors. They also give you that tight control for circuit strays and power

supply bypassing needed for today's high speed computer, RF, and even microwave circuits. In fact, many of today's popular projects will not work at all should you attempt to "rats nest" breadboard them instead of using a printed circuit board.

The boards themselves are often 1/16th of an inch thick and may have full copper surfaces initially applied to one or both sides. The insulating portion of the board is often made from a phenolic, which is cheap but cracks easily and has to be preheated before it can be sheared. Or from an expensive fiberglass, particularly the Mil G-10 variety. Or, most popularly, from an economical epoxy which has only a layer or two of fiberglass in it. Typical board costs vary from \$2 to \$20 per square foot, depending on the source and quantity ordered.

The two often-used copper weights are the *one ounce* copper of an 0.00135 inch thickness, and *two ounce* copper 0.00270 inches thick. Thus, the more popular one ounce copper is slightly over one mil thick, while the heavier two ounce copper is nearly three mils thick. Two ounce copper gets used for higher current applications.

The simpler boards are *single sided* ones that end up with all conductors only on their foil side. Fancier boards have their conductors on both sides, and are known as *double sided* boards. On the cheap, you can easily connect between the two sides by using your component leads, small eyelets, wire feedthroughs, jumpers, or socket pins. Another trick is to employ wirewrap sockets spaced enough off the board that you can solder to both your top and bottom sides.

But most commercial double sided boards use *plated through holes*. The bad news here is that plated through holes seem to require a minimum of \$10,000 in machinery and can involve deadly chemicals and scads of costly

steps. The good news is that today's newest *surface mount* components can minimize or even eliminate the need for any plate through.

At steeply increasing costs you can get far fancier than the double sided boards by going to *multilayer boards* with buried internal conductors. Most of today's computers would simply not be possible without the multilayer motherboards. There are also such specialty items as 3-D molded boards and flexible, thin circuit boards. Two specialty firms in the thin and flexible department are *Rodgers* and *Schaedahl* if you want to get fancy.

The bottom line: Forget about any plate-through and multilayer for your homebrew work. It just won't happen. At least not today.

Any particular process that helps you create a circuit board is *additive* if the copper is build up on an insulator, or *subtractive* if unwanted portions of copper get chemically or physically removed. As a ferinstance, you might build up a double sided plate through board by starting with double sided PC stock, drilling your through holes and then additively electroplating the conductors against your through-hole walls. And later on, after selectively applying an *etch resist*, you will go subtractive by etching away the large copper areas on one or both of the foil sides of your board.

Although there are lots of possible sources for smaller quantity printed circuit materials and supplies, one of the best are those *Kepro* folks. Whose products are available either direct or through distributors and from many *Nuts & Volts* advertisers. So, for sure, your number one homebrew printed circuit board resource would be the free *Kepro* catalog.

There are lots of different methods of creating circuit boards, and many variations of each method. But the three that I have found most practical

for homebrew and prototyping work are the *silk screen method*, the *dry film method*, and the *direct toner method*. Let us look at each in turn...

Silk Screen Method

The *silk screen method* is the lowest cost way to home produce a dozen to several hundred or more identical boards. This gets best used on looser tolerance "hacker" or "end consumer" products that do not demand plated through holes. Say 20 mil lines on 40 mil centers minimum. Although fancy screens can do better than this.

The procedure is the same as silk screening a greeting card or a Gimmie cap. A metal or wooden frame has a special piece of silk or stainless steel screen tightly stretched across it. The typical screens used have 1600 to 2000 holes per square inch. Next, a special photosensitive *blocking photofilm* is placed on the screen and gets exposed through your 1:1 artwork positive. A chemical processing and washout leaves silk holes where all the traces were and blocking elsewhere.

A small amount of etch resistant ink is placed on the screen and dragged across the bare but ultra-clean circuit board using a squeegee.

The process is fast, simple, cheap and fairly low tech. But there is an hour's worth of setup and makeready that may cost you \$30 to \$100 if it is ordered outside. So screening isn't all that great for single prototypes.

Two leading silk screen magazines are *Screen Printing* and *Signcraft*, while two major suppliers of materials and supplies are *Advance Process Supply* and *Southern Sign Supply*. The largest source of screen films is *Ulano*.

Dry Film Method

There is an obvious "chicken and egg" problem with your circuit board layouts. You need the final layout to make sure the circuit works. But you can't prove the circuit works till you have your final board. So, at least one or two prototype boards are a must for all your initial design and debug. Especially for higher frequency and higher speed designs where the *exact* component positioning and supply bypassing noise is critical.

A number of different *photo process* methods are now available for board prototypes. These can also be super accurate and are easily extended into multilayer boards and plated through

holes. To any precision.

A *photoresist* is some chemical glop that can be applied to your board one way or another. It is exposed to light through your artwork and then gets processed, leaving a hardened resist only where you want traces. Resists could be either *negative acting* (light selectively hardens) or *positive acting* (light softens). Because of physical laws and some other constraints, the negative acting photoresists tend to be faster, better, and cheaper.

Traditional photoresists arrive as liquids and are sprayed or spin coated in place. The liquid resists are quite hacker unfriendly because of the pin holes, dust, coating hassles, board cleanliness, exposure variability, and so on. Thankfully, there has long been a newer and much better way.

That newer way is called *dry film photoresist*. A dry film photoresist is just that - a thin and a dry film of photoresist material that is bonded to a thoroughly cleaned circuit board using the heat and pressure of a laminating machine. In one swell foop, all problems with liquid coating, drying, pinholes, and any variability magically disappear.

You can get small boards precoated with dry film resist from *Kepro* and similar sources. These are by far the fastest and friendliest way to do all simple hacker photoboards in small quantities. But if you require plated through holes, you have to drill and plate the holes *before* your dry film gets mounted.

Two leading suppliers of the dry photoresist itself are *Dupont Riston* and *Thiokol Dynachem*.

Your pre-coated boards must be kept in dark packages, but they can be quickly handled in a subdued room light. To expose, you can place your artwork negative in tight contact with the pre-coated board and apply strong ultraviolet light. You could use an exposure unit or leave your contact printer outside in the direct sun for several minutes.

After exposure, the dry film resist is developed or hardened by using a plain old sodium triphosphate wash solution from your local hardware store. Etching proceeds as usual.

There are lots of industrial trade journals that center on photoresist methods. These do include *Circuits Assembly*, the *Surface Mount Design*, *Printed Circuit Design*, and *Electronic Packaging and Production*, among several others.

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Write in 146 on Reader Service Card.

Direct Toner Method

The *direct toner method* is *potentially* but by far your most hacker friendly, fastest, simplest, and cheapest process for any high quality prototypes. Your custom circuit boards can be done at home in seconds for pennies. The only little problem is that we aren't quite there yet, so some experimenting and a lot of luck is still needed. But things

are about to get a lot better in a very big hurry.

The key secret is that laser printer toner makes a very fine etch resist. Which is not really all that surprising since toner is an inert polyethylene plastic with certain additives.

With the direct toner method, you first use the PostScript language to laser print a good grade of graphics toner onto a suitable transfer film. The film substrate must be dimensionally stable and must loosely but reliably accept toner. The transfer film is then placed in contact with an ultra clean bare circuit board. Applied heat and pressure bonds the toner to the circuit board where it is directly used as an etch resist.

One older transfer film is *TEC 200* through *Meadowlake*, while a greatly improved new film is stock number PCBTF-1000 and is supplied through *Techniks Inc.*

In theory, you could use just an iron to transfer your toner. But you will get far better and more consistent results by using some heated roller transfer device such as a *Kroy Color* machine, a laminator, or a heat press

of one type or another.

Some things that may improve your direct toner results: A squeaky clean circuit board which has a ten second pre-etch to give it a better surface "tooth". A temporarily "dry" wiper pad in your SX-style laser printer. And preheating the circuit board so it does not act as a giant heat sink. A careful choice of toner. Rubbing the back of the fused transfer sheet with an ice cube in a baggie. Very slowly and carefully peeling the transfer sheet away at right angles.

And, of course, not trying to use a clothes iron or someone else's plain old walk-in copier.

Sadly, we are still one generation away from the optimum combination of toner, transfer materials, and the transfer system that is needed for the reliable "works every time" direct transfers. But this process is so new, so fast, so cheap, and so incredibly hacker friendly that it just can't be ignored. From print to etch typically takes twenty seconds and uses a quarter's worth of materials.

Two magazines that deal with the direct toner method include *The Flash*

from *Black Lightning* and *Midnight Engineering*. You could pick up more details on the process from my *GENie* PSRT download #269 DIRECTPC.TXT, or through my new *Hardware Hacker III* Book-on-demand reprints.

The Etching Process

Regardless of the resist method used, your PC board material must start out squeaky clean and stay that way throughout the entire processing. The usual way to clean a bare board is to scour it thoroughly using a chlorine based cleanser such as *Comet* and by using a *Scotchbrite* pad from *3-M*. Done at home, it takes at least *twenty minutes* to properly clean up a small board. Any less time spent is inviting a near-certain disaster.

Those chemical brightening copper cleaners are also a very good idea, but these can be toxic and do require some care in their use.

Besides allowing a fully unbroken stream of water to flow over it, any properly cleaned board will not be a copper color at all. Instead, it will be a distinctive hot pink.

The object of etching is to eat away the copper that is not protected by the resist. There are two popular etchants. One ancient etch is known as *Ferric Chloride* and is an ugly and sloppy opaque brown liquid. The modern one is known as *Ammonium Persulfate* and is a clean granular powder that mixes with water to create a clear liquid that changes a progressively deeper blue as the etching proceeds. Besides *Kepro*, you'll find both types of etchant at *Mouser Electronics* and through other *Nuts & Volts* ads.

I overwhelmingly do prefer to use ammonium persulfate etchant, as do most commercial etching houses. The etchant should be stored in airtight plastic bags inside opaque plastic containers. It is best to prepackage your etchant into individual "single serving" baggies.

Etching is best done with a spray or other brisk agitation at an elevated temperature. Often 120 degrees or so. The etch should only require ten or twelve minutes maximum, done at the correct temperature. Longer times than this are nearly certain to lead to pinholes, undercutting, or to erratic results. Most hacker etching problems are caused by trying to etch at too low a temperature.

Kepro makes a versatile benchtop etcher. But you can use nothing but a

RESOURCE BIN NAMES & NUMBERS

Advance Process Supply

400 North Noble Street
Chicago, IL 60622
(312) 829-1400

Black Lightning

Riddle Pond Road
West Topsham, VT 05086
(800) BLACK-99

Circuits Assembly

600 Harrison Street
San Francisco, CA 94107
(415) 905-2200

DuPont Riston

2841 Junction Ave #110
San Jose, CA 95134
(408) 433-5600

Electronic Packaging

1350 E Touhy Avenue
Des Plaines, IL 60018
(708) 635-8800

Ethone-OMI

Box 1900
New Haven, CT 06508
(203) 799-4908

GENie

401 N. Washington Street
Rockville, MD 20850
(800) 638-9636

Kepro Circuit Systems

630 Axminster Drive
Fenton, MO 63026
(314) 343-1630

Meadowlake

25 Blanchard Drive
Northport, NY 11768
(516) 757-3385

Midnight Engineering

111 E Drake Road #7041
Ft Collins, CO 80525
(303) 491-9092

Mouser Electronics

11433 Woodside Avenue
Santee, CA 92071
(800) 346-6873

Nordson Corporation

1150 Nordson Drive
Amherst, OH 44001
(800) 477-9878

Nuts & Volts

Box 1111
Placentia, CA 92670
(714) 632-7721

Personal Engineering

Box 1821
Brookline, MA 02146
(617) 232-3625

Printed Circuit Design

2000 Pwrs Ferry #450
Marietta, GA 30067
(404) 952-1303

Rogers Corp

100 S. Roosevelt Avenue
Chandler, AZ 85226
(602) 961-1382

Screen Printing

407 Gilbert Avenue
Cincinnati, OH 45202
(513) 421-2050

SignCraft

PO Box 06031
Fort Myers, FL 33906
(813) 939-4644

Southern Sign Supply

127 Roesler Road
Glen Burnie, MD 21061
(301) 768-8600

Surface Mount Technology

17730 W. Peterson Road
Libertyville, IL 60048
(312) 362-8711

Techniks Inc.

45 J. Ringo Road
Ringoes, NJ 08551

Thiokol Dynachem

2631 Michelle Drive
Tustin, CA 92680
(714) 730-4200

3-M/Scotchbrite

3M Center
Saint Paul, MN 55144
(800) 328-1303

Ulano Corp

255 Butler Street
Brooklyn, NY 11217
(718) 622-5200

warming tray from a yard sale, and a glass pan that is gently sloshed or bubbled from any aquarium pump. Your etchant should only contact glass or plastic. I've found it much better to etch *upside down* using plastic clips or standoffs to hold your board *half way* down into your etch bath. Naturally, you use good ventilation, rubber gloves, and safety goggles. The mercury activator that is sometimes included in the ammonium persulfate etchant is a poison.

After etching, a thorough and triple rinsing in cold water is done to stop the etch process. The resist is then removed physically or chemically using suitable resist removers. Post etching operations usually include drilling, immersion tin plating, solder masking, and the screening of your circuit callouts.

By the way, *Ethone-OMI* is a good source for solder mask materials.

What can you do with all of your spent etchant? If you are now on a commercial sewer line and have less than a pint of it every three weeks, dilute it with great heaping bunches of *very cold* water and dump it down the drain. Note that hot etchant can eat through your sink's copper drain trap. Otherwise, you should follow local guidelines for hazmat disposal.

Creating PC Artwork

The traditional way to make your printed circuit artwork was to start with a grided mylar sheet that is 1X, 2X, or 4X of your final size. Then you used a light box along with lots of stickum tape and dots. And plenty of instant transfers to create your layout patterns. When completed, a litho camera got used to make the final 1:1 positive or negative for prototyping, publishing, or production. Careful use of *registration marks* was needed when several sheets were involved for top foil, bottom foil, component callouts, or whatever.

One very important detail: Most modern electronic components are shown and numbered as a *top view*. Everything *reverses* itself when you do the foil side layout. You have to be super careful that all of your final images are "right viewing" in their intended location. And a quick and dirty reversal by "printing through the film base" is a no-no in most of the more critical uses.

These days, just about all of your printed circuit layouts are instead

done electronically by using either personal computers or those fancier workstations. Electronic layout is far faster and far cheaper. It is way easier to modify, edit, share, or rework. And there's none of the old hassles such as dried-out tape, slipped clearances, knife slits, or tennis elbow.

All sorts of layout packages are now available, with pricing ranging from freeware up to outrageous. Your fancier tools include such features as *autorouting* (figuring out where and how to arrange the connections), and *schematic capture*, (starting with the circuit, rather than with your physical component arrangement).

Besides the many ads for printed circuit layout tools and services right here in *Nuts & Volts*, you will find lots of others in *Midnight Engineering*, *Personal Engineering*, and the in the many workstation-specific high end trade journals.

Layout packages are intended to output to dot matrix printers, laser printers, plotters, or to a precision photoplotter. Several languages are popular, including Hewlett-Packard's HPGL, Gerber's *Photoplotter Language*, and *PostScript*.

I've written a shareware printed circuit layout package in PostScript and have posted it on *GENie* PSRT as our file #401 PRINCRCT.GPS. It's just an in-house automated tape and dots putter-downer; works eight or more levels; 1X, 2X, or 4X; frontwards or backwards; normal or reversed; and even provides for a microscaling to compensate for printer errors and media stretch. It is especially strong in doing fancy circuit overlay art and in generating ready-for-publication art for manuals and projects.

And my utility runs fully device independently on nearly *any* personal computer or workstation, while using nothing but your very favorite word processor. Typical downloading costs are a dollar or two.

Since PostScript is infinitely more powerful than any of those older plotting languages, you often can translate into PostScript using nothing but a simple prolog dictionary. I've also worked out a way to get from most PostScript back to the older and more primitive vector languages. This mind-blower is #387 POSTVECT, and is again up on *GENie* PSRT.

PostScript also lets you eliminate most, and often nearly all, of your darkroom and other photo work. No more slopping in the slush.

A final and really major advantage of PostScript that should be of crucial interest to both *Nuts & Volts* authors and readers: You can easily create a special type of PostScript file called a *Compiled EPS File*. Compiled EPS Files are plain old ASCII textfiles that can be printed, modemed, downloaded, flopped, mailed, or otherwise sent just about anywhere.

A compiled EPS file can be used to generate a true first generation digital master on any old PostScript printer, giving absolutely "perfect" art to the end user. And the compiling process completely eliminates any trace of any proprietary art generating program. And it should run very quickly on *any* computer. Anywhere and anytime.

I definitely have lots of room for downloadable compiled EPS files on the *Nuts & Volts* section of *GENie* PSRT and will be most happy to work with you to get your digitally mastered precision layouts into the hands of your end-users. We also have lots of new EPS compiling tools and options readily available.

This Month's Contest

For our contest this month, just tell me about any unusual or little-known product, service, or secret technique that makes hacker-friendly printed circuits easier, faster, or cheaper.

There will be a dozen or so of my newly revised *Incredible Secret Money Machine II* book prizes going to the best entries, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

As usual, be sure to send all your written entries directly to me here at *Synergetics* per the end blurb, rather than to *Nuts & Volts* editorial.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 27 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can call GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number four

Sources for unusual and interesting semiconductors.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers. You'll find some superb technical downloads and lots of tutorials here.

Three big updates to our previous columns: *Consolidated Electronics* and *MCM Electronics* both have a fairly good selection of Japanese and other far east semiconductors and useful substitutes, along with lots of other service and repair parts. Free catalogs are available.

And an incredibly stupendous new product has just become available to ridiculously improve the reliability of that new direct toner PC method for making printed circuits. This is the *Toner Transfer System* from *DynaArt Designs* in California.

Unlike the oft hoped-for differential transfer of the earlier products, this new system uses a *water soluble* decal base. You print to film, gently iron to the pc board and then apply warm water to dissolve away your backing sheet. Besides 100% accurate toner transfers just about every time, the system is ideal for component callouts or *anywhere* else that water transfer decals can be used. A five sheet, \$10 kit is available.

I've just posted #435 TONERTRX.PS to *GENie* PSRT that gives you a good review of the new transfer system, along with some other "secret" toner products which could give you real thermography and the ability to print

your own MICR bank checks.

On to our business at hand...

As in any field, the biggest and the largest of semiconductor companies rarely offer any unique or innovative products. They also have other nasty habits such as charging big bucks for full data book sets and making their best products available only through greedy local reps and impossible to deal with old-line distributors.

Instead, you'll have to dig around deep down into all those second- and third-tier sources to ferret out all of the very best-of-the-best oddball chips for hacker, hobbyist, and new-product development use.

For it often turns out that the little guys have all the good stuff.

They've also usually got the best free data manuals, ap notes, samples, reasonably priced kits, and available help as well. So, for in our resource bin drawer for this month, I thought I would gather together and comment on some of my favorite off-the-wall sources for unique integrated circuits and other semiconductors.

We'll start with my personal top five, and then take a quick look at a bunch of others. The all time *numero uno* champion good guy, is...

Maxim Integrated Products

Maxim is very big in video switches and drivers; in both micropower and switching regulators; in digital filters that actually work; and in the serial drivers that internally generate their own oddball supply voltages. They have plenty of data books, individual data sheets, and ap-note packages available. They are very liberal with freebie engineering samples, besides having great evaluation and test kits at quite reasonable prices. They also publish the *Maxim Design News*, an outstanding free newsletter.

Some of their exciting current chips include single and dual AA cell to +5

volt dc switching regulators, lots of economical A/D and D/A converters, plus their new single device audio and video switching centers.

Dallas Semiconductor

Up in second place on my top five, *Dallas Semiconductor Inc.* is a second smaller, aggressive, and an extremely innovative firm. They are especially big in real time computer clock chips, identification products, and in many micropower devices. Many of their chips have built-in lithium batteries which provide ten years or more of power backup.

Dallas is also strongly into the short range telemetry business with several microminiature and also micropower devices that are interrogated by a VLF field and return an UHF data stream. Anti-shoplifting devices are one big possible application, besides isopod home power monitoring. The current biggie is a new line of electronic dog tags that last ten years, can be read from one single I/O pin and support permanent serial numbers, writable memory, and time stamping.

The usual data books, data sheets, samples, and ap-notes are obtainable on written or phone request.

Dallas was also the first semi house to realize that the old-line distributors and local sales reps can be their worst possible enemies. At least when it comes to putting sample chips in the hands of new users generating new applications and exploring potential market areas. To work around this, Dallas bravely set up a direct order line where you can get one or more of anything immediately, cheaply, and hassle free. Via VISA.

I cannot even begin to praise Dallas highly enough for this sorely needed service. It is high time the other semi houses saw the error of their ways. Let all the others know how you feel about direct order lines.

LSI Systems

For my third choice, the *LSI Systems* folks are a virtually unknown source of mind-blowing and low cost chips. They seem to be hiding out in a very obscure Long Island NY town, clear across the entire country from Silicon Valley. Since they have no foundry, they specialize mostly in design and distribution of unusually unique low end consumer electronic products.

They have several dozen exciting new products, ranging from dimmers, touch controls, electronic counters, doorbell and sound effects chips, tune generators, and even electronic lock circuits. Plus bunches of other lower price consumer electronics chips that scream "use me!"

A full collection of data sheets and ap-notes are available on request.

Signetics/Philips

And fourth on my source list (and probably topping the list of any radio ham) would have to be the *Signetics/Philips* folks. Their NE602 series of hot mixers and converters have totally revolutionized hobby high frequency communication circuits. As have their companders, compressors, satellite, and cellular comm devices.

They have scads of products with lots of untapped potential. Others I have found of high interest are their synchronous demodulator chips and zero switching heater proportional control triac drivers.

Bunches of data books and free ap notes are available. Be sure to get both their domestic and foreign catalogs.

Samsung

Yes they are big, and yes, they are also foreign, but I would certainly have to include *Samsung* in my top five preferred semi and integrated circuit manufacturers. Among their many data manuals Samsung offers a big three volume set of linear circuit books. These are crammed to the gills with radio control model R/C remote controls, five- and ten-channel audio equalizers, specialized VCR chips and much, much more. Their linear data books read like pulp novels. Each and every page has new and wondrously great devices crying to be explored.

Plus A Few Others

Let's briefly cover some of the other smaller outfits having really exciting chips for both hacking and product development prototyping uses.

Rohm is a really obscure firm with an incredibly great chip – the BA1404 FM stereo broadcaster. Which can form the the central core of a wireless broadcaster, miniature FM stations, a "please buy my nice house" driveby system, or serve as a CD ROM to car radio antenna interface.

Advanced electronic music circuits have been really sticky to pin down. But an almost unheard of *Integrated Circuit Systems* has some really fancy new synthesizer chips available off the shelf. Fully polyphonic.

One of my very favorite mid-range manufacturers is *GEC Plessey*. Among many other areas, they are especially strong in remote control transmitters, receivers, and encoders. Of all their dozen useful data books, the *Cable, TV, and Audio Handbook* has the most parts in it of immediate interest to *Nuts & Volts* readers. Plessey is also big on frequency synthesizers, and, in a separate division, in SAW filters.

When it comes to lower price solid state pressure transducers and related accelerometers, you can immediately write off the two obvious biggies as being overpriced and unimaginative. Instead, the "gang of three" are by far your best places to go. These include *SenSymb* who have outstanding data and design books, *NovaSensor*, and IC Sensors. Prices start under \$10.

The small company leader in many telecomm chips appears to be *Teltone*. Who are strong in touchtone coders and decoders, call progress detectors, special 911 gear, ring detection, and similar telephone related circuits. A second source for Teltone is *Silicon Systems*. Another rather interesting company in this area would be *Sierra Semiconductor*, who have by far the finest new caller ID telephone chips available, besides pioneering this single chip calling party field.

Certainly one of the most obscure semi houses is *MX-COM*. Yet they have a great catalog crammed full of their pager, tone coders, signalling, security, communication, and voice scrambling chips. A niche market for sure, but one with lots of untapped hacker potential.

Another virtually unknown chip manufacturer is *Unitrode*. Who are big on very sophisticated battery charger circuits and power regulators. Several interesting ap-notes are available.

For any electrically variable analog potentiometers, *Xicor* is pretty much a single product firm with their *eept* digitally controlled attenuators.

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SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

Crystal Semiconductor is yet another niche company who lead the field in a new type of analog-to-digital circuit known as *Delta-Sigma Conversion*. At their fast and high end, they have CD audio quality and beyond circuits. At the new slower and super accurate end, they now provide converters that are useful for strain gauges, weighing scales, and any other instruments that require an extreme 24-bit (!) resolution range. Crystal also has some pricey

UNUSUAL SEMICONDUCTOR RESOURCES

Allegro Micro Systems

363 Plantation Street
Worcester, MA 01605
(508) 795-1300

Analog Devices

One Technology Way
Norwood, MA 02062
(617) 329-4700

Brooktree

9950 Barnes Canyon Road
San Diego, CA 92121
(800) VIDEO-IC

Crystal Semiconductor

Box 17847
Austin, TX 78760
(512) 445-7222

Dallas Semiconductor

4401 Beltwood Parkway S
Dallas, TX 75244
(214) 450-0400

General Instruments

2355 West Chandler Blvd
Chandler, AZ 85224
(602) 963-7373

Harris Semiconductor

Box 883
Melbourne, FL 32902
(305) 724-3739

Integrated Circuit Sys.

2626 Van Buren Avenue
Valley Forge, PA 19482
(215) 666-1900

Linear Technology

1630 McCarthy Blvd
Milpitas, CA 95035
(408) 432-1900

LSI Systems

1235 Walt Whitman Road
Melville, NY 11747
(516) 271-0400

Maxim Integrated Prods.

120 San Gabriel Drive
Sunnyvale, CA 94086
(408) 737-7600

Mini-Circuits Lab

PO Box 350166
Brooklyn, NY 11235
(718) 934-4500

MX-COM, Inc

4800 Bethania Station Rd.
Winston-Salem, NC 27105
(800) 638-5577

NovaSensor

1055 Mission Court
Fremont, CA 94539
(415) 490-9100

Plessey

PO Box 660017
Scotts Valley, CA 95067
(408) 438-2900

PMI

1500 Space Park Drive
Santa Clara, CA 95052
(800) 843-1515

Reticon

345 Potero Avenue
Sunnyvale, CA 94086
(408) 738-4266

Rohm

Box 19681-631
Irvine, CA 92713
(714) 855-0819

Samsung Semiconductor

3725 North First Street
San Jose, CA 95134
(408) 434-5400

SenSym

1244 Reamwood Avenue
Sunnyvale, CA 94089
(408) 744-1500

SGS-Thomson

1000 East Bell Road
Phoenix, AZ 85022
(602) 867-6259

Signetics/Philips

811 East Arques Avenue
Sunnyvale, CA 94088
(800) 227-1817

Silicon Systems

14351 Myford Road
Tustin, CA 92680
(714) 731-7110

Stanford Telecom

2421 Mission College Blvd
Santa Clara, CA 95054
(408) 980-5684

Telton

22121 20th Ave SE
Beothell, WA 98021
(800) 426-3926

Unitrode

580 Pleasant Street
Watertown, MA 02172
(617) 926-0404

Xicor

1511 Buckeye Drive
Milpitas, CA 95035
(408) 432-8888

been *Brooktree*. But all their brand new multimedia, D/A conversion, lookup, titling, and video interface chips are so exciting that they simply cannot be ignored. And their prices are in fact dropping significantly.

In Memoriam

As a general rule, most technical excellence gets ruthlessly stomped out whenever and wherever it happens. Sadly, many of the very greatest semi houses are no more, have sold out, or have radically changed who they are or what they do.

For instance, Maxim's grandfather was a company called *Intersil*. Intersil did sell superb clock, stopwatch, and voltmeter chips. Along with a wide variety of innovative linear circuits. And some really great ap notes and evaluation kits, too. Well, GE bought Intersil. Then RCA bought out GE. Finally, a second-tier purveyor of overpriced military circuits by the name of *Harris* picked up the whole dusty pile off of the junk table at a corporate yard sale.

Yes, you can still get some of the more popular *Intersil* products from *Harris*. And some of RCA's linear chips as well. But it just ain't the same. The energy level is zero. And the stunning innovation is no more.

Another long goner is *Mostek*. They were real big in top octave generators, organ music chips, telephony, real time clocks and in zero power static RAM devices. It seems *SGS* picked up the *Mostek* dregs after a bankruptcy and still offers a scant few of the older *Mostek* devices. *SGS* does have a bunch of innovative circuits of their own. Not to mention their great free sample promotions, often cleverly disguised as soup cans or soap boxes. Their new *high side driver* power chips are especially interesting.

Two other has-beens are *Interdesign* and *Ferranti*. *Interdesign* had several elegant medium cost build-your-own custom ic chips (plus an outstanding design journal), while *Ferranti* was pretty good with comm chips, A/D converters, and some early AM radio receiver chips. Both of these firms have become part of *GEC Plessey*. But most of the chips are no more.

Let's see. Several other comings and goings. *General Instruments* moved across the country, and in the process summarily dropped all of their nice speech, graphics, and sound effects chips. *Amperex* was merged by *Philips*, keeping most of their temp sensors

but quite useful evaluation boards for most of their components.

Microwave transistors and related integrated circuit devices can often be unbearably expensive. But the folks at *Mini-Circuits Lab* now do offer VHF and microwave amplifiers for under a dollar each.

Reticon is well over in a class by themselves. For they specialize in the image sensing and the video camera chips, especially for scanners and FAX machines. They also manufacture analog delay line devices for reverbs and pitch shifting.

And, of course, we would have to mention *Analog Devices* who have a wide variety of new automotive and analog chips available, along with a quite useful monthly *Analog Dialog* newsletter. Among their gems are "the lights are ok" current transducers so sensitive they use a printed circuit trace for a series sensing resistor; and true RMS power detection chips. See if

you can't get a copy of their *Best of Analog Dialog*, a large reprint having classic tutorial info on most areas of analog design.

The *Linear Technology* folks would also have to get a major thumbs up, especially for their great application notes and seminars. They are strong in low noise amplifiers, switching regulators, and for highly unusual analog switching circuits and related techniques.

I guess my opinion of *Stanford Telecom* is rapidly changing. Many of their sophisticated communication, error correction, numeric oscillator, and digital signal processing chips are now priced at several hundred dollars each. But they are starting to come up with several cheaper and eminently hackable new chips. Especially their STEL-2130 digital wireless chip that immensely simplifies wireless LAN communications.

Another high priced spread has

OTHER MENTIONED NAMES & NUMBERS

Consolidated Electronics

705 Watervliet Avenue
Dayton, OH 45420
(513) 252-5662

DynaArt Designs

3535 Stillmeadow Lane
Lancaster, CA 93536
(805) 943-4746

GENie

401 N. Washington Street
Rockville, MD 20850
(800) 638-9636

MCM Electronics

650 Congress Park Drive
Centerville, OH 45459
(513) 434-0031

but discontinuing all of their low cost infrared sensors. And the *Solid State Music* analog synthesizer products are now available by way of *PMI*.

Finally, *Sprague* has long been a good and economical source of power drivers (The ULN2813 is still one of my favorites), liquid level sensing chips, stepper controllers, automotive electronics, Hall effect switches and such. *Sprague* has recently sold their chip line to *Allegro Micro Systems*. Who, thankfully, still offer most of the winners in this line.

Getting Results

Naturally, the first place to try and find actual chips is in our *Nuts & Volts* advertisers. But no matter where you get all your devices or what you are going to do with them, be *absolutely certain* to have current data sheets and ap notes on hand. And make sure the

NEXT MONTH: Don explores the world of labor-of-love technical newsletters.

data is from the same company who actually made the chip.

You can often get one or two free samples of most any semiconductor just by asking for them. But you do have to be fully professional when you try this. Ball point pen on tablet paper simply will not hack it. You somehow will have to convince the supplier that you are a possible high quantity buyer for their products.

The best place to start is with the bingo cards and response coupons in the various trade journals. More on this in a future column. And follow this up with a laser printed letterhead or telephone request sent directly to applications engineering at the main factory or head office.

You'll get the best results with very specific requests that exactly spell out

which new product you are going to develop and just how their device is essential to your development. Only ask for what you really need.

Avoid local reps like the plague. And save the old line distributors as an expensive and high hassle court of last resort.

A Contest

Besides studiously ignoring several of the major players (I still consider any chip whose part number starts with an 8 to be intrinsically vile and despicable), who did I miss? Who else that is non-obvious, yet offers unusual hacker-friendly integrated circuits?

For our contest this month, just tell me about any other little known or fresh source of innovative circuits useful to experimenters and hardware hackers.

There will be a dozen or so of my newly revised *Incredible Secret Money Machine II* book prizes going to the best entries, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

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Don Lancaster's

RESOURCE BIN

number five

Exploring labor-of-love technical newsletters.

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Information is where you find it. Over the years, I've noticed that the home crafted labor-of-love specialty newsletters often give you more info faster and better than do many larger circulation magazines. With honest "from the trenches" reviews and more genuinely usable material for you.

At its outset, any publication has to decide what or who is to be in charge. The options are to be *reader driven*, *ego driven*, or end up *advertiser driven*. In an advertiser-driven publication, you the reader, are the product delivered to paying advertisers. Done so on a cost-per-thousand basis.

If you are lucky, you are worth an entire nickel. There is thus an inherent conflict in delivering any useful and unbiased end reader info within any advertiser driven pub. Especially stuff that warns you about poor products, operating defects, or any third party alternatives. Or workarounds that let you avoid buying anything in the first place. Sadly, the economics of any high-circulation marketplace strongly favor being ad driven.

For our resource bin this month, I thought I'd gather up a great heaping bunch of labor-of-love newsletters, fancier reader-driven magazines, and several related resources...

Great Newsletters

Let's start off with the *TecSpec* from *Allegro Electronics*. This hobbyist and homebrew electronics newsletter is heavily into electronic strobes, optical communications, lasers, magnetics, and such. Most of which are easy to build from low cost parts and offered kits and pc boards.

By far my favorite labor-of-love newsletter is Frank Reid's *Speleomics*. This "underground" publication is specifically intended for spelunkers and cavers who have an interest in high-tech goodies. Covered subjects include low frequency radio comm, rescue gear, electronic compasses and survey instruments; nav services, high tech lamps, piezo lighters, mapping software, remote sensing goodies, and geophysical fundamentals.

Amateur radio astronomy is one rough row to hoe. All the equipment is expensive, the math is messy, and finding low noise sites is tricky. For credibility, you also have to avoid the e.t. and UFO crowd like the plague. The leading newsletter here is called *The Radio Observer* and is associated with the *Association of Amateur Radio Astronomers*.

Getting useful tech info on radio controlled models has been hard. But a brand new *Micro-Avionics Newsletter* promises to deliver lots on this sorely needed topic. Several of those R/C models are now up to one-fifth or one-quarter scale. Which gives you a very respectable platform for aerial measurement, experiments and video observations. At a ridiculously tiny fraction of a "real" aircraft.

And, speaking of which, *Homebuilt Rotorcraft* is a newsletter on building your own helicopters. It is intended for the gyro gearloose crowd. Yes, the lawyers completely ate up the entire personal aircraft industry for lunch. But, there's still plenty of interesting

experimental and homebrew small scale possibilities. No profit potential, of course. And they just might end up calling you "shorty". Oh well.

There is some amateur interest in high vacuum techniques now being addressed by Steve Hansen's *The Bell Jar*. This one is on building your own vacuum pumps, compressors, neon displays, and such. The Bell Jar is a newer publication that is currently in its third issue.

There are quite a few collectors of old radios. Whose primary newsletter seems to be *Antique Radio Classified*. Besides the hundreds of buy/sell ads for older AM broadcast band radios, they also cater to ancient military and wireless receivers, early television, loudspeaker rebuilding, upcoming auctions, and special services.

At one time, building a Tesla coil was a mandatory rite of passage for an emerging technonerd who just could neither afford nor understand girls. While interest in these "lots of sparks" humongous machines has dwindled, a dedicated cadre of enthusiasts still remain. And gets addressed by the ongoing *Tesla Coil Builders Association* newsletter. But be forewarned: The name "Tesla" tends to attract several rather strangish denizens out of the woodwork. Such as those alien UFO free energy power conspiracy buffs.

Any useful reader-oriented desktop publishing magazines which address the lower end needs of beginners are few and far between. Be sure to let me know if you find one, for I would very much like to move my *Ask the Guru* and *LaserWriter Corner* columns from their present state of near limbo. At any rate, there is one labor-of-love low end desktop pub which someday could turn into something big. It is even free. It is called *The Flash* and is now published by Walt Jeffries from *Black Lightning*. Those topics covered

include toner thermography, T-shirt transfer printing, Book-on-demand publishing, printed circuits, special toner techniques, cartridge reloading, decals, and cartridge reloading.

There are now many hundreds of computer user group newsletters of varying quality. Two of my favorites include Tom Weishaar's exceptionally well done *Resource Central* that tightly focuses on those Apple IIe and IIs products; and BMUG, an incredible publication produced by the *Berkeley Macintosh Users Group*.

One Mark Voorhees newsletter of interest to traditional craftsmen and musicians is the *Classic Organ Builder*. Or, if coin operated music is more to your style, check into *Always Jukin' - The Monthly Jukebox Magazine*.

I've only reviewed a scant few of those hundreds of ham and specialty communications magazines. But one I have found of interest is *The Lowdown*, which does specialize in all those low frequency communications services below the AM broadcast band. These include beacons, navigation aides, and natural geophysical phenomoma related to earthquakes and whistlers.

A second new comm newsletter is that *Spread Spectrum Scene*. Spread spectrum communications is getting super important for everything from power line controls through wireless modems through ham packet radio on up through navigation satellites. And offers the promise of allowing many stations on the same frequency at the same time without major interference. With greatly simplified licensing.

If you are at all into home printing, be certain to check into *The Printer's Devil* newsletter from the *Mother of Ashes Press*. Whose masthead motto is "A home in every press. A press in every home." Old line fer sure. And exceptionally well done.

Many of the so-called inventor's publications are marketing scams in disguise. But one of the few and far between that I can recommend is Ed Zimmer's useful *Inventor-Entrepreneur Network* newsletter. It addresses the realities of product marketing and development on an individual, small scale, and real-world basis.

There's also a new resurgence in traditional crystal sets and real down home electronics using a minimum of the simplest possible parts and found materials. One newsletter that covers these projects is the new *Crystal Set Builder's Association*. Several similar mags are supposedly in the works.

House Organs

A *house organ* will differ from a labor-of-love newsletter in that it is published by a company rather than a person. House organs obviously have "sell our product!" as their primary mission in life. Once you recognize their total and their overwhelmingly obvious bias, you will often find lots of useful info. Much of which can clearly be applied way beyond what the writer intended. Or at least get you started off in a research direction. And house organs are usually free on a credible enough request.

There are countless thousand upon thousands of house organs. Let's look at three wildly different ones...

The first of these is that *Hewlett Packard Journal*. Which gives excellent technical coverage of the underlying principles behind electronic test and comm gear. It is particularly handy for picking up any new applied math concepts, unusual packaging ideas, and all of the fundamentals of newer measurement technologies.

Thomson-Shore is a higher quality printer that specializes in limited run paperback and hardbound books. The *Printer's Ink* house organ is an every now and then pub which has lots of useful info in it for self publishing. Especially if you do read between the lines to pick up what is really being said. They also have a free hardback demo of previous copies.

In what has to be the greatest name ever thunk up for any trade journal, *Foiled Again* is published by *Transfer Print Foils*. This beauty covers all the different uses for hot stamping foils. Including scads of emerging desktop publishing uses. And various ongoing product decoration and enhancement techniques.

Beyond Labor-of-love

The next step up from labor-of-love newsletters are what I like to call *high energy resources*. Quite often, these are professionally done "real" magazines which have clearly gone beyond the newsletter class. But they still remain rather strongly reader oriented and usually have one very charismatic or highly creative head honcho who is obviously in total charge.

Most importantly, they remain on a strongly reader driven mission, rather than being advertiser based. Which means that useful and top-notch info can still be given out to you without offending any advertisers.

new from DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. **\$19.50**

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. **\$24.50 each.**

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. **\$18.50**

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LOTS OF OTHER GOODIES

Ask the Guru I or II or III	\$24.50
Hardware Hacker II or III	\$24.50
Blatant Opportunist I	\$16.50
Book-on-Demand Resource Kit	\$39.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
GENie PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
PostScript Secrets Brochure	FREE
Hacking Secrets Brochure	FREE

LASERWRITER SECRETS

A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. **\$29.50**

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GENie PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Call (800) 638-9636 for connect info.

FREE VOICE HELPLINE VISA/MC

SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

Here's a few of my favorites...

First and foremost on my list would have to be the *Whole Earth Review*. Still at that same old stall after all of these years, their "access to tools" charter remains their central editorial goal. Of the several hundred magazines and trade journals which I personally do subscribe to, WER is number two. Second only, of course, to MAD.

Most of the solar energy mags have long gone belly up. But *Home Power* is

LABOR-OF-LOVE NEWSLETTERS AND SIMILAR RESOURCES

Allegro Tec Spec
3 Mine Mountain Road
Cornwall Bridge, CT 06754
(203) 672-0123

Always Jukin
221 Yesler Way
Seattle, WA 98104
(206) 233-9460

Am. Radio Astronomers
247 North Linden Street
Massapequa, NY 11758
(516) 798-8459

Antique Radio Classified
PO Box 2
Carlisle, MA 01741
(508) 371-0512

The Bell Jar
35 Windsor Drive
Amherst, NH 03031
(508) 689-1027

BMUG
1442A Walnut Street #153
Berkeley, CA 94709
(510) 849-9114

Classical Organ Builder
PO Box 27476
Phoenix, AZ 85061
(602) 973-1395

CompuServe
5000 Arlington Center Blvd
Columbus, OH 43220
(800) 848-8199

The Flash
Riddle Pond Road
West Topsham, VT 05086
(800) BLACK99

Foiled Again
PO Box 538
East Brunswick, NJ 08816
(908) 238-1800

GENie
401 N Washington Street
Rockville, MD 20850
(800) 638-9636

Hewlett Packard Journal
3200 Hillview Avenue
Palo Alto, CA 94304
(415) 857-1501

High Energy Enterprises
PO Box 5636
Security, CO 80931
(719) 475-0918

Home Power
PO Box 130
Hornbrook, CA 96044
(916) 475-3179

Homebuilt Rotorcraft
5555 Zuni SE, Ste 281
Albuquerque, NM 87108
(505) 298-9362

Inventor-Entrepreneur
1683 Plymouth Road
Ann Arbor, MI 48105
(313) 663-8000

Lindsay Publications
PO Box 538
Bradley, IL 60915
(815) 935-5353

Low Down
Longwave Club of America
45 Wildflower Road
Levittown, PA 19057

Micro-Avionics News
4241B Valley Road
Drexel Hill, PA 19026
(215) 259-6430

Model Railroader
21027 Crossroads Circle
Waukesha, WI 53187
(414) 796-8776

PC Techniques
7721 E Gray Road #204
Scottsdale, AZ 85260
(602) 483-0192

The Printer's Devil
PO Box 66
Harrison, ID 83833
(208) 689-3738

Printer's Ink
7300 West Joy Road
Dexter, MI 48130
(313) 426-3939

Radio Observer
7605 Deland Avenue
Ft Pierce, FL 34951
(407) 464-2118

Recharger/Supplies Unlim.
101 Granite Street, Ste F
Corona, CA 91719
(714) 371-8288

Resource Central
PO Box 11250
Overland Park, KS 66207
(913) 649-0567

Science Probe
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-0467

Speleonics
Box 5283
Bloomington, IN 47407
(812) 239-7305

Spread Spectrum Scene
PO Box 2199
El Granada, CA 94018
(510) 278-3157

Synergetics
Box 809
Thatcher, AZ 85552
(520) 428-4073

Tesla Coil Builders Assoc
3 Amy Lane
Queensbury, NY 12804
(518) 792-1003

The WELL
27 Gate Five Road
Sausalito, CA 94965
(415) 332-4335

Whole Earth Review
27 Gate Five Road
Sausalito, CA 94965
(415) 332-1716

also the only pubs I know of where carefully reading all of the ads can immediately save you hundreds and even thousands of dollars.

I would also have to include *Model Railroader* here for three reasons. First, because this magazine has by far the very finest technical writing of any publication anywhere in the world. Period. It should be required reading for any and all tech writers and tech illustrators on all levels everywhere. I hope to someday eventually be able to communicate with my readers as well as the *Model Railroader* authors do.

Second, *Model Railroader* shows how a large circulation magazine can have zillions of wall-to-wall ads and still remain overwhelmingly reader driven. It's common to have a "this kit sucks" review right beside a full page color ad for the very same kit product. Their enlightened advertisers do not mind in the least, since they do know that any loyal and dedicated readers consistently given accurate and useful info tend to buy more products more often. Besides, the kit probably is an atrocity, or they wouldn't have said so. And hobby kit suppliers have to be in the game for the long haul.

Third, because there's lots of neat tools, materials, and techniques here that you just may not be exposed to otherwise. Low cost chemical milling forms a typical example. Amazingly, *Model Railroader* published one of the very first practical examples of non-volatile memory projects. Long before any of the electronic ones.

Not Quite Newsletters

While these are not exactly "on paper" periodical publications, three other resources deserve mention...

First, check out *Lindsay Publications*, who have now taken upon themselves to reprint great books and articles as far back as the turn of the century. They are very good at "lost" machine shop techniques, unusual craft secrets, and early radio titles. Prices are quite reasonable.

For perpetual motion, zero point scalar energy, zillion mile per gallon carburetors, magnetics-only motors, pan-galactic happy faces on Mars, and for "Boy, a whole flock of 'em flew over that time" pubs in general, the definitive bookstore is *High Energy Enterprises*. A free catalog is offered. Totally fascinating reading for sure. Even if you do not really expect Congress to repeal the second law of thermodynamics. At least not in this

coming on like gangbusters. And they do practice what they preach, doing everything off grid and off line. All in a down-to-earth and totally hands-on, recycled, and eco-friendly style.

Jeff Dunteman's *PC Techniques* is an interesting bimonthly programming magazine having a strong focus on solving end-user problems. A similar electronic hardware journal would be Steve Circia's *Circuit Cellar Ink* with lots of hands-on construction projects, especially those related to embedded controllers and systems.

Most of you do know by now that Forrest Mims is publishing *Science Probe*, an amateur science magazine heavily into science education and

atmospheric research topics. Kind of a "what *Scientific American* should have become" publication. And Bill Gates has a great *Midnight Engineering* magazine zeroing in on electronic and software startups, money machines, and entrepreneurship in general. Free samples are available.

Recharger and Supplies Unlimited are a pair of magazines aimed at the laser printer repair and the toner recycling industries. While these obviously are advertiser driven (one offers poorly done technical content; the other none at all), the fact that certain Fortune 500 companies definitely do *not* want you reading either of these mags makes the entire trip worthwhile. These are

legislative session.

Finally, of course, there are now lots of on-line options for electronic labor-of-love publishing. Among the other benefits is instant world wide accessibility. Avoiding the months of delay and high costs of traditional publishing. Not to mention the rapid error correcting and direct end user "close the loop" feedback.

My favorite here is *GENie*. Partially because they pay me to say things like that. Besides my own PSRT on *GENie* where a special area has now been set aside for use by all you *Nuts & Volts* readers, you might also find all their RADIO, HOSB (home office and small

NEXT MONTH: Don previews the wondrously bizarre world of electronic surplus.

business), MAC, IBM, AMIGA, A2, ATARI and DTP (desktop publishing) RoundTables of more than passing interest. The average cost of a PSRT download is around twenty one cents. System wide, over 120,000 technical downloads are immediately available.

It never ceases to amaze me that I can press a button on *GENie* and then immediately route a "must read" ad message to scads of people. At a cost per thousand of - zero!

I have now seen the future and it is email oriented.

Two obvious competitors to *GENie* include *CompuServe* and *The Well*. But there are, of course, thousands more. Both free and fee.

The SCAR Ploy

Since sub prices vary all over the lot, I've purposely avoided giving you current subscription costs. But the typical range runs from free to \$4 to \$30 a year. I very carefully excluded anything that I'd consider too costly for what they deliver.

Please bear in mind the "labor of love" in the smaller newsletters. Most of these are struggling to say the least. Many are running at a dead loss. So, on the really tiny mags, just go ahead and flat out subscribe. Or send along five bucks cash with your request for info. And a very large pre-addressed envelope with lots of postage.

But, on any "real" magazine, there is one simple and useful ploy which is almost certain to get you at least one free copy and perhaps even a comp subscription. I call this one the SCAR

technique. Which is short for *Sample-Copy-Ad-Rates*. Call up the advertising department of the magazine and then pretend that you just might become a potential advertiser. Then just ask for a sample copy and a rate card. Almost always, you'll have an express mail copy of the publication in your hands the next day.

Another Contest

I do suspect my coverage here is grossly uneven. Especially for all the zillions of regional ham radio mags and computer user group newsletters. And, almost certainly, you'll find a dozen ads right here in *Nuts & Volts* for several labor-of-love newsletters that I've obviously missed.

So, let's have us another one of our contests. Simply tell me about any publication of any sort that (A) you happen to like, that also (B) actually delivers genuinely useful end reader info on a no-holds-barred, objective and fairly priced basis.

There will be a dozen or so of my newly revised *Incredible Secret Money Machine II* book prizes going to the best entries, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the best of all.

As usual, be sure to send all your written entries directly to me here at *Synergetics* per the end blurb, rather than to *Nuts & Volts* editorial.

If possible, get me a sample copy. Or, better yet, placed on their comp list. A few months from now, then we can do a resource bin on *your* favorite newsletters and pubs.

While you are at it, be sure to let me know which other types of topics (especially insider secret stuff) that you'd like to have appear here in *Nuts & Volts*. I'll see what I can work up on my own or pass on to others. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 27 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can call GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number six

The wondrous world of electronic surplus.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers. You'll find some superb technical downloads and lots of tutorials here.

This month, I've decided we might explore several of the obscure nooks and crannies in the bizarre world of electronic surplus.

Surplus is just "stuff left over". Very often, it is stuff left over because it is obsolete, broken, worn out, or never worked properly in the first place. Or because it just didn't sell. Sometimes, you can score honest bargains. Other times, surplus can easily become an outright ripoff.

Surplus can range from brand new and first rate materials having a full pedigree and provenance, on down to the most abjectly worthless of floor sweepings that somebody didn't want to haul to the dump.

Usually, there is not any warranty or guarantee with most surplus items. Either that the stuff works at all or is in any manner suited to your needs. And the quality of technical help you may get can vary all over the lot. But, more often than not, it will be dead wrong info.

Electronic and computer surplus is a lot of fun to play with. But the big bucks are only to be made by the lean and mean full time pros who have the contacts and know exactly what they are doing. It is super easy to grossly overvalue something, just because it

seems cheap at the time. Or to assume that some major "greater fool" market exists for your newly found treasures. And it could end up deadly to design surplus parts into any product only to have those sources forever vanish. Or to buy a zillion parts and maybe sell seventeen of them. Or to have all your shipping charges eat you alive on raw iron or other heavies.

Thus forewarned, let's take a fast survey of some of the many different sources of electronic surplus, to find out just where all of this stuff comes from. And how you could go about getting some of it on your own.

We might start with the oldest and most obvious...

Military Surplus

At one time, surplus was nearly all military. Incredible buys were the rule rather than the exception. Whole city blocks were often devoted to long gone "radio row" stores all of which featured military surplus. *Heathkit* and similar companies got their start repackaging old military electronic components into their oscilloscope kits at unheard of prices.

Surplus "command set" conversions often led to really useful ham gear for literally pennies on the dollar. One \$2

NEXT MONTH: Don details some obscure automotive electronics opportunities.

special formed a "Q-5" instant if strip for high performance homebrew ham communications gear.

My personal ventures into military surplus first took place many years ago and involved lots of dynamotor power supplies bought at sixty-five cents per. Or aircraft VHF altimeters at four bucks. And crystals at five cents each; acorn tubes at four. Oh

yeah. And bright yellow *Gibson Girl* rescue transmitters that made some really dandy (although highly illegal) college dorm AM broadcasters.

One of my first really big business failures involved converting surplus castings into decorator lamps. I have still got one or two left if you want to get in ahead of the hoarders.

The last few years, though, those military bargains weren't really there. At least not very often. The materials are typically worn out, filthy, trashed, truly obsolete, or highly specialized. Those bidding requirements, certified checks, pickup hassles, and all of the paperwork could end up awesome. And professional bidders pretty much have things down to a cut and dried process all their own.

There's also the fact that a lot of government surplus gets higraded by a triple filtering. First by the military themselves, then by states, and finally by schools. You are often at the end of a very long line.

But, with the newly emerging peace breakout, military surplus sales just may be on a sharp upswing again. So now may be the time to get back on those bidder's lists.

Getting onto any military surplus bidders list has been a major rite of passage for most electronic hackers. The process is cheap and quite simple: You write or call the *Defense Logistics Supply Agency* and ask them for their surplus sales brochure. Then you fill out a card, giving them your area and material preferences. That's all there is to it. Easy.

After that, you will receive a few bidders notices per your selections. To keep their mailing list size down, they will drop you after six or so notices if you do not actively participate. Thus, you may have to repeat your requests every few months or so.

Needless to say, you must *personally inspect anything and everything before*

ever submitting any bid. The military bidders description might sometimes say "Approximate quantity: one". And they mean just that.

Ah yes, all those \$45 jeeps. Vintage military vehicles are sometimes still offered at less than commercial prices. The only tiny gotcha is that it is illegal to drive them on any public roads, so they are cut in half with a torch before you are permitted to accept delivery. These can be great for giant bookends. But check your local zoning first.

There are also obvious restrictions on weapon systems, military aircraft, and all hazardous materials. Federal employees, or their families, or agents are not allowed to bid.

Note that there is also *non-military* government surplus. This is handled entirely differently, done through the *General Services Agency* listed under *US Government* in the white pages of your nearest large city phone book.

The process is also free and works pretty near the same way. You contact them, telling them which regions you seem interested in for what types of products. And then you are placed on the bidder lists. At least for a while.

Neither one of these agencies are involved in any way with narcs, DEA, or RICO confiscated personal items. Regardless of what all those fine print classified ads say.

Yet another source of unusual (and certainly "surplus") government stuff is the Post Office dead letter office. The main PO in every large city or the regional SCF has one or more yearly auctions in which the undeliverable, unreturnable or mystery packages are sold to the highest bidder. Usually by the hamper full.

A central post office should always end in an 00 zipcode. Several calls might be involved before you can get any straight info.

Hamfests

No, you do not have to be a radio ham to be welcome at any hamfest. Anyone can attend. The admission is often free or nominal.

A *hamfest* is an annual and often outdoor gathering of radio amateur enthusiasts. The main event is usually a high tech flea market where plenty of electronic bargains can always be found. There's also prize giveaways, with excellent odds of you winning at least something.

Besides obvious comm gear, the focus is often on military surplus, old computer boards, scanners, and older

antique radio electronics. Anything a techie could get off on can and will show up here.

One tip: Always arrive extra early, preferably well before sunup. All the best goodies really go fast.

Here in Arizona, the main hamfests are held in Tucson, Yuma, Apache Junction, Scottsdale, and Prescott. The ultimate primo biggie, though, is the Dayton Hamvention in Ohio. To tune yourself into hamfest activities, check all of the listings right here in *Nuts & Volts*, read the ham magazines, contact an amateur radio BBS, or ask around at your local radio club. The RADIO board up on *GENie* also has extensive hamfest info instantly available.

If you don't have the foggiest idea how to contact any radio ham at all, start with the search and rescue group at your local Sheriff's office.

Wholesale Surplus Sources

Much of electronic surplus today is traded by a shadowy and low profile group of highly lean and mean outfits who are collectively called *wholesale surplus distributors*. They operate by buying large lots of stuff and splitting it down into smaller lots. Virtually all the business is done by fax, and they try to turn their inventory over every twelve minutes. Their idea of long term is "outthere before lunch".

There are often very high (\$100 to \$500 line item minimums. And much of it is sold by the lot, which can be anything from 384 to 384,000 pieces. If your needs do not meet those precise quantities available, tough luck.

Typical wholesale prices can be two cents for a light emitting diode or a nickel for most jelly bean integrated circuits. On the other hand, if some very critical component gets scarce or suddenly has longer delivery times, they might charge you several times list and then some. Any production manager will gladly pay ten bucks for a nickel part if it is the only barrier item standing between his products and the shipping dock.

Your first and foremost rule when dealing with any of these people is *no screwing around*. You can expect *zero* handholding or technical assistance. The assumption is made that you do know exactly what you ordered and precisely what you are getting into. You fax them and tell them what you want. If they have it, you buy it. Right now. Period.

I've listed a few wholesale surplus distributors in the first of our two

new from DON LANCASTER

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Book-on-Demand Resource Kit	\$39.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
GENie PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
PostScript Secrets Brochure	FREE
Hacking Secrets Brochure	FREE

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A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. \$29.50

FREE SAMPLES

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FREE VOICE HELPLINE VISA/MC

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Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

sidebars. While I double checked this list just before our column deadline, you'll find that these firms come and go with astonishing speed. And some of them can be rather picky over who they allow for customers.

A few of these wholesale only firms advertise regularly in the *Electronic News* and the *Electronic Buyer's News* trade journals. Both of these are free to qualified requests. Otherwise, these outfits may be hard to find.

SOME WHOLESALE SURPLUS DISTRIBUTORS

Ace Electronics

3210 Antoine
Houston, TX 77092
(713) 688-8114

ACP Components

1317 East Edinger
Santa Ana CA 92705
(714) 558-8822

All Components

5999 Summerside Pl #208
Dallas, TX 75252
(800) 334-4637

Am Design Components

Box 2601
Secaucus, NJ 07094
(800) 776-3800

Braniff Industries

91 South Ottawa
Dixon, IL 61021
(815) 288-4500

Calcera

PO Box 489
Belmont, CA 94002
(800) 257-5549

Derf Electronics

1 Biehn Street
New Rochelle, NY 10801
(800) 431-2912

H&R Enterprises

21521 Blythe Street
Canoga Park, CA 91304
(818) 703-8892

Japan Electronics

15138 Valley Blvd
City of Industry, CA 91744
(818) 369-5000

J&C Electronics

Box 630
Salem, MA 01970
(800) 447-7014

Leo Electronics

22353 S Western Ave #201
Torrance, CA 90501
(310) 212-6133

LJ Enterprises

2377 Yorktown Street
Oceanside, NY 11572
(516) 766-2304

Micro-C

11085 Sorrento Valley Court
San Diego, CA 92121
(619) 552-1213

New England Circuit Sales

292 Cabot Street
Beverly, MA 01915
(800) 922-NECS

Search Electronics

228 East Atara
Monrovia, CA 91016
(818) 359-3350

Southwest Memory

3330 Earhart, Ste 213
Carrollton, Texas 75006
(214) 484-1595

Surplus Traders

Winters Lane Box 276
Alburt, VT 05440
(514) 739-9328

World Wide

18 Stern Avenue
Springfield, NJ 07081
(800) 222-6268

Some Personal Favorites

Naturally, you'll find hundreds of ads for lots of small quantity surplus electronics right here in *Nuts & Volts*. And we would hope this would be your best place to start.

Over the years, though, I've found a few sources that clearly and obviously stand out above the crowd. Here's a few favorites that I have often used and personally recommend...

The first and foremost, of course, is *JerryCo*, who have recently renamed themselves as *American Science and Surplus*. If your entire universe were reduced to only one surplus store, this would clearly be it. In fact, the entire industry should now get calibrated in *JerryCo* units. An exceptionally good store might be 0.02 of a *JerryCo*, a poor one 0.0015, and so on.

While not very strong in electronic components, their coverage of optics, small motors, materials, and weird gizmos that cry "use me" is genuinely exceptional.

The most obvious surplus house is *Edmund Scientific*, who have long been the ad leader in optics and scientific stuff. They are also very big in small motors, magnets, and compasses.

Still at their same old stall after all these years is *Fair Radio Sales*. They remain by far the leading place to go for any and all of the genuine military

surplus electronics. Clear on back to WWII vintage. Transmitters, receivers, test gear, antennas, meters, and even electromechanical items are usually featured in their free flyers.

For any "big mutha" raw iron, my favorite remains *C&H sales*. Although the *Burden's Surplus Center* is certainly a useful second choice. Both outfits specialize in medium through larger hydraulics, generators, pneumatics, strange servos, and motors. Their free catalogs are essential if you are at all thinking of going into robotics.

While I've often felt their prices a tad high, *Herbach and Rademan* tend to offer a quality assembly of unusual electronics gear. Their infrared people detectors for only \$12 seem to be a genuine bargain.

Ultra cheapo parts have long been offered by *B & F Sales*, who seem to have cut way back on their fat and free catalogs, but are still in business at their old location. Speakers and radio chassis assemblies are typical listings. Plus bunches more.

As a good example of a wholesale surplus distributor who sometimes sells retail, my first choice is Marvin Bierbaum of *Surplus Traders*. He offers outstanding large quantity pricing on everything from wall power supplies to solar panels to laser printers to VCR front ends. Free catalogs are offered, as are co-op mailings in which you

can advertise your own products.

While not really surplus, I would have to include *Archie McPhee* here.

They are the world's preeminent supplier of rubber iguanas and are a "must have" for any serious catalog collector. No *Nuts & Volts* reader can possibly afford to be without Archie's free catalog.

Attention K-Mart Shoppers

While not nearly as common (or as profitable) as they once were, you'll still find a scant few retail electronic surplus stores scrounging around the marginal neighborhoods in larger cities. Many of these regional stores flat out can not afford to send any catalogs to non-buyers. With others, their stock moves too fast or is too weird, in too small lots, or too cheap to properly itemize.

Yet others don't have the slightest idea what they've got in stock. And there is some sort of a continuum from "real stores" on down (way... on down) to rusting junk piles in an otherwise overgrown empty lot.

For instance, I'd guess there are about twenty or so regional electronic surplus stores here in Arizona, with the lion's share of these in or around Phoenix. The most well known one is *Apache Reclamation & Electronics*, that started out as a *Honeywell* sponsored self-help ghetto improvement project. These days, there's still tons of stock and great prices here, but the quality is down markedly and some of the stuff is clearly getting rather long in the tooth. Sigh.

To find these unadvertised regional surplus stores, start with the yellow pages of your largest city. Don't be surprised if half of them are closed, have strange hours or are simply not there. The other obvious ways to pin down these stores are all your local computer clubs and the regional BBS systems. Plus, of course, those same amateur radio resources that got you to the hamfests.

My Ultimate And Top Secret Surplus Source

I have recently discovered several absolutely incredible places to go for my surplus electronic and computer goodies. At totally astonishing prices. Very sadly, many community colleges are either eliminating their electronics programs outright, or else are sharply cutting way back on them. Typical schools now have surplus materials auctions open to the public and held

once a year or more.

The big secret: The outlying schools (those a two hour's drive from any large city) will often end up literally giving the stuff away. Mostly because all their auctions are not advertised heavily. And because the few locals that do manage to attend are flat out broke. Or don't know tech values.

There is also the minor fact that these sales are sometimes held in a furnace room between 2:13 AM and 2:46 AM on a Tuesday morning. With twenty milliseconds advance notice sent only to four long time friends of the auctioneer.

Some examples: A \$35,000 theater lighting system has sold for eighteen dollars. An almost new \$1800 printed circuit benchtop etcher for twelve. An antique gas pump for twenty. Clean *Selectric* typewriters for five. A mint tube caddy chock full of new vacuum tubes for ten. A *Tektronix* scope cart for twelve. An entire dino mainframe computer for \$3.50.

On the other hand, if the popular *perceived value* of whatever is getting dumped ends up too high, you could get ripped off badly. After a spirited bidding, worn out lathes and older broken personal computers often go for ten times what any sane person would pay for them.

With many of these auctions, your personal checks are accepted and advanced registration isn't needed.

To tune yourself into these types of school auctions, Get a list of *all* the community colleges in your state and figure out which ones are not in a high tech and big bucks locale. Then call the school's public information office and find out when and where these events are held.

Industrial Auctions

Major sources of electronic surplus include *industrial auctions*. Some of these involve bankruptcies. Others are perfectly healthy firms using auctions for their routine ongoing and orderly disposal of excess materials.

Now, down in Silicon Valley, you just pick any local paper and you will have a long list of industrial auctions to select from. The real biggies will advertise in *Electronic Buyer's News* or even *The Wall Street Journal*.

But it may not be obvious who is auctioning what to whom in your part of the country. And it probably didn't occur to them that you might want an invitation.

One obvious ploy is to find all the

OTHER MENTIONED RESOURCES

American Sci & Surp

601 Linden Place
Evanston, IL 60202
(708) 475-8440

Apache Reclamation

313 West Apache
Phoenix, AZ 85003
(602) 254-0613

BNF Enterprises

119 Foster Street
Peabody, MA 01961
(508) 531-5774

Burdens Surplus Center

PO Box 82209
Lincoln, NE 68501
(800) 488-3407

C&H Sales

PO Box 5356
Pasadena, CA 91107
(800) 325-9465

Defense Logistics Agency

PO Box 1370
Battle Creek, MI 49016
(616) 961-4000

Edmund Sceintific

101 East Gloucester Pike
Barrington, NJ 08007
(609) 573-6250

Electronic Buyer's News

600 Community Drive
Manhasset, NY 11030
(516) 562-5000

Electronic News

Box 1051
Southeastern, PA 19398
(215) 630-0951

Fair Radio Sales

PO Box 1105
Lima, OH 45802
(419) 227-6573

GENie

401 N Washington Street
Rockville, MD 20850
(800) 638-9636

GSA Personal Property

Box 25506 DFC B41 R223
Denver, CO 80225
(303) 979-0361

Herbach & Rademan

401 East Erie Avenue
Philadelphia, PA 19134
(215) 426-1700

Archie McPhee

PO Box 30852
Seattle, WA 98103
(206) 547-2467

Nuts & Volts

430 Princeland Court
Corona, CA 91719
(714) 632-7721

Synergetics

Box 809
Thatcher, AZ 85552
(520) 428-4073

Used Equipment Directory

1100 Superior Avenue
Cleveland, OH 44144
(216) 696-7000

Wall Street Journal

420 Lexington Ave, 14th Fl
New York City, NY 10170
(212) 808-6960

names of all those auction houses and the contract auctioneers in your area. Then call them all and tell them you do want to be notified of upcoming events. Or otherwise find out where and how they advertise.

Now, there positively *must* be some really great auctioneer's insider trade journals, bidder's magazines, or odd newsletters which cover this sort of thing. Sadly, I just don't know about them. With the single exception of Penton's *Used Equipment Directory*, which is mostly into heavy machine shop stuff. Sorry about that.

But, why don't you tell me instead?

For the first of this month's two contests, just tell me about any insider publication that compiles national or regional industrial auctions. If you can, send along a sample copy or get me on their mailing list.

A Second Contest

On second thought, let's extend this to make it even easier. Just tell me about *any* surplus resource I don't know about that may be of interest to all *Nuts & Volts* readers. Electronic or otherwise. Or else, give me some *specific* GSA or other local auction information for your home turf. There will be a dozen of my newly revised *Incredible Secret Money Machine II* book prizes going to the best, along with an all expense paid (FOB Thatcher, AZ)

tinaja quest for two going to the best.

Be sure to send all of your written entries directly to me at *Synergetics* per the end blurb, rather than to *Nuts & Volts* editorial.

As usual, we've gathered our *Names & Numbers* together into a pair of sidebars. One specifically lists those wholesale surplus sources, and the other lists most everything else I've mentioned. Be sure to check out these sidebars before you contact our voice helpline for further technical help.

Oh yes. One last chance and utterly stupendous surplus offer: What am I bid for a surplus DEC *Micro PDP-11*? More or less all there.

Approximate quantity one. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 27 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can call GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number seven

Unique opportunities in auto electronics.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers. You'll find some superb technical downloads and lots of tutorials here.

Are you on a first paw basis with your local junkyard dog? Have you ever shared a bowl of *Purina* together? Or woofed over the aerobic exercise potential of *Felis Domesticus*? Like that striped orange one that is sitting over there on that pile of wheel rims?

Automotive electronics can be a mixed bag. On one hand, much of it is primitive and specialized. Additional portions are supersecret, overpriced, and poorly documented. On the other, there's all this great *stuff* just sitting there crying to be used. Some of it at giveaway prices. Or better.

Just how can you get started using, enjoying, and recycling automotive electronics? We might begin by...

Starting with the obvious

Many used auto components offer outstanding robotics potential. Most especially for the luxury car add-ons and similar auto "peripherals". Those electric fuel pumps could make great fountains, while a typical windshield washer driver produces an incredible range for smaller liquid volumes.

Most auto relays are cheap, rugged, reliable, and have quite high current ratings. Some will offer latching and blinking; others can provide variable speed options. And all those auxiliary

motors on such accessories as power antennas, seat adjustment, tracking mirrors, cooling fans, locks, or even the power windows are crying to be applied to new uses. Miniature linear stepping motors are often a part of idle adjusters. Surely all the possible uses for fuel injectors haven't yet been thunk up.

And, of course, most auto radios are far more rugged, better shielded, and offer much better AM sensitivity than home versions.

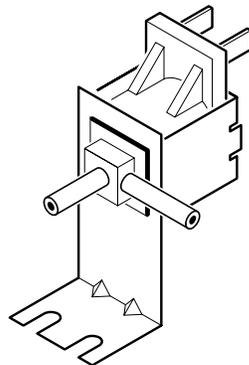
Step number one is to get some permission to wander around your local junkyard. And paying particular attention to older and more common stuff that obviously is not in current demand. Ask not what the parts are really intended for. Instead, ask what mechanical or electrical function they are actually performing deep down inside. Then, use or abuse per your own needs.

Certainly the *least* asked-for parts in any junkyard are those...

TCS and SCS electronic valves

Despite my shouting it from the rafters for two decades now, there is one auto electronics component that *still* goes begging. Would you believe a three-way pneumatic air valve for a quarter each?

Here's what a typical one of these dudes looks like...



When de-energized, that straight front pipe connects to a filtered vent to ambient out the rear. When 12 volts is applied, those two front pipes are connected together and the ambient vent is blocked. While intended for vacuum uses, you can apply positive pressures on up into the 10 PSI range without any cracking problems. Yes, liquids can also be handled simply by glopping over the vent. Especially as an automated barkeep.

Around 150 mils of coil current is needed at +12 volts DC. While most any old transistor will do, my favorite driver for these still remains the octal *Sprague/Allegro* ULN2813. Be certain to provide an anti-spiking diode across your coil if your driver is unprotected from transients.

These were originally known as *Transmission Controlled Spark* (TCS) or *Speed Controlled Spark* (SCS) valves. In their intended emission control uses, a spark advance was not permitted at lower speeds or in lower gears.

The original manufacturer was *Carter Carburetor*, now renamed *Carter Automotive*. These valves (and all their newer versions) come and go in all of the surplus catalogs, with *C&H Sales* currently listing their item #SV7904 for \$2.95 in singles. *American Science and Surplus* and *Edmund Scientific* often listed the valves for as little as \$25 per hundred. *That's a quarter each!*

Low pressure pneumatics in the 4-6 PSI range has yet to take off. Yet this offers absolutely outstanding hacker potential. Among other things, air "amplifies" in that the power comes from the air source, not directly from the actuator control signal itself. Air is great for acting through a distance, especially around robotic elbows or in hazardous areas. And an air actuator is ridiculously more linear, lots cooler, and vastly more powerful than most smaller solenoids. Besides being far cheaper. And easy to hack.

You could use any larger aquarium pump (or even a truck tire) for your air source, and a hollow toilet bowl float as an air accumulator. Add a \$6 regulator from any of a number of *Nuts & Volts* advertisers. One tip: You should have the best luck with your actuators by following this rule: *Never have a low pressure air seal that moves!* If your seal is good, it robs you of all your power. If not, it robs you of all of your air. Either way, you will lose. Instead, use flexible actuators such as bellows or balloon-style inflators.

Any time you must have a static seal, the plain old O-rings from *Small Parts* are hard to beat. Unless you try to freeze a badly underdesigned and misapplied one on a rocket.

A second obvious tip: There's a big and very crucial difference between pneumatic and electronic circuits. If you try using a "SPST" or a *two-way* valve with pneumatics, you'll extend your actuator all right. But it will *stay* extended, because of all the air that stays stuck in the pipe. All dressed up and nowhere to go.

Instead, you have to use a SPDT or a *three-way* air valve. To extend your actuator, you will power your valve, connecting actuator to air source and accumulator. To retard your actuator, you turn the valve off, connecting the actuator to ambient air and flushing any remaining air pressure.

One good source of traditional (but costly) miniature air components is *Clippard Minimatic*, while one bellows source would be *Bellofram*. But your actuators are easily done using found or homemade materials. Start off with those kiddie "push the button" water toys from a yard sale. These contain really fine bellows actuators. A good source for hoses and sheet rubber for custom pneumatic parts is *Hygenic Manufacturing*. Two lower cost fitting sources are *Ark-Plas* and *Value*.

The BA1404

Sometimes, a brand new and first run automotive electronics device can be reapplied to totally different uses and solve otherwise thorny problems.

The word is finally getting out that the majority of today's FM wireless broadcaster kits and systems flat out no longer work. The problem is that nearly all premium home and auto FM receivers are fully synthesized and now *demand* precisely on-channel and super stable input frequencies. While any old FM broadcaster kit will work just fine with a \$4 FM receiver having

analog AFC, it definitely won't work with a \$400 digitally synthesized one. Because of serious drift problems.

Enter a stupendous chip and two wondrously hackable products. The magic chip is called the *Rohm BA1404*. This is a low cost and low power high quality FM stereo broadcaster. When combined with its crystal stabilized stereo pilot *and* a crystal stabilized FM carrier, the BA1404 can provide a very high quality and a locked-to-channel miniature broadcast source. One that is easily handled by most any modern synthesized receiver.

The two hackable products are the *Pioneer CD-FM-1*, and the *Sony XA7A*. These are widely available at most audio stores, with pricing in the \$10 (clearance) to \$55 (list) range. Both of these intended to let you conveniently connect a CD audio player into your car audio system. To use them, you simply disconnect your antenna from the radio, plug your module in, and then reconnect your antenna. The FM stereo audio from your CD player now magically appears on some lower FM broadcast frequency.

Although I like the Pioneer unit much better, either of these will hack beautifully into a stable and precisely on-channel FM stereo limited range broadcaster. Something that *none* of the earlier kits or low end products can offer. Additional details on these (including full schematics) appears in my files #414 HACK52.TXT and #415 HACK52.PS on *GENie* PSRT.

Abusing car alternators for fun and for profit

Auto alternators are often available in junkyards for as little as \$5 if you don't need any specific model or the matching regulator that goes with it. Usually included are six high current and low voltage power diodes.

Your obvious thing to try with an alternator is to rewind it into a 110 volt power generator. Which is most definitely feasible, giving you an ac generator up in the 500 to 1000 watt range. But note that constant input speed will be needed for a stable 60 Hertz output frequency.

More details on practical alternator rewinding appear in several low cost info books and booklets from *Lindsay Publications*, while *J.C. Whitney* offers various alternator modification kits. One crucial hint: The brushes on an alternator's slip rings will "explode" if you are not extra careful during your disassembly. In each brush holder is a

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Hardware Hacker II or III	\$24.50
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GENie PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
Whole works (all PostScript)	\$350.00
PostScript Secrets Brochure	FREE
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SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

tiny hole that accepts a toothpick or a small wire. This can safely lock your brushes in place. You then pull your toothpick or wire off after assembly is complete. Watch this detail.

SOME AUTOMOTIVE ELECTRONICS RESOURCES

American Sci & Surplus

601 Linden Place
Evanston, IL 60202
(708) 475-8440

Analog Devices

One Technology Way
Norwood, MA 02062
(617) 329-4700

Ark-Plas Products

Highway 178 North
Flippin, AR 72634
(501) 453-2343

Automotive Electronics

7 East 12th Street
New York, NY 10003
(212) 741-4184

Automotive Industries

PO Box 2056
Radnor, PA 19080
(215) 964-4876

Bellofram

30 Blanchard Road
Burlington, MA 01803
(617) 272-2100

C & H Sales

PO Box 5356
Pasadena, CA 91107
(800) 325-9465

Carter Automotive

9666 Olive Road
St. Louis, MO 63132
(800) 325-4664

Clippard Minimatic

7390 Colerain Road
Cincinnati, OH 45239
(513) 521-4261

Edmund Scientific

101 East Gloucester Pike
Barrington, NJ 08007
(609) 573-6250

Electronic Comp. News

One Chilton Way
Radnor, PA 19089
(215) 964-4345

Electronic Products

645 Stewart Avenue
Garden City, NY 11530
(516) 227-1300

GENie

401 N Washington Street
Rockville, MD 20850
(800) 638-9636

Hygenic Manufacturing

1245 Home Avenue
Akron, OH 44310
(216) 633-8460

Lindsay Publications

PO Box 538
Bradley, IL 60915
(815) 935-5353

Motion Control

800 Roosevelt Road E-408
Glen Ellyn, IL 60137
(708) 469-3373

National Semiconductor

475 Ellis Street
Mountain View, CA 94043
(800) 632-3531

Pioneer Electronics

PO Box 1720
Long Beach, CA 90801
(213) 835-6177

Rohm Corporation

PO Box 19681-631
Irvine, CA 92713
(714) 855-0819

SAE

400 Commonwealth Drive
Warrendale, PA 15096
(412) 776-4841

SGS-Thomson

1000 East Bell Road
Phoenix, AZ 85022
(602) 867-6259

Small Parts

PO Box 4650
Miami Lakes, FL 33014
(305) 557-8222

Sony of America

9 West 57th Street
New York, NY 10019
(212) 371-5800

Sprague/Allegro

70 Pembroke Road
Concord, NH 03301
(603) 224-1961

Synergetics

PO Box 809
Thatcher, AZ 85552
(520) 428-4073

Tektronix

PO Box 500
Beaverton, OR 97077
(800) 835-9433

Texas Instruments

PO Box 809066
Dallas, TX 75380
(800) 336-5236

Uhlricht's Dictionary

1180 Americas Avenue
New York, NY 10016
(212) 916-1600

Value Plastics

3350 Eastbrook Drive
Ft. Collins, CO 80525
(303) 233-8306

JC Whitney

1917-19 Archer Avenue
Chicago, IL 60680
(312) 431-6102

Most of your larger stepper motors can end up horrendously expensive. Particularly those big sizes you might need to drive a milling machine or a sign router. Could an alternator be converted into a giant stepper motor? The answer is yes, the alternators are fairly easily converted into large size steppers. No, the final performance will not end up remotely as good as a comparable sized stepper.

But at junkyard prices, who cares? I have watched several videos of some incredible sign routers built up from junk alternators.

The trick is to remove the diodes and bring out the center of the wye connection of those three alternator stator windings. This gives you three separate stator windings that you can

use to create a three-phase stepper motor. By powering ABC you will step in one direction; use ACB for the other. The rotor and the slip rings are separately used as a rotating power electromagnet.

For best results, you may want to rewind your alternator, providing more turns per slot and having each phase bridge only one slot. Ampere turns are the name of the game here. More info on alternators as steppers appears in files #284 HACK44.TXT and #285 HACK44.PS on GENie PSRT.

Switched reluctance drives?

Innovations in power electronics all do seem to come from foreign sources these days. For several years now, Japan has had air conditioners that

are ridiculously more efficient than ours. And far more comfortable. Key secrets to their 16.0 and higher SEER ratings include variable speed scroll compressors, their variable speed air handling, and fuzzy logic multi-zone controllers.

But the really big rage sweeping the rest of the world (especially Europe) are the *switched reluctance drive motors*. The switched reluctance drive is the heir apparent replacement for the low cost single phase ac induction motor, offering fully adjustable speeds, easy reversibility, and better higher energy efficiency. All in an actually cheaper mechanical design.

A plain old car alternator can be converted into a "sort of" switched reluctance drive simply by providing some driver smarts and a few Hall Effect speed and position sensors. The details are pretty much the same as when stepping, except you now have reversibility and will often tend to run continuously, instead of cogging in discrete incremental steps.

More on switched reluctance drives appeared in the February 1992 issue of *Motion Control*, on pages 50-53.

Automotive electronics chips

There are quite a few automotive trade journals. Two of these include *Automotive Electronics* and *Automotive Industries*. The latter has a really great directory in their June 92 issue, and does include lots of the electronic chip manufacturers. Auto-oriented chips also do tend to appear in all the usual electronic trade journals.

Electronic Components News or else *Electronic Products* are useful choices. Most other auto trade journals can be found through the *Uhlrichts Periodicals Dictionary* at your local library.

Sprague/Allegro has long offered lots of interesting auto-oriented circuits. Their ULN2429 liquid level chip is one example, as are all their various Hall Effect devices applied in and around electronic ignition boards. *National* is yet another source of auto liquid level integrated circuits.

Analog Devices seems to be newly making noises at Detroit. Their new AD22001 is a specialized lamp sensor chip which seems to have all sorts of interesting new uses. While intended to spot burned out taillights, these are basically comparators so sensitive that millivolts of drop across a very short printed circuit run can be used as a current sensing shunt.

And their AD22180 is a precision

battery charger circuit that measures both battery voltage and temperature. It even has an input that knows when your headlights are on.

The big Detroit rage among most other semi manufacturers centers on new *high side driver* circuits. These are basically chips which will or will not deliver +12 volts on command. They are smart enough to safely protect themselves, besides detecting open, short, overload, or high temperature conditions.

The major sources include *National*, *SGS*, and *Texas Instruments*. Since the part numbers are all rapidly changing and since no clear winners are as yet emerging, just ask for their high side driver info packages.

A great freebie manual

Tektronix has been promoting their new *SDU* miniature battery operated digital storage oscilloscope. They now offer a new free *Automotive Electronic Troubleshooting Using a Digital Storage Oscilloscope* booklet.

This manual does go into the really obscure auto measurements, such as on mass flow air sensors or on those throttle air bypass valve circuits. The inherent memory of a digital scope is quite useful for recording any slower events, such as those that take place at routine engine speeds.

Digital scopes also let you record a *single cycle* of any one event sequence, rather than smearing repeated events on top of one another. They also offer "negative time" by letting you look at things that occurred *before* triggering.

A really dumb move

I am very much a Volkswagen fan, and I consider my ultra-rare 4WD (!) Syncho van to be one of the greatest vehicles anywhere ever. At least for me. Yup, a four wheel drive VW bus. But by far the stupidest thing VW ever did was try to come out with a "theft proof" car radio. Which clearly ends up as neither.

Here is how this miserable atrocity works: The tiniest glitch on your car battery and your radio blows up and needs recoded. You have only three shots of coding, any four of which are guaranteed to fail. And VW charges \$150 for a code reset. Not to mention the seven hour drive involved, since most of their dealerships are going belly up. Sigh.

I suspect the primary reason their dealerships are failing involves how badly and how permanently they are

hacking off their customers over this really dumb radio.

Naturally, this wonderful scheme in no manner prevents anyone from ripping off your radio. If they do, the radio blows up. So what? If they are an easy going car thief, they simply throw the radio away. If not, they'll come back, trash what's left of your vehicle, shoot your dog, and might even burn down your house.

Good thinking, kiddies.

NEXT MONTH: Don looks at all the insider's electronic trade journals and mags.

At any rate, there is an opportunity of sorts here to provide a bypass and repair for the most abysmally stupid example of technology run amuck I have ever seen.

Automotive books

A very good source for technical automotive books (both electronic and otherwise) is *SAE*. Who used to call themselves the *Society of Automotive Engineers*. They have both a stocking bookstore and a new free catalog of all their publications. Sadly, the prices on some of these are rather high. These titles should also be available through interlibrary loan or similar sources.

The other day, I got one of the usual "lots more miles per gallon" inventor helpline calls who was having trouble selling his device to either "Detroit" or (get this) to the EPA. The fact that he never even heard of the *SAE* or any of the automotive trade journals or any scholarly pubs just might have been a minor cause for some of his problems.

Another good source for auto books is *Chilton*. You contact the *Automotive Industries* address in the sidebar for a complete catalog.

A documentation center

I get hundreds of helpline requests for all of the insider "secret" codes for auto diagnostics and emission EPROM listings. Obviously, manufacturers do not like this type of material getting out to their end users.

So, your availability ranges from the difficult to the impossible. There are also severe EPA penalties for any tampering with any emission control device. Particularly on someone else's vehicle. Yes, even if your tampering significantly *reduces* all of your auto emissions and *improves* your city gas

mileage, the EPA will *still* stake you to the nearest anthill.

What is really needed is one single book or one single BBS service that offers immediate and total availability of *all* codes for *all* manufacturers. On a continuing update basis. Preferably as shareware or otherwise reasonably priced. This info is in demand.

This is an incredible opportunity for several someones who now have insider automotive connections. I'd be happy to offer a portion of my *GENie* PSRT as a new forum for information exchange in this area. Otherwise, the great *GENie* RADIO RoundTable just might also prove useful.

Let's have your thoughts on this.

Another resource contest

To make it as easy as possible for you to win, I will make this month's contest as unstructured as I possibly can. Simply send me *anything* that by some wild stretch of the imagination is somehow related to an automotive electronic opportunity.

The lumpier the better.

There will be a dozen of my newly republished *Incredible Secret Money Machine II* book prizes going to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

Any junkyard dogs submitted must be housebroken and include both a thirty day Purina supply and at least four spare cats.

Be sure to send all of your written entries directly to me at *Synergetics* per the end blurb, rather than to *Nuts & Volts* editorial.

As usual, we've gathered our *Names & Numbers* together into one sidebar. Be sure to check out the sidebar first before you contact our voice helpline for further technical help. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 27 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number eight

Exploring those electronic trade journals.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers. You'll find some superb technical downloads and lots of tutorials here.

I'm often asked "What is the best way to learn electronics?" I'll usually answer this one with a new question: "Do you want a well-paying job, or do you *really* want to learn electronics?"

If you simply want an electronics position with an old line Fortune 500 company, the *only* sensible route is a four to six year accredited university program that produces a magic piece of sheepskin that says BSEE or MSEE on it. Plus all of the needed advanced math courses that go with it.

Do note that nearly everyone leaves engineering and then starts up a "real" career twelve to fifteen years after they get their EE degree. Sadly, all the so-called "engineering shortages" trumped up every five years or so are nothing but carefully orchestrated outright lies.

Hey - Before you panic, I am a fully degreed and extensively experienced electronics engineer and I am very proud of the fact. And of my track record. I've also made it very much my lifetime commitment, and would not change for the world. It's just that the reality of today's workplace often makes electronic engineering a short term and a largely dead end career.

And it is a severe disservice to tell young people otherwise.

Unless, and this is a humongously big *unless*, you happened to be born with a soldering iron in your cradle. And are forever willing to eat, live, and breathe electronics and computer hardware/software on a total lifestyle basis. Which, of course, means forever forgoing such utter frivolities as food, clothing, and shelter.

It also helps bunches if you were an undersized or underage wimp who was terrified of girls as a teenager. When even the nerds were constantly stuffing you into trash barrels. The jocks didn't even bother. And gym classes were a stark raving horror.

I strongly feel that trade schools or BSEET degrees are less than a good choice. Most traditional companies tend to draw enormous distinctions between engineers and technicians. Technicians are definitely second rate galley slaves. At least they get treated as such in some corporations.

Very real and very ugly barriers to advancement exist that can mean at least a quarter of a million dollars of lifetime income and benefits. Not to

NEXT MONTH: Don gives us an insider's look at the great PostScript language.

mention a real desk. And chrome trim on your chair. For some individuals at least a part of the time, technician level training can be a sucker bet that should be studiously avoided. In the final analysis, the cost/benefit ratio simply may not be there.

Also note that bunches of excellent electronic and computer products are produced in garages by nondegreed folks who have largely undermined the need for formal training and three piece suits. A university degree of *any* type is not nearly as important as it was a decade or more back. *So long* as

you focus on very small, unstructured, and nontraditional companies.

What is important is *knowing what you're doing and consistently delivering positive and out-the-door results.* On the other hand, it definitely takes a few years in a larger company to learn the way the world works. And, Catch 22, chicken and egg, you can't get into the larger company without first earning that magic sheepskin.

Very sadly, many of the traditional opportunities to learn electronics on your own are not nearly as useful as they once seemed. Some high schools have absolutely no electronics courses available. Many community colleges are dropping or scaling back on their offerings. But if you can sign up for any good high school or community college courses, by all means do so.

The military is one obvious place to pick up direct electronics training and benefits which can lead you to more technical education. But that sure as hell ain't me, so I won't comment any further on this apparent resource.

Scrounging around surplus stores, scoring junk, taking it apart and then rebuilding it remains a great way to first learn electronics. Especially when combined with kits from *Nuts & Volts* advertisers and similar sources.

Heathkit recently dropped many of their kits. But they apparently still continue their educational electronics courses. These are very well done and are quite reasonably priced for what they do deliver. The offerings are an all around good deal.

Heath does have several different catalogs. You have to specifically ask for their industrial education one to get course and self-study info.

Today, ham radio remains the most ethereal shadow of what it once was. But your local ham club can still be a good place to pick up electronic basics and lots of hands-on experience. An important book in your electronics

library should definitely be the *Radio Amateur's Handbook*.

I am also laboring under the grave delusion that my *CMOS Cookbook*, *TTL Cookbook*, and *Incredible Secret Money Machine II* should all be an important part of any electronics library.

Computer clubs could also be a big help. But make certain you associate yourself with hackers rather than end user groups. Hackers in that original definition of the term, of course. As creative individuals who'll push the envelope and challenge the limits. On a total lifestyle basis.

I seem to be ending up associated with a group of loosely knit ventures which are starting to look more and more like some medieval guild. Lone artisans who interact and interdepend upon each other. While totally sharing experiences. Which leads me to think that the classic apprenticeship might once again become a superb way to learn electronics.

So, it might be a darn good idea to try and set up a student-mentor or apprentice-guru relationship with an appropriate engineer, teacher, or a science type in your neighborhood. More bluntly, you have to bug the hell out of them. At the very least, you should be able to score some older klunker oscilloscope with this ploy.

Or get rid of one.

Electronics can no longer stand on its own. These days, you absolutely *must* mix electronics with computer hardware and software. There is no point whatsoever in learning one of these without the other.

The newsstand electronic mags are a great way to pick up the electronic fundamentals. Besides *Nuts & Volts*, I can personally recommend lots of others. Such as *Electronics Now (RE)*, *Popular Electronics*, *Circuit Cellar Ink*, *Elector Electronics*, *Science Probe* and *Audio Amateur*. Also check out an incredible British pub called *Wireless World*. It is one of the finest electronics magazine anywhere ever.

Electronic BBS sources are getting more and more important for picking up electronic information and gaining valuable networking contacts. While I hope you find my very own PSRT on *GENIE* useful, be sure to check into *GENIE's* RADIO RoundTable.

To quickly research any electronic, scientific, or computer topic, you use the *Dialog Information Service*.

Dialog has recently offered a new and one-quarter cost late evening rate price structure.

But the best way...

OK. By far your two best and most cost effective ways to really learn any electronics today is a combination of hands-on personal experience and the aggressive use of all of those free *trade journals* as information gateways.

It never ceases to amaze me how many people have never even heard of trade journals. Let alone use them. Trade journals are only available to insiders in a tightly targeted industry.

They never appear on newsstands and only rarely advertise. They are strongly advertiser driven, since most subscriptions are free. Besides their technical content, trade journals lead you to bingo card ad responses, data manuals, ap notes, samples, seminar info, specialty bookstores, contacts, catalogs, employment ads, directories, courses, and great heaping bunches more. Most importantly, the trade journals also establish the mainstream vibes and lingo for their target area.

To qualify for a free trade journal subscription, you must already be in industry. Or else you have to set up your own electronics venture. As my new *Incredible Secret Money Machine II* shows you, this can get set up in a few minutes for a few dollars. Most trade journals have to be rather fussy over just who their comp subscribers are so they can qualify for a special and very cheap *controlled circulation* postal rate. But all that really matters in the end is whether you are genuinely interested in (and a potential buyer of) all their advertiser's products.

You can pick up some trade journal subscription qualification cards at a larger technical library. Or ask for them over the phone or by way of a new PostScript laser printed business letterhead. Or, you can contact their advertising department and request a sample copy and an ad rate card.

You then fill out their qual card, presenting yourself and your venture in as positive a light as possible. And always ask yourself "Who are their advertisers looking for in the way of customers?" Some trade journals are rather easy to qualify for; others are extremely difficult.

After you do qualify for one or two trade journals in any industry, all the others will steal your name from the original mailing lists and actually beg you to subscribe.

The best place to get a complete list of trade journals is on that reference shelf at your library. My favorite here

new from DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. **\$19.50**

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. **\$24.50** each.

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. **\$18.50**

LANCASTER CLASSICS LIBRARY

Don's best early stuff at a bargain price. Includes the CMOS Cookbook, The TTL Cookbook, Active Filter Cookbook, Micro Cookbooks I & II, newly revised Incredible Secret Money Machine II, and those Hardware Hacker II reprints. **\$119.50**

LOTS OF OTHER GOODIES

Ask the Guru I or II or III	\$24.50
Hardware Hacker II or III	\$24.50
Book-on-Demand Resource Kit	\$39.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
GENIE PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
Whole works (all PostScript)	\$350.00
PostScript Secrets Brochure	FREE
Hacking Secrets Brochure	FREE

LASERWRITER SECRETS

A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. **\$29.50**

BLATANT OPPORTUNIST I

The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. **\$18.50**

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GENIE PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Call (800) 638-9636 for connect info.

FREE VOICE HELPLINE VISA/MC

SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

is the *Uhlricht's Periodicals Dictionary*. You might also find the *International Standard Periodicals Dictionary* to be a useful resource. Last time I checked, there were some 45,000 trade journals

ELECTRONIC AND OTHER TRADE JOURNALS

Appliance

1110 Jorie Blvd CS 9019
Oak Brook, IL 60522
(708) 990-3484

Appliance Manufacturer

29100 Aurora Road #200
Solon, OH 44139
(216) 349-3060

Automatic ID News

7500 Old Oak Blvd
Cleveland, OH 44130
(216) 243-8100

Circuits Assembly

600 Harrison Street
San Francisco, CA 94107
(415) 905-2200

Computer Reseller

600 Community Drive
Manhasset, NY 11030
(516) 365-4600

Design News

44 Cook Street S210
Denver, CO 80206
(303) 388-4511

EDN

275 Washington Street
Newton, MA 02158
(617) 964-3030

EE Times

600 Community Drive
Manhasset, NY 11030
(516) 365-4600

Electronic Comp. News

One Chilton Way
Radnor, PA 19089
(215) 964-4345

Electronic Design

611 Route 46 West
Hasbrouck, NJ 07604
(201) 393-6060

EITD

2057-2 Aurora Road
Twinsburg OH 44087
(216) 425-9000

Electronic News

Box 1051
Southeastern, PA 19398
(215) 630-0951

Electronic Pack & Prod

1305 East Touhy Avenue
Des Plaines, IL 60018
(708) 635-8800

Electronic Products

645 Stewart Avenue
Garden City, NY 11530
(516) 227-1300

Electronics

1100 Superior Avenue
Cleveland, OH 44114
(216) 696-7000

Foodservice Prod. News

104 Fifth Avenue
New York, NY 10011
(212) 206-7440

HVAC Product News

400 N Michigan Avenue
Chicago, IL 60611
(312) 222-2000

ID Systems

174 Concord Street
Peterborough, NH 03458
(603) 924-9631

Identification Journal

2640 N Halsted Street
Chicago, IL 60614
(312) 528-6600

Machine Design

1100 Superior Avenue
Cleveland, OH 44114
(216) 696-7000

Measurement & Control

2994 W Liberty Avenue
Pittsburgh, PA 15216
(412) 343-9666

Microwave Journal

685 Canton Street
Norwood, MA 02062
(617) 769-9750

Microwaves & RF

611 Route 46 West
Hasbrouck, NJ 07604
(201) 393-6286

Motion

Box 6430
Orange, CA 92613
(714) 974-0200

Motion Control

800 Roosevelt Road E-408
Glen Ellyn, IL 60137
(708) 469-3373

Motor Techniques

120 S Chaparral Court #200
Anaheim, CA 92808
(714) 283-1123

New Equipment Digest

1100 Superior Avenue
Cleveland, OH 44114
(216) 696-7000

PCIM

2472 Eastman Avenue #33-34
Ventura, CA 93003
(805) 658-0933

Pollution Equipment News

8650 Babcock Blvd
Pittsburgh, PA 15237
(412) 364-5366

Powder & Bulk Solids

PO Box 640
Morris Plains, NJ 07950
(201) 292-5100

Quick Printing

1680 SW Bayshore Blvd
Port St Lucie, FL 34984
(407) 879-6666

Sensors

174 Concord Street
Peterborough, NJ 03458
(603) 924-9631

Surface Mount Technology

17730 W Peterson Road
Libertyville, IL 60048
(312) 362-8711

Textile World

29 North Wacker Drive
Chicago, IL 60606
(312) 726-2802

Trade Winners

PO Box 2868
Vancouver, WA 98668
(206) 694-1765

TypeWorld

One Technology Park Drive
Westford, MA 01886
(508) 392-2157

graphics. Electronic News tends to emphasize personalities and who is now doing what to whom, especially which CEO's are sleeping with which government contractors, and/or vice versa. While rather stuffy and old line, their classified ads offer good wholesale surplus bargains.

A second competitor is *Electronic Buyer's News*, which tends to address many issues of interest to purchasing agents in Fortune 500 firms. But, once again, the classified ads offer lots of wholesale surplus.

And the *EDN News Edition* is a "Hey look! Me too!" imitator of *E.E. Times* that tries to do all the same things in the exact same way, but it just barely misses in the attempt.

Electronic Design and EDN

These form my number two and number three choices. Two biweekly magazines that offer in-depth surveys of component parts and useful tech articles. But note that the stories are provided by their advertisers and often go out of their way to studiously ignore a competitor's solution or try to shove a point of view down your throat. As long as you factor in the "Why are you telling me this?", both magazines do offer excellent tutorials on current technology trends.

Both magazines also offer detailed annual directories of microprocessors and such, along with industry wide product listings.

Electronic Products and ECN

Both of these cut to the chase. Their emphasis is strictly on new electronic products and who builds them. The *Electronic Products* folks also produce the annual *EEM Master* multi-volume purchasing directory that covers just about everything electronic. They also publish their *IC Master*, which is a similar multi-volume directory and integrated circuits selection guide.

You can sometimes cop a free or bargain EEM Master, but pretty near everyone has to pay the going rate on the IC Master. The charges usually vary from \$130 to \$174, depending on the time of year. You can also try to get out-of-date copies.

ECN, short for *Electronic Component News* is a larger "throwaway" tabloid. It consists solely of ads for electronic parts and fake editorial material that describes the ads for these parts. Once again, the bingo cards, coupons, and phone numbers are valuable ways to zero in on mainstream components.

currently being published.

Once again, trade journals form a high energy and low cost information gateway. One that could be a very effective way to learn and improve your electronic and other skills. Let's look at a few of my favorites...

E. E. Times

This tabloid newsprint publication is by far the best US electronic trade journal. This is a really fine mix of tech news, emerging developments, component parts, and employment

surveys. Such far ranging topics as wavelets, HDTV, fuzzy logic, and new algorithms all do tend to appear here first. Really useful info.

As with most of the trade journals, there's a bingo card that leads you to data sheets, ap notes, seminar info, and even free chip samples. Plus lots of coupons and fax sheets.

There are several "big newsprint" competing offerings. The oldest is the *Electronic News*, who have recently reworked their 1948 editorial layout style into some stunningly fresh 1956

Electronics

At one time several years back, *Electronics* was the best industry trade journal. Fat issues were crammed to the gills with quite well-written and in-depth technical applications stories and detailed tutorial analysis. They literally defined the industry.

Sadly, this mag has been milked as a cash cow and got passed around from corporate takeover to corporate takeover, and is no longer even the remotest imitation of its once great self. The latest attempt is to make it an international survey magazine with an outrageously high and "paid only" subscription price. I would expect it to shortly vanish entirely. Sigh.

The Electronic Industry Telephone Directory

No, this one is not really a trade journal and it is usually very hard to get a current free copy. And it's only published annually. But I find it to be number two on my resource list, right behind by own *Synergetics Names & Numbers* files.

This looks and works like any other phone book, with the usual white and yellow pages. Just about everyone electronic is listed here.

Specialty electronic journals

All of those switching mode power supplies, motor controls, and the "big mutha" semiconductors have their own collection of trade journals. I do prefer *PCIM* the best, which once was named *PowerConversion & Intelligent Motion*. The others include *Motion*, *Motor Techniques*, *Motion Control* and *Power Techniques*.

For sensors and such, your two best selections are Carl Helmer's *Sensors* magazine, along with *Measurement and Control*. I have also found that *Pollution Equipment News* throwaway to have useful info here.

For radio frequency and higher electronic design, you might try *RF Circuit Design*, the *Microwave Journal*, *Microwaves and RF*, and *Microwave New Product Digest*.

For printed circuit manufacturing, try *Circuits Assembly*, *Surface Mount Technology*, or *Electronic Packaging & Production*.

For the bar codes and identification stuff, *Automatic ID News*, *ID Systems*, and *Identificatin Journal*.

For motors, solenoids, actuators, valves, timers, and similar goodies, try *Appliance*, *Appliance Manufacturer*,

OTHER MENTIONED RESOURCES

Audio Amateur
Box 576
Peterborough, NH 03458
(603) 924-9464

Circuit Cellar Ink
4 Park Street Ste 20
Vernon, CT 06066
(203) 875-2751

Elector Electronics
PO Box 876
Peterborough, NH 03458
(603) 924-9464

Electronics Now
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-3000

GENie
401 N Washington Street
Rockville, MD 20850
(800) 638-9636

HeathKit
PO Box 1288
Benton Harbor, MI 49022
(616) 982-3200

IC Master
645 Stewart Avenue
Garden City, NY 11530
(516) 227-1300

Nuts & Volts
430 Princeland Court
Corona, CA 91719
(714) 632-7721

Popular Electronics
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-3000

Radio Amateur's Handbook
225 Main Street
Newington, CT 06111
(203) 666-1541

Science Probe
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-0467

Uhlricht's Dictionary
1180 Americas Avenue
New York, NY 10016
(212) 916-1600

and *Appliance New Product Digest*.

For really great insider prices on lots of computer products, *Computer Reseller* or *Trade Winners*.

The other stuff

My favorite three of the mechanical design magazines are *Design News*, *Machine Design*, and *New Equipment Digest*. The latter includes lots of free sample offerings.

I do personally subscribe to several hundred trade journals that range the gamut from *Powder and Bulk Solids* to *Fire Engineering* on to *Quick Printing* to *HVAC News* to *TypeWorld* to *Textile World* to *Foodservice Product News*.

That last gem is the world's greatest diet magazine - you just read it before every meal. And try to second guess whether the glop in the bottle is a new dessert topping or an EPA approved grease trap clarifier. This is also the home for all of the world's dumbest blueberry recipes.

By now, you should get the general idea. Industry trade journals are an unbelievably outstanding good deal when properly used as an information gateway. And they are a very good means to learn or later improve your electronics and other skills. For more listings on more trade journals, go to *Uhlricht's* at your local library.

Always keep all your qualification requests fully professional. Never look like a student or a lone individual!

Two contests

Let's have us two different contests for this month. Just tell what you feel are the seven most important books for learning electronics. If the cover isn't broken on your fifth personal

copy, don't even bother to mention it. And tell me *why* you feel each of the books is essential.

Or else tell me about any obscure trade journal in any off-the-wall field that I have not yet heard about and do not already subscribe to. Better yet, send me an actual copy of the trade journal. Or at least a qual card or a copy of the masthead page.

There will be a dozen of my newly republished *Incredible Secret Money Machine II* book prizes going to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

Be sure to send all of your written entries directly to me at *Synergetics* per the end blurb, rather than to *Nuts & Volts* editorial.

I have put our *Names & Numbers* together into a pair of sidebars, one for trade journals, and another one for everything else. Be sure to check out these sidebars first before you contact our voice helpline for further info. ♦

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Don Lancaster's

RESOURCE BIN

number nine

Exploring PostScript for fun and profit.

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An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers.

If you are a really serious hardware hacker, what do you genuinely need for computers and software? A word processor for sure. But what else?

Let's see. You would want to make up your own printed circuit boards and artwork. You'd want schematics, as well as figures in both isometric and perspective. Charts and graphs would be handy, as would a universal and totally general purpose language to do *all* of your engineering design. A method to publish projects, memos, flowcharts, manuals, newsletters, tech illustrations, and proposals.

CAD/CAM for drawings. Analysis for circuits, physics and mechanical stuff. Some dialplates, overlays, and templates. Fast and convenient ways to explore math concepts, including statistics, fractals, wavelets, and even image processing.

Well, I personally do *all* of this and great heaping bunches more by using nothing but *AppleWriter* and its *WPL* scripting supervisor on my *Apple IIe*. And that is the *only* software package and the *only* computer I use for *all* my engineering design, consulting, books, and columns.

Well, I will admit that there is this little black box (actually it is usually ivory or beige) that's sort of connected to my *IIe* that does help things along a teeny bit. I think of it as...

The Hacker's Universal Coprocessing Computer

This handy little add-on box has a 68030, 8 Meg of memory, and its own SCSI hard drive on it. And I've found it to be a fine "Mother's little helper" for the 65C02 in my *IIe*. Sort of like an all-silicon *Au pair* girl.

The *Hacker's Universal Coprocessing Computer* is what I call it. Say HUCC for short. The HUCC is programmed with a magic hacker's language that is faster and friendlier than Basic, far more object oriented than C++, and better at lists and strings than LISP. A downright addictive language, in fact. You simply create plain old textfiles that quickly and conveniently can tell your HUCC what to do. The general purpose language inside a HUCC then does what you tell it to, recording its results to hard disk, or else returning them to you for a host recording. A number of different comm channels of varying speeds are provided.

Oh yeah. Almost forgot. As a very minor and an almost inconsequential afterthought, the HUCC is also able to dirty up any otherwise clean sheets of paper. There is this *printer* built in that prints really outstanding artwork for everything from direct toner printed circuits to business cards to T-shirts.

A HUCC is fully *device independent*. You can connect it to *any* computer of

NEXT MONTH: Don reveals his favorite non-electronic sources for wonderments.

any size, and easily control it with *any* word processor or editor. Plain old ASCII textfiles do all of the work. At the output end, if your pages are too fuzzy for your tastes, those very same textfiles can be sent to fancier black boxes which generate absolutely first

quality camera-ready output.

Think of your Mac or your 486 as a rinky-dink dumb terminal connected to your *real* computer. And then use the HUCC to do *all* of your computing for you. You will be utterly amazed at the improvement in both quality and productivity. With *zero* investment in costly device specific software.

PostScript to the rescue

Naturally, there's already millions upon millions of these HUCCs in use worldwide. But for some strange reason, the manufacturers elected to place a horribly restrictive label on all of them. Nearly all of these HUCCs in the world today appear to have this grossly demeaning label erroneously stuck on them. A small label that says "*PostScript Laser Printer*".

Worse yet, many users and many applications packages labor under an insane delusion that such a HUCC is able to work properly under one way comm, or their klunky old host (ugh) is somehow superior in doing typical computing than their HUCC is.

Needless to say, these delusions can blindfold you and tie both of your feet together. Hopelessly.

Our magic programming language, of course, is known as *PostScript*. Or more specifically, as genuine Level II *PostScript* by *Adobe Systems*.

PostScript is a universally general purpose computer language that can, consistent with its three I/O modes, do *anything* you can do with any other modern language. And very often do so far faster, more conveniently, and with incomparable graphics.

Once again, *PostScript's* ability to dirty up any otherwise clean sheets of paper is almost an afterthought, and certainly not of major consequence to any serious *PostScript* language user.

When horribly restricted for use as page description code, *PostScript* does have the ability to generate text and

graphics that simply and totally blow all of the other methods away.

But, using PostScript solely for its graphics output is about as dumb as buying a *Porsche* because you'd like another radio in your carport.

When it's restricted to directing up pages, PostScript offers outline fonts having full hinting technology. Which means that a single font description is needed for any sized font from 3 up to 25,000 points high. With powerful and built-in hinting, the fonts auto adjust themselves to fit space and resolution. PostScript is highly adept at drawing smooth flowing 2- and 3-dimensional curves, through their magic of *Bezier* graphics, or otherwise known as third order cubic splines.

PostScript also has some incredibly strong imaging capabilities, halftone screens, great grays, and full color separation abilities.

As a language, PostScript is related to Forth. Sort of as its second cousin three times removed and five times disowned. You can think of it as Forth without the religion. PostScript is both reentrant and threaded. Meaning that you can add any instructions you like any way you like. Subject solely to new instructions being workable combinations of previous ones.

No, you do not have to go out and buy a copy of PostScript. This arrives built into your PostScript printer. All you need to talk to it from day one is your favorite word processor.

Normally, you or an applications package generates a standard ASCII textfile. This textfile gets routed to your PostScript *computer*. That's the box that wrongly has a "printer" label on it. Your PostScript computer then executes the PostScript program on your textfile. It then creates any of the three possible outputs, either writing to its disk, returning data to host, or dirtying up sheets of paper.

EPS Files

There's a provision in PostScript to let you select one PostScript file and insert it into another one. Important examples are moving a logo onto a letterhead or a halftone photo onto a full page layout.

The best way to import files is by using the EPS file format described in the red book II. Properly done EPS files are extremely portable.

An EPS file is nothing but a plain old PostScript file which has several comments added to it. While there are lots of recommended comments, these

two are essential...

```
%!PS-Adobe-3.0 EPSF3.0
%%BoundingBox: 20 20 580 750
```

The bounding box changes with the file. It should be slightly larger than any marks that are actually going to appear on the page.

There are also a few rather subtle restrictions to EPS files, but most of these just involve common sense. You are limited to files that can print on a single page or less. Obviously, you could import as many individual EPS files for as many pages as you want to. Your code should be well behaved, and it must leave the machine exactly the way it was found. Several rarely used commands that could harm the importing program are no-no's.

A Nuts & Volts First: Digital Mastering

There is a simple variation on the EPS files that should have a stunning impact upon hardware hackers world wide. And *Nuts & Volts* intends to be a leader with this incredible hobbyist technical breakthrough.

You can take most any EPS file and further process it by doing a compile or a pseudocompile on it. Typically, you would use such products as the *Adobe Distillery* or my *Maudedoc*, as found on *GENie* PSRT.

I call these *compiled EPS* files. And I refer to their creation process as doing a *distilling* or *double distilling*.

At any rate, after you do distill or double distill an EPS file, you end up with a plain old ASCII textfile. With care, a short and an astonishingly fast executing textfile. A royalty free one which has *no trace whatsoever* of any proprietary applications generation code. A textfile that can be sent to and used by *any* word processor on *any* computer anywhere.

The distilling process extracts only the essential information and then can either write it to hard disk or return it to your host for recording.

Which means that we can now offer true *original digital masters*, directly to you readers, of printed circuit boards, dialplates, schematics, drilling guides, CAD/CAM, overlays, templates, and calibration charts. Plus lots more.

Digital masters which easily can be updated and corrected at any time. Even long after publication.

Digital masters that run on any *PostScript* printer or software.

I feel very strongly about compiled EPS files as a major hacker concept. To

the point that I do not care whether you work with me or do everything off on your own. There is no doubt whatsoever that compiled EPS files form *the* breakthrough technique to deliver first rate digitally mastered artwork directly to end users.

If you want to do things on your own, just use that PostScript output feature of whatever is generating your artwork. Then distill and rework your files into fast running compiled EPS textfiles on your own. Finally, offer them on any BBS service.

If you want to work with me, I'll be happy to either help you create your compiled EPS files or create them for you. And then post them on *GENie* PSRT in a special library.

One quite subtle and little noticed advantage of compiled EPS files is known as *microsizing*. It is extremely important to get the final size of any printed circuit just right. For instance, a 2 percent error in a 25 pin connector could end up shorting pin 24 to 25. Nearly all copiers do magnify slightly. Most low end printers will be off by a percent or so, and paper or any media shrinkage or swelling can add another percent. An ultra simple *microsizing* process can instantly fix this.

To microsize a compiled EPS file, print a working copy and measure it, calculating all your errors. Then place a new PostScript *scale* operator at the beginning of your file. That easy.

For instance, say you ended up one percent high horizontally and half a percent low vertically. Just do a...

```
0.99 1.005 scale
```

at the beginning of your file, and you are home free. You can even correct for skew in a proc that is only a tad more complicated. With a short term accuracy better than three mils. Print shops are just beginning to discover how microsizing revolutionizes such tasks as flexographic printing.

I have already got lots of doubly distilled compiled EPS examples up and ready to go on *GENie* PSRT. These should give you some idea of what can be done. Most of these end with a ".PS" tag. Such as HACKFG57.PS.

I'd be more than happy to act as a clearing house for this exciting hacker breakthrough.

Which PostScript Printer?

I strongly recommend using *only* genuine Adobe PostScript. And Level II if you can. My favorite printers are those from *Apple*, *Hewlett-Packard*, or

SOME POSTSCRIPT RESOURCES

Adobe Systems

1585 Charleston Road
Mountain View, CA 94039
(800) 833-6687

Apple Computer

20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010

Bove & Rhodes Report

Box 1289
Gaulala, CA 95444
(707) 884-4413

Canon

One Canon Plaza
Lake Success, NY 11042
(516) 488-6700

Computer Reseller

600 Community Drive
Manhasset, NY 11030
(516) 365-4600

Font & Function

PO Box 7900
Mountain View, CA 94039
(800) 833-6687

Freedom of the Press

900 Tech Park Drive #8
Billerica, MA 01821
(800) 873-4367

GEnie

401 N Washington Street
Rockville, MD 20850
(800) 638-9636

GoScript LaserGo

9235 Trade Place Ste A
San Diego, CA 92126
(619) 530-2400

HP Manuals

19310 Pruneridge Avenue
Cupertino, CA 94014
(800) 752-0900

HP Printers

16399 W Bernardo Drive
San Diego, CA 92127
(619) 592-8333

InfoWorld

1060 Marsh Road C-200
Menlo Park, CA 94025
(800) 227-8365

MacWeek

One Park Avenue
New York, NY 10016
(212) 503-4433

Nuts & Volts

430 Princeland Court
Corona, CA 91719
(714) 371-8497

Pagemaker/Aldus

411 First Ave. S. #200
Seattle, WA 98104
(800) 685-3614

PMI/Lazer Products

12741 E Caley Ave. #130
Englewood, CO 80155
(800) 843-5277

Pre-Owned Electronics

30 Clematis Avenue
Waltham, MA 02154
(800) 274-5343

Printer's Devil

PO Box 66
Harrison, ID 83833
(208) 689-3738

QMS

PO Box 81250
Mobile, AL 36689
(205) 633-4300

Recharger

101 Granite Street Ste F
Corona, CA 91719
(714) 371-8288

Shreve Systems

3804 Karen Drive
Bossier City, LA 71112
(800) 227-3971

Supplies Unlimited

101 Granite Street Ste F
Corona, CA 91719
(714) 371-8288

Synergetics

Box 809
Thatcher, AZ 85552
(520) 428-4073

Don Thompson

23072 Lake Center Dr. #100
El Toro, CA 92630
(800) 457-5776

TypeWorld

One Technology Park Drive
Westford, MA 01886
(508) 392-2157

U&Ic

2 Dag Hammarskjold Plaza
New York, NY 10017
(212) 371-0699

Ventura Publisher

15175 Innovation Drive
San Diego, CA 92128
(800) 822-8221

QMS. Although getting a tad long in the tooth, the best low end bang for the buck is still the QMS PS-410.

The best mid-level printers are the Apple LaserWriter G with its superb photo halftones, or the exciting new QMS *Hammerhead* machine using the fourth generation Canon BX engine. A good high end printer will be the HP IISI if and when they release their long-promised PostScript Level II and hard disk support.

As with an auto, the *engine* is the mechanism that makes a laser printer go. Canon makes the most popular OEM print engine, and has the best print economics. You could easily hit 0.15 cents per page toner costs with a Canon engine by doing all of your own cartridge refilling. Which can be *fifty* times cheaper.

The best service and repair manuals for the Canon engines are quickly and conveniently available from *Hewlett Packard*. These manuals apply equally well to Apple, QMS, and some others.

Although HP has outrageously jacked up the prices to the \$100 range, these manuals remain essential "must have" bargains. Our sidebar does show you several manual part numbers for the more popular printers. Note that a separate address must be used for HP manuals. Also note that most low end HP printers usually need *three* pieces (printer, Adobe PostScript card, and extra memory) when pricing.

A *duplex* printer is one which can print on both sides of the page. These can sharply up your productivity and throughput. They also can be lots more fun and dramatically reduce your scrap rate. Sadly, HP seems to have a stranglehold on the duplex market today. Their older IID is too primitive, too klutzy, and too slow to consider any more. The IIID is an acceptable lower end machine, while the IISI does a really great duplexing job. The IISI has a bolt-on duplexer with a \$600 list, \$400 street price.

This bolt-on route does make a lot

of sense, because it can move duplex printers out of their high price niche market. Now, if only Apple or QMS would offer them...

Most of those lower end "bargain" fake PostScript printers range from outright ripoffs to more or less honest but inexperienced firms trying to buy into an industry they know pitifully little about. These printers are simply not cost effective.

The low end "bargains" all do seem remarkably similar to a \$999 hot tub. These may look good in their ad, but you certainly would not want to put any water in one, or actually sit in it.

Yes, there are used printer bargains. But you should definitely stick to *only* Apple, HP, or QMS here. Some of the laser printers offered in the Distressed Yuppy Surplus catalogs are not even suitable for flood control rip rap.

One fine source for used machines is *Don Thompson*, who also offers the finest in training and repair seminars available anywhere. Two other used printer sources are *Shreve Systems* and *Pre-Owned Electronics*.

Today, the bang-for-the-buck in a honest Adobe \$1600 printer is at least *twenty times* higher than that of a fake PostScript clone I tested chopped the tail off MEOWRRR, our old *Synergetics* puddy tat. The second one refused to print my fractal fern. The latest fake was unable to print up my Gonzo test page without a gross error that was obvious at twenty feet.

And the rest of the fakes weren't nearly that good. After testing most of these, I have not found *any* fake clone anywhere that can correctly print my *Book-on-demand* production files. Files that run fine on Adobe printers.

Actually, the working definition of a "100 percent compatible PostScript clone" is that the prongs on the power cord are roughly the same size and spacing as on a real PostScript printer. If you try to print *Meowrrrr* on a fake PostScript clone, you can try rubbing some tuna fish on the page first.

What if you flat out cannot afford *any* genuine PostScript laser printer?

Adobe is soon to release a low cost product called *Adobe Showpage* for the Mac and IBM which gives you screen and bitmap images using full Display PostScript. It also should (in theory) create a bitmap usable by *any* printer. Or for that matter, any signmaker, 3-D sculpting router, engraving machine, CAD/CAM mill, Santa Claus device, or embroidery setup.

There are earlier pseudo PostScript products that try to let you work with older or cheaper printers. Commercial versions include *Freedom of the Press* and *GoScript*, neither of which I can personally recommend. But there is a great shareware package that recently has gotten much better with release 2.5. This is called *GhostScript* and lets you run fake PostScript from any host platform on nearly any printer. One GhostScript source is *GENie* PSRT.

Ghostscript typically will consist of three files. The first is a run-time IBM package. The second is the full source code written in C and compilable for any reasonable platform. The third is a package of fonts.

There are several good magazines to keep you up to date on PostScript printers. By far your best free one is *TypeWorld*. And the most wondrously bizarre typography magazine is *U&lc*, short for *Upper and lower case*. Adobe's own freebie is *Font and Function*.

Your best street prices for printers usually are found in *Computer Reseller* magazine. New products will usually show up in such sources as *Infoworld* and *MacWeek*. The leading recharging magazines are *Recharger* and *Supplies Unlimited*.

For a rather unusual labor-of-love newsletter, try the *Printer's Devil*. And your finest (although big bucks costly) industry insider newsletter is the *Bove and Rhodes Report*.

My very favorite recharging supply source is still *PMI Lazer Products*.

I am leery of all the printer reviews shown in most of those slick desktop magazines, because they simply do not have even the foggiest idea how to properly test a PostScript printer.

More often than not, all their speed tests conclusively prove that they are baud rate limiting themselves. Or else they are demonstrating weaknesses in klutzy applications packages. Or are measuring the cartridge, paper, and operator variability, rather than any genuine machine differences.

And they never seem to address the recharging economics, repair manual availability, or long term durability. It is not possible to properly review any PostScript printer without personally working with it for at least ten hours a day for six months. Because of ad interests, they also never say anything truly bad. And they totally miss the "vibes" and "feel" issues critical to a decent printer test.

Getting Started With PostScript

Use these HP Manuals for Apple LaserWriter repairs:

HP MANUAL	HP PRINTER	APPLE PRINTER	QMS PRINTER
02686-90920 (CX Engine)	LaserJet I	LaserWriter LaserWriter Plus	PS800
33449-90906 (SX Engine)	LaserJet II LaserJet III	LaserWriter NT LaserWriter NTX LaserWriter F LaserWriter G	PS810 & Turbo PS820 & Turbo PS815-MR PS825-MR
33459-90906 (SX Engine)	LaserJet IID LaserJet IIID	-----	-----
33471-90904 (LX Engine)	LaserJet IIP	Personal LW NT	PS410
33491-90929 (SI Engine)	LaserJet IIIsi	-----	-----

As with nearly any general purpose computer language, the best way to learn PostScript is through plenty of personal hands on experience. Unlike most of the others, PostScript is fast and easy to learn. Besides being fun.

And you certainly do not have to pick up everything at once. You can be writing and using useful code with only a dozen commands. I've had one student who never even used a word processor before win a big company award for her hand coded PostScript business cards. This after only a few hours of practice.

Yes, there are bunches of high-end applications packages that will write PostScript code for you. The obvious examples include *Pagemaker*, *Ventura Publisher*, *Illustrator*, and *Photo Shop*. And these all do handle certain tasks fairly well. But you will eventually get to that "*whaddyameanIcant*" level with any of these. And the more you learn and use raw PostScript, the more you will be able to accomplish by adding your personal value added to these fancy packages. And any code these packages produce can *always* be made faster, shorter, and better looking by reworking it in raw PostScript.

The application packages obviously do not properly emphasize the use of PostScript-as-language. Several hand coded words of PostScript code can often do absolutely astonishing things that these packages can't provide.

For instance, a least squares curve fit is tricky to do in *Pagemaker*, while a Yagi FM antenna gain optimization is

even trickier in *Photo Shop*. An auto list-to-directory converter is real hard to create with *Ventura*.

Start with the "blue" book by *Adobe Systems*, also known as the *PostScript Tutorial and Cookbook*. Then go to my *PostScript Secrets* book/disk combo, followed by Adobe's "red" book and called the *PostScript Reference Manual II*. I do stock all these here at my own *Synergetics*, as well as offering great heaping bunches of other PostScript products and support. If you want to get started in a real big hurry, I do offer *The Whole Works*, which is one each of everything that is useful and important on PostScript by all major authors. At a bargain price.

The PSRT RoundTable on *GENie* has 500+ files on PostScript immediately downloadable at a typical charge of twenty one cents each. These include tutorials and working code, utilities, PostScript-as-language examples, the interviews with authors and industry leaders, and great heaping bunches more. Two good first files are #337 SECRTEMP.PS or #459 SPEEDUP.PS.

I've also got lots of utilities up on PSRT that can let you do outstanding schematics or printed circuit layouts, engineering design, stock analysis, isometric or perspective illustration, histograms, and lots more. Start with my *Gonzo justification* package, that gives you full and total editability on your final page layouts.

Let's hear from you. Especially if you want to apply this new hacker digital mastering breakthrough. ♦

Don Lancaster's

RESOURCE BIN

number ten

Oddball sources for just plain stuff.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

An area of the great *GENie* PSRT at (800) 638-9636 (for voice info) has been set aside specifically for use by all of you *Nuts & Volts* readers.

This month, I thought we'd look at some unique and unusual sources for ordinary old stuff. The mechanical bits and pieces you can use to tie all your electronics together. Or simply places which have products so weird or unusual that you'd probably want to know all about them. Just because they are there.

Before we begin, just how can you put together your own resource file of preferred reliable sources? Naturally, we would hope you would begin with all our fine *Nuts & Volts* advertisers, and then mosey on to those *Names & Numbers* directories in the *Resource Bin* previous columns.

Yes, all my back columns, a cross reference index, and a master names and numbers directory have now all been gathered together into one single new Book-on-demand volume. Check my nearby *Synergetics* ad for details. You could also quickly and cheaply access this info on my *GENie* PSRT.

All of those industry trade journals are your prime method of finding out who sells what to whom. We've seen bunches on trade journals in previous columns. We have also seen that the *Uhlricht's Periodicals Dictionary* on the reference shelf of your local library is a superb starting point to pin down just who is now publishing what for whom. Many trade journals are free if

you tell them what they want to hear on their qualification cards.

Once you have access to the actual magazines, you use the reader service cards to get your catalogs, data sheets, samples, the local distributors, annual directories, and such.

Another way to pick up some trade journals is simply to keep your eyes and ears open. Especially in reception areas or waiting rooms of firms doing tasks wildly different from your own. Never flip past a bingo card without ripping it off! Unthinkable.

Besides Uhlricht's, most any library also gives you lots of other hints and tips. Especially in that *Encyclopedia of Organizations* and the gigantic *Thomas Registry of Manufacturers*

Your final obvious route to unusual stuff resources is to just ask anyone involved in anything really weird or strange. The chances are that they will happily talk your ear off.

For instance, you might not be too interested in model railroading. But *Model Railroader* has zillions of ads for miniature tools and materials. Even such exotic goodies as photochemical etch milling.

Many firms that cater to ceramics people, stained glass artisans, beef ranchers, blacksmiths, watchmakers, dentists, bulldozer operators, or other specialties do tend to target all of their advertising so tightly that you'll never

NEXT MONTH: Don looks at the electronic books which really made a difference.

normally hear about them. Yet their catalogs are often crammed full of goodies that scream "use me".

Don't overlook the classified ads in the traditional newsstand magazines. There's some utterly amazing goodies tucked away in and around all those

Popular Science and *Popular Mechanics* fine print classifieds. Quickly leafing through your Yellow Pages at random can also reveal unexpected sources.

Your final route to unusual stuff is to simply spend a tad additional time wandering around any oddball store after you have picked out what you really wanted. Jot down all the names and addresses on packages of weird goodies. Then write them for catalogs, data sheets, samples, and distributor insider price lists.

Over the decades, I have gathered together a humongous master names and numbers list. Since I usually live in remote rural areas, I've gone out of my way to build up the best possible personal resource files. Let us take a tour of my favorite places to go for the bizarre and wondrous...

Small Parts

Numero uno on our list, of course, would be *Small Parts*. This is by far the greatest robotics store in the world. Besides custom cutting small pieces of metal and plastics for you, they stock everything your hardware store never heard of. And, yes, you can order in single or very small quantities. Mix or match any way you like.

Small Parts is very big in most any type of hardware. Bolts, nuts, screws, plastic standoffs, gears, belts, O-rings, sheets, rods, shims, clutches, E-rings, balls, cork, clips, shafts, pins, springs, retainers, music wire, tools, the whole bit. Metric and English. They also get into such exotics as low melting point alloys and similar curiosities.

Their catalog and price lists are "must have" hacker resources.

W. W. Grainger

Surely everybody knows all about *W.W. Grainger*. But just in case you don't, they are the leading electrical products distributor in the country. They've got warehouses in just about

any larger city. They are fairly liberal with their thick catalogs.

Grainger is now heavy into motors, tools, and electrical supplies. Heating, ventilation, air conditioning, timers, controls, fans, dehumidifiers, pumps.

I just bought a replacement hot tub blower from them. Only to find a tiny scrap of warranty paper in the bottom of the new motor box that tells me about *Ametek's* great low cost repair program for sick hot tub blowers. Oh well. Information is where you find it. The new motor was a perfect fit and works just fine.

Certain of the local Grainger stores will absolutely insist upon tax stamps, billable accounting, and paper before they'll sell to you wholesale. Others are largely walk-in. It does seem to depend on the local contractors and the unions. Full details on picking up all of the needed credentials and then forming your own small business or tech venture appear in my brand new *Incredible Secret Money Machine II*.

McMaster-Carr

McMaster-Carr is where all industry goes to shop. They do stock virtually everything mechanical, all tools, and all of the bits and pieces you need to either build a factory or prevent one from falling apart. As Grainger, they have branches in many larger cities.

McMaster-Carr does distribute an incredibly thick catalog, but these are very hard to qualify for. Their prices are also not all that great. But they do certainly give a new meaning to the term "one stop shopping".

Edlco

The name is short for *Educational Lumber Company*. These folks are into exotic hardwoods in a very big way. Especially the weird, the beautiful, or the unusual. Nothing like a piece of wenge or cocobolo to liven up a small electronic enclosure.

A free catalog is offered.

Outwater Plastics

This outfit believes they are in the display fixtures business. They have a wildly mind-boggling assortment of low cost and potentially quite useful hardware for you electronic hackers. Plus all sorts of ways of hanging and showing things. They even now offer Grecian urns for writing odes on.

Once again, a fat and free catalog is offered. This one is a real page turner, chock full of "use me" stuff. Stuff that simply cannot be ignored.

The Player Piano Company

How's that again? Yup, the *Player Piano Company*. They stock all of the replacement bits and pieces for you individuals restoring player pianos and similar coin operated self-playing musical instruments. As such, they really do get into exotic tools, strong adhesives, and odd materials. Plus a library of incredible books.

What they don't recognize is that they are really in the low pressure pneumatics business and much of what they have is ideal for innovative new hacker robotics.

Satco

Satco normally sells primarily to the schools, prisons, and the industrial training facilities. But they will sell to individuals as well.

They have a wide selection of tools, materials, kits, books, and trainers related to industrial arts. Electronics, automotive, machine shop, plastic or metal casting, drafting.

Pricing is fairly reasonable on most items, and they do stock stuff that's extremely hard to find elsewhere.

Modeling materials

Your local hobby shop probably has smaller quantities of most building stock. I have found it better to go to the actual sources for wider variety and far better prices. For aluminum, brass, and other metal sheets, rods, and tubes, try *K & S Engineering*. For styrene sheet stock and similar plastic items, use *Evergreen Scale Models*. And for "lumber" precisely cut in all of the train gauge and scale dollhouse sizes, *Northeastern Scale Models* is it.

For the larger pieces of flat display, exhibit and modeling materials, your best source is *Fomeboards*. These folks are strong in foam core plastics and similar base materials for architectural mockups, fancier point-of-purchase signs, trade show panels, and such.

Several highly unusual decorative sheeting materials are now sold by *Coburn*. These can include prismatic, holographic, foils, glow-in-the-darks, metallics, and lots of other stunningly attractive display materials.

One of my favorite sources for the traditional art supplies is *Dick Blick*, while the *Polyline* people are big on cases, labels, and packages for audio cassettes and VCR video cases. I use *Polyline* cases for my *Introduction to PostScript* videos. They also stock hard-to-find VHS spine labels.

new from

DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. \$24.50

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. \$24.50 each.

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. \$18.50

LANCASTER CLASSICS LIBRARY

Don's best early stuff at a bargain price. Includes the CMOS Cookbook, The TTL Cookbook, Active Filter Cookbook, Micro Cookbooks I & II, newly revised Incredible Secret Money Machine II, and those Hardware Hacker II reprints. \$119.50

LOTS OF OTHER GOODIES

Ask the Guru I or II or III	\$24.50
Hardware Hacker II or III	\$24.50
Book-on-Demand Resource Kit	\$39.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
Genie PSRT Sampler	\$29.50
PostScript Reference II	\$28.50
PostScript Tutorial/Cookbook	\$16.50
Whole works (all PostScript)	\$350.00
PostScript Secrets Brochure	FREE
Hacking Secrets Brochure	FREE

LASERWRITER SECRETS

A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. \$39.50

BLATANT OPPORTUNIST I

The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. \$18.50

RESOURCE BIN I

A complete collection of all Don's Nuts & Volts columns to date, including a new index and his master names and numbers list. \$12.50

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on Genie PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Call (800) 638-9636 for connect info.

FREE VOICE HELPLINE VISA/MC

SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

SOME "PLAIN OLD STUFF" RESOURCES

AIN Plastics

249 E Sandford Blvd
Mt Vernon, NY 10550
(914) 668-6800

American Safety Razor

Razor Blade Lane
Verona, VA 24482
(703) 248-8000

Aremco

PO Box 429
Ossining, NY 10562
(914) 762-0685

Ark-Plas Products

Highway 178 North
Flippin, AR 72634
(501) 453-2343

Bead Chain

110 Mountain Grove
Bridgeport CT, 06605
(203) 334-4124

Dick Blick

PO Box 1267
Galesburg, IL 61401
(800) 447-8192

Caplugs

2150 Elmwood Avenue
Buffalo, NY 14207
(716) 876-9855

Castolite

PO Box 391
Woodstock, IL 60098
(815) 338-4670

Clippard Minimatic

7390 Colerain Road
Cincinnati, OH 45239
(513) 521-4261

Coburn Corp

1650 Corporate Road
Lakewood, NJ 08701
(201) 367-5511

Devcon

30 Endicott Street
Danvers, MA 01923
(508) 777-1100

DonJer

Ilene Ct Bldg 8
Belle Mead, NJ 08502
(800) 336-6537

EDLCO

PO Box 5373
Asheville, NC 28813
(704) 255-8765

Evergreen Scale Models

12808 NE 125th Way
Kirkland, WA 98034
(206) 823-0458

Fastex ITW

195 Algonquin Road
Des Plaines, IL 60016
(312) 299-2222

Fomeboards

2211 N Elston Avenue
Chicago, IL 60614
(312) 278-9200

Fotofoil

4400 N Temple City Blvd
El Monte, CA 91734
(818) 444-4555

Garden Fresh Replicas

PO Box 208
Neosho, MO 64850
(800) 545-7304

Grainger

2738 Fulton Street
Chicago, IL 60612
(312) 638-0536

Hello Direct

140 Great Oaks Blvd
San Jose, CA 95119
(800) HI-HELLO

Hygenic Manufacturing

1245 Home Avenue
Akron, OH 44310
(216) 633-8460

K & S Engineering

6917 W 59th Street
Chicago, IL 60638
(312) 586-8503

Kepto Circuit Systems

630 Axminister Drive
Fenton, MO 63026
(800) 325-3878

Kindt-Collins

12651 Elmwood Avenue
Cleveland, OH 44111
(216) 252-4122

Klockit

PO Box 636
Lake Geneva, WI 53147
(800) 556-2548

Hank Lee's Magic

PO Box 1359
Boston, MA 02205
(800) 874-7400

McMaster-Carr

Box 54960
Los Angeles, CA 90054
(213) 692-5911

Archie McPhee

PO Box 30852
Seattle, WA 98103
(206) 547-2467

Robert A. Main & Sons

555 Goffle Road
Wychkoff, NJ 07481
(201) 447-3700

Metalphoto

18531 S Miles Road
Cleveland, OH 44128
(216) 475-0555

Northeastern Scale Models

PO Box 727
Methuen, MA 01844
(508) 688-6019

Outwater Plastics

4 Passaic Street
Wood-Ridge, NJ 07075
(800) 526-0462

Player Piano Company

704 E Douglas
Wichita, KS 67202
(316) 263-3241

Polyline

16018-C Adelante St
Irwindale, CA 91702
(818) 969-8555

Roper-Whitney

2833 Huffman Blvd
Rockford, IL 61103
(815) 962-3011

Satco

924 S 19th Avenue
Minneapolis, MN 55404
(800) 328-4644

Small Parts

PO Box 4650
Miami Lakes, FL 33014
(305) 557-8222

Stock Drive Products

2101 Jerico Turnpike
New Hyde Park, NY 11040
(516) 328-0200

Tandy Leathercraft

1400 Everman Parkway
Ft. Worth, TX 76140
(817) 551-9770

Tuners Supply

88-94 Wheatland Street
Somerville, MA 02145
(800) 247-0702

Uhlricht's Dictionary

1180 Americas Avenue
New York, NY 10016
(212) 916-1600

United States Plastics

1390 Neubrecht Road
Lima, OH 45801
(419) 228-2242

Value Plastics

3350 Eastbook Drive
Ft. Collins, CO 80525
(303) 233-8306

J C Whitney

1917-19 Archer Avenue
Chicago, IL 60680
(312) 431-6102

Zero Corporation

777 Front Street
Burbank, CA 91503
(818) 846-4191

And bunches more...

There are lots of companies which specialize in strange little bits and pieces of stuff. *Caplugs* immediately comes to mind for lots of small plastic closures, caps, grommets, and seals. They do have bunches of free sample packs available. For extremely low cost connectors and snaps, try *Bead Chain*. They are ridiculously cheaper than nearly any electronic connector company for such things as student lab clip-on lashups.

Long ago and far away, I did several *digital logic microlab* projects that centered themselves on the Bead posts and spring clip connectors.

If its round and either sharp or dull, try *Robert A. Main*. These folks make every conceivable type of needle or pin or rod of just about any size. For everything from 78 RPM phonograph needles to carpet installing machines. A mind blowing collection of stuff that you suspected that someone had to make, but weren't sure who.

For the wildest collection of razor blades you have ever seen, you can check *American Safety Razor*. Up to eighteen inches (!) that do nasty stuff in the hog to bacon process. They are really fixed for blades.

Higher volume plastic and metal connectors, bushings, standoffs, and related hardware are offered in wide variety from *Fastex/ITW*.

Lower pressure pneumatic tubing and rubber sheeting can be insanely expensive from your typical sources. Instead, *Hygenic Manufacturing* offers bunches of both at very low cost. They mostly have dentists and hospitals as customers, but they'll sell to anyone. They also have several sample sheets available.

For flocks and flocking, traditional "cabbage duster" flock is still available through *DonJer* and aimed largely at school shop and artsy-craftsy markets. The more modern silk screened flock products are offered by *HIX*.

Castable plastics remain obtainable through *Castolite*, who are still at the same old stall after all of these years. Unusual sticky stuff in tubes and cans comes from *Devcon*. Sticks anything to anybody. Machinable, pourable, and otherwise unusual industrial ceramics are sold by *Aremco*.

An astounding variety of industrial waxes is available from *Kindt-Collins*. Everything from machinable wax for cheaply checking out CAD/CAM to a genuine document and wine bottle

sealing wax. Even water soluble waxes are offered.

Machinable wax is fully recyclable, besides eliminating wear and tear on tools and machines if the plans or feed rate are wildly wrong. It can also be used directly for lost wax casting.

Plastic companies tend to be hard to deal with. But two having reasonable prices and wide variety include *AIN Plastics* and *US Plastics*. And the two sources for miniature plastic fittings suitable for hobby and pneumatic robotics are *Ark-Plas* and *Value*. A very pricey source for miniature air components is *Clippard Minimatic*.

Klockit is mostly a source for huge grandfather clock kits. Hidden among their other gems are \$4 hygrometers that are essential if you are doing any laser printing.

For photo-on-aluminum dialplates and museum exhibit panels, you can try either *Metalphoto* or *FotoFoil*. These are super durable.

Hmmm. Looks like I am near the bottom of the list, and all that's left is a totally unrelated and disjointed pile of loose ends.

So, here are a totally unrelated and disjointed pile of loose ends: *Kepron* for printed circuit supplies and materials; *Hello Direct* for consumer telephone products; *Hank Lee Magic Factory* for all sorts of tricky magic toys, books, and special effects; *Roper-Whitney* for reasonably priced hand punches and professional layout tools.

Look at *Stock Drive Products*, for, of all things, stock drive products such as shafts, gears, bearings, supports, differentials, and mechanical kits; *Tandy Leathercraft* for unusual tools and materials, especially punches and perforators.

J. C. Whitney, of course for their claim of "everything automotive"; and *Tuner's Supply* for piano tuning tools, books, and replacement parts.

And, at the very bottom of our list *Zero Corporation* for rounded cans and boxes that make fine electronic cases and enclosures.

For the truly and utterly bizarre, don't forget *Archie McPhee*. Off in a corner all by themselves, they are the world's leading supplier for giant rubber iguanas and similar essentials.

The ultimate neat stuff

No discussion of unusual products and supply sources can possibly be complete without our mentioning the synthetic kale now available through *Garden Fresh Replicas*. These people

take their phony kale seriously, folks. Actual, genuine, authentic, 100% real kale is used for the mold masters. The molds are destroyed after a custom crafted limited edition of a mere 35 replicas. After all, the fake kale would look – well – fake if it all ended up identical. And real powdered kale is used for the filler in the plastic resins injected for molding.

Just like the Russian invention of synthetic caviar, their final product is absolutely indistinguishable from the real-world original.

Except by taste.

Two contests

Let's have a pair of contests for this month. Either (A) tell me about some obscure but truly great source for neat stuff, or else (B) come up with a new and a non-obvious use for synthetic kale. On (A), try to send me a sample catalog and get me on their mailing list. Or whatever.

There will be a dozen of my newly republished *Incredible Secret Money Machine II* book prizes awarded to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

Be sure to send all of your written entries directly to me at *Synergetics* per the end blurb, rather than to *Nuts and Volts* editorial.

By the way, your odds of winning most of our contests are extremely high. On typical contests most of the time, pretty near everyone ends up winning something. Unless I really get swamped with entries. Which only rarely happens.

As usual, we've gathered our *Names & Numbers* together into one sidebar. Be sure to check out the sidebar first before you contact our voice helpline for further technical help. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number eleven

Technical books that made a difference.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja* questing, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

We sure did get a wide variety of entries in our *important books to learn electronics* contest. One rather obvious problem I didn't anticipate at the time was that a book that was great for you twenty years ago just might not end up the best one for today.

So, we'll broaden our focus a bit to target on *books that made a difference*. Even the oldest of these just might be worth a fresh look.

Many thanks for putting my own *CMOS Cookbook*, *TTL Cookbook*, and *Active Filter Cookbook* right on the top of your entries. These three, plus the *Radio Amateur's Handbook* and *The Art of Electronics*, got the most votes.

But then again, if Kellogg's ran a *my favorite breakfast cereal* contest with prizes, there might not be too many *Grape Nuts* or *Cheerios* top entries.

Probably the best way to arrange all this is by the entrants. Let's start off with our *tinaja quest* winner...

Ken Luchini

Some of Ken's titles are somewhat dated, but are all good choices...

Handy Book of Practical Electricity, Frank Graham (Audel 1925). "Audel's book has everything you wanted to know about electricity and electronics but were afraid to ask. From batteries to electro-therapeutics. Circa 1925, but Ohm's Law is still true."

Basic Electronics, by Bernard Grob, (McGraw Hill). "A very good text to

learn all the electronics basics. Read and study Grob's book from cover to cover and you are well on your way to an exciting career."

Transistor Basics: A Short Course, George Stanley (Hayden). "It is short, sweet, and to the point. The book for understanding most transistor circuit design. Worth its weight in gold."

Pulse and Switching Circuit Action, Henry Veatch (McGraw-Hill). "If you would like to learn how to build high powered pulse circuits, read this book and use your imagination."

Electronic Communications Systems by George Kennedy, (McGraw-Hill). "The book for learning the basics of radio system receivers, transmitters, and antennas. An excellent book for anyone wanting to know exactly how satellite receivers or microwave comm works. For low noise amps and radio theory in plain language."

Art of Electronics, Paul Horowitz (Cambridge 1992). "The master chef's cookbook for all the ins and outs of electronic design and construction. It tells you the components and circuits to use. Gives examples of good and bad circuit design."

Electronics Engineer's Handbook by Donald Fink (McGraw Hill) "A good electronics reference book. Coverage

NEXT MONTH: Don reveals some desktop publishing secret supply sources.

here ranges from materials and basic electricity to electronics systems. In easy-to-understand format."

Neil Youshak

Neil sent us a list of his favorites, without too many details...

Introductory Circuit Analysis
Electronic Principles
Solid State Electronic Theory
Digital Electronics
Wel's Think Tank
Modern Electronic Communication
Crash Course in Digital Technology

Respective authors are Boylestad, Malvino, Sanfilippo, Forbes, Wells, Miller, and Sams.

Daniel Gates

Here are Dan's six selections...

CMOS Cookbook & TTL Cookbook, Don Lancaster, (Howard Sams, 1977). "Lots of useful info. Excellent info on electronic breadboarding."

The Active Filter Cookbook, by Don Lancaster, (Sams, 1975). "A practical intro to all these important circuits. I especially do appreciate his optional math approach."

Build Your Own Z80 Computer, by Steve Circa (Circuit Cellar). "Reduces the title task to its essentials. Good basic intro to all the microprocessor fundamentals."

Getting Started in Electronics by Forrest Mims. "Lets you pick up from what you remember from school."

Engineer's Mini-Notebooks, Forrest Mims (Radio Shack). "Good and low cost breadboarding guides."

Frank Sergeant

A *GENie* subscriber and another *Resource Bin* contest entrant, Frank's favorites are...

The Art of Electronics, by Paul Horowitz (Cambridge, 1989). "I love this book, and must study it in depth someday. Meanwhile, I just use it as a reference. He does know everything about electronics and discusses it in a very readable fashion."

CMOS Cookbook & TTL Cookbook

"I've been using these steadily over the years. One of the ideas I love from them is that you can use components for what they actually can do, not for just what they are labeled for. Yes, at least the CMOS book is falling apart, but I keep stuffing the pages back in place and handling it very gently."

Electronic Principles, by Albert Malvino, (McGraw-Hill 1989). "A very thorough grounding in the basics of semiconductor electronics, with the big-picture perspective as well as the individual details."

Intro to Microprocessors I, by Adam Osborne. "Not volume II, and most especially not that newer Volume 0, but Volume I has all the meat. It was originally published as a deceptively thin book and later got puffed up with larger and thicker paper to appear more substantial. It has to be my first recommendation for learning all the hardware details of microprocessors and their peripherals."

The IBM PC From the Inside Out Sargent, (Addison-Wesley 1986). "This is a very pleasant book on the IBM PC hardware and assembly language. It does include understandable low-level information and the examples needed for getting at the insides of the PC. While a little out of date in that fancy video hardware gets omitted, this still makes a fine general reference."

The Kilbaud Classroom Course in Digital Electronics, by George Young (Wayne Green, 1982). "I have hardly touched this in years, but it was just what I needed at the time. The articles that went into this book actually got me breadboarding circuits. It gave me the confidence that I could do and understand just about anything about digital electronics."

Lee Hart

Lee sent us a short list of all his favorites...

Radio Amateur's Handbook Reference Data for Radio Engineers Troubleshooting Analog Circuits

Respective authors are ARRL, Sams, and Robert Pease.

"But as I think about it, it's hard to go beyond these. Though I have a large reference library, it seems that vital information is getting ever more widely scattered. As with television, quantity drives out quality."

Ward Belliston

Let's now turn to Ward Belliston, who teaches industrial technology at Utah State in Logan. Ward is also both a former student and a department head of mine. He is also very much in the front line trenches of electronics education....

Micro Cookbook, by Don Lancaster (Synergetics Press, 1993). "The books in this two volume set are very easy to understand for anyone wanting to know microprocessors at a beginning level. Don does a quite good job of relating the concepts and ideas with cartoons and diagrams."

My own comment here is that these two titles are getting somewhat dated, although I am definitely reprinting them and still stocking them here at *Synergetics*. The problem is that the world got a lot more complicated than it used to be. Any old seventh grader could create unique and innovative machine language code for a C-64 or an Apple. But it takes years of effort and practice to create even atrocious coding for most newer platforms. And much of the fun is long gone.

Introductory Circuit Analysis, by Robert Boylestad (Merrill, 1990). "A good outline, well organized, useful problem sets plus good examples. Includes the use of PSPICE and *Basic* example programs."

Digital Fundamentals, by Thomas Floyd (Merrill, 1990). "Includes some fine examples. Complete. Thorough."

Microprocessor Architecture, by Gaonkar Ramesh (Merrill). "Workable from introduction to advanced. Ties the topics together well. Has a good building approach to learning. Could use more advanced examples."

Modern Electronic Communication, Gary Miller (Prentice Hall). "Easy to read and understand. He has a good support lab manual to go along with the text. Covers the subject well."

Electronic Devices & Circuit Theory, Louis Nashelsky (Prentice Hall, 1992). "Uses both the approximation and the theoretical approaches. Good outline, well organized, good problem sets, and good examples. Uses PSPICE and *Basic* programming."

Operational Amplifiers and Linear Integrated Circuits, Robert Coughlin (Prentice Hall, 1991). "Introduction to op-amps that covers a broad area."

Harry Werner

Harry is a certified electronic tech doing service and repair work. Here are his suggestions...

Complete Handbook of Electronics Troubleshooting, James Jacox. "This book covers methodology rather than the mechanics of other texts."

Basic Electricity Basic AC Circuits

Basic Electronics Technology. (Texas Instruments & Radio Shack). "These three are excellent tutorials."

Video Scrambling & Descrambling Rudolf Grat. "Great coverage."

The RS-232 Solution, Joe Campbell (Sybex). "A rather well written and illustrated book. A must for RS-232 problem solutions."

Electronic Troubleshooting, Jerome Oleksy. "Very instructional. Excellent illustrations. One of the very best."

Stacey's

Stacey's Bookstore decided to vote with their wallet. Here are some of their recent best selling books...

Art of Electronics Art of Electronics Student Manual Introduction to DSP Noise Reduction Techniques Programming Pearls C Language Algorithms for DSP C++ Primer

Respective authors are Horowitz, Horowitz, Lynn, Ott, Wall, Embree, and Lippman.

Jeff Duntemann

Jeff Duntemann is the editor and publisher of *PC Techniques* magazine, a prominent author on programming languages, a long time radio ham, and a grass roots hardware hacker. Here are his selections of books that made a difference to him...

Using Electronics, by Harry Zarchy (Thomas Crowell, 1958). "This book contained the first electronics projects I ever built. It's a juvenile, obviously, but nicely done, with line drawings and clear explanations. All the usual one- and two-transistor projects, plus a regenerative radio using a 3V4 that was my first tube project."

The Boy's Second Book of Radio and Electronics, Alfred Morgan (Scribners, 1957). "This is a larger book with more explanatory content and much better

SPECIALIZED BOOK RESOURCES

Active Electronics

11 Cummings Park
Woburn, MA 01801
(800) 677-8899

Antique Radio Books

498 Cross Street
Carlisle, MA 01741
(508) 371-0512

Bob's Electronics

7605 Deland Avenue
Ft Pierce, FL 34951
(407) 464-2118

CompuServe

5000 Arlington Ctr. Blvd.
Columbus, OH 43220
(800) 848-8199

Computer Literacy

2590 North First Street
San Jose, CA 95131
(408) 435-1118

Dialog Info Service

3460 Hillview Avenue
Palo Alto, CA 94304
(415) 858-2700

DigiKey

701 Brooks Ave South
Thief River, MN 56701
(800) 344-4539

GEnie

401 N Washington Street
Rockville, MD 20850
(800) 638-9636

High Energy Enterprises

PO Box 5636
Security, CO 80931
(719) 475-0918

Knollwood

PO Box 197
Oregon, WI 53575
(608) 835-8861

Lindsay Publications

PO Box 538
Bradley, IL 60915
(815) 935-5353

MIX Bookshelf

6400 Hollis Street, Ste 12
Emeryville, CA 94608
(800) 233-9604

Mouser Electronics

11433 Woodside Avenue
Santee, CA 92071
(800) 346-6873

Newark Electronics

228 East Lake Street
Addison, IL 60101
(312) 941-7200

OpAmp Books

1033 N Sycamore Avenue
Los Angeles, CA 90038
(800) 468-4322

Reiter's

2021 K Street NW
Washington, DC 20006
(800) 537-4314

SAE

400 Commonwealth Drive
Warrendale, PA 15096
(412) 776-4841

Singing Wind Bookshop

Ocotillo Road, Box 2197
Benson, AZ 85602
(520) 586-2425

Stacey's Bookstore

219 University Avenue
Palo Alto, CA 94301
(415) 326-0681

Stanford Bookstore

135 University Avenue
Palo Alto, CA 94305
(800) 533-2670

Synergetics

Box 809
Thatcher, AZ 85552
(520) 428-4073

Tesla Books

Box 121873
Chula Vista, CA 91912
(805) 646-3371

UFO Books

PO Box 1053
Florence, AZ 85232
(602) 868-4273

Whole Earth

27 Gate Five Road
Sausalito, CA 94965
(415) 332-1716

drawings, so I learned a fair amount from it. The problem was the projects were more elaborate and exceeded the mechanical skills of a ten-year-old. I think I learned as much from all my failures here as from my successes."

Radio Amateur's Handbook (ARRL, 1964). "I took this book out of the library when I was 12 and manfully tried to teach myself electronics from it. I gave up in frustration, not to try again for another eight years. But I held the book in tremendous awe and got my first taste for "grownup" electronics."

The Elements of Radio Servicing, by William Marcus (McGraw-Hill, 1955). "In my middle teens, I did manage to repair some 50's era tube receivers by taking this book out of the library and reading it closely. It is a model of technical clarity, and taught me more about receiver theory than anything else I've ever read before or since. The figures are among the best in any of the tube-era books."

Understanding Amateur Radio. "I went on back to my quest for a ham

license, and this was the book which put me over the top. Unlike the *Radio Amateur's Handbook*, it was designed for the beginner, and was much more detailed in its explanations. The book works very well, even today."

CMOS Cookbook, Don Lancaster, (Howard Sams, 1977) "Atypically, I read this book before encountering Don's *TTL Cookbook*. I discovered it in conjunction with wire-wrapping my first computer. The book speaks for itself; without it, I could never have finished or expanded either of my two hand-build 1802 machines."

Solid State Design for the Radio Amateur, by Wes Hayward, (ARRL, 1978). "I learned most of my RF theory in connection with tubes, and this book more than any other brought me up to speed on solid-state, back in the early 80's. I built a number of these projects. The receivers worked well, and the theory certainly stuck."

Rich Skalsky

Rich actually entered and won an

earlier *Resource Bin* contest, so his book choices all focused upon library research tools....

Applied Science and Tech Index
The Supplementary Periodical Index
Micro Computer Index
Research Centers Directory
Statistical Sources
Directories in Print

Most of these should now be on the reference shelf of any larger library.

Your Guru

Outside of recently using my own cookbooks in an intro programming course, I aren't doing all that much lately in electronics teaching. I also feel that technical books can be highly overrated. Especially if you don't read them thoroughly enough and often enough. Or select the wrong ones.

Sadly, the availability and quality of most non-computer tech books has plummeted sharply in recent years. Owing to mind-numbing changes in how new books are now produced and marketed. Bunches more on this in my *Book-on-demand resource kit* and on my *GEnie* PSRT.

Your first and foremost electronic learning resource is all of your own hands-on experience. Number two is all the electronic trade journals, which are an absolutely incredible training and learning bargain.

Next is the *Dialog Info Service*, which lets you instantly find out everything about anything. Dialog has recently introduced a cheaper late evening service, and also now offers CD-ROM access to information.

Number four is the hobby press, followed by the manufacturers' data books, catalogs, and ap notes.

I guess I would put the traditional textbooks in sixth place. Followed closely by the on-line BBS services, especially *CompuServe* and *GEnie*. The ham radio and computer clubs would be my eighth place choice. Provided you pick good ones and use them aggressively.

At any rate, it is interesting to go back over the years and see which books have made the biggest personal difference to me. Most of these are ancient, but here goes anyway...

Radiotron Designer's Handbook, Langford Smith (Wireless Press 1953). This is *the* most significant and most important electronic book of all time. Period. Three or four generations of electronic engineers cut their teeth on

this tomb, learning all that there then was to know about vacuum tubes and radio receiver design. It is about as hands-on oriented and as end-user as you can get. While obviously dated, I still refer to it every now and then.

The Mathematical Tables from the Handbook of Chemistry and Physics, Charles Hodgman (Chemical Rubber 1957). An excellent cast of numeric characters, but the plot development is rather primitive and the ending is totally predictable. This is the *one* book that I have used the most often. Consistently throughout all the years. Absolutely essential. But then again, I often tend to work my way up from the fundamentals. Years ago, the book eased trig calculations for me. Today, it is helping me in doing weird and wondrous graphics transforms.

My "ABC" Catalogs. Those letters have changed today, but all of the plain old hacker friendly distributor full line catalogs were an incredible learning resource. At least for me. In particular, the original *Allied Radio*, *Burstein Applebee*, and the *Cameradio* catalogs. Back then, Allied was a full line electronics source, while BA went out of their way to welcome hackers, and had affordable prices. Except it was sometimes tough to ante up their \$5 minimum order. Cameradio was Pittsburgh's largest walk-in old-line distributor. Reachable by streetcar.

An aside to any of you Allegheny County *Nuts & Volts* readers – What ever happened to Cameradio? When? And is "beer" still pronounced "Airn"? A free ISMM to the first responses.

These days, I guess you'd have to get MAD instead. Short for *Mouser*, *Active*, and *Digi-Key*. Plus *Radio Shack*. And *Newark Electronics* for their full service, old line catalog.

Electronic Musical Instruments by Richard Dorf (Plimpton Press 1968). A thorough and well written book that first got me off on technical writing, electronic music, circuit design, and solidly communicating with the end reader on their own terms.

General Electric SCR Manual. (GE, 1967) Long out of print, this set the standard for what an industrial data book and ap note collection should do. It's been downhill all the way ever since. I created dozens of early *Popular Electronics* construction projects from these pages. Projects involving color organs, psychedelic lighting, motor

controls, and lamp dimmers.

6500 Programming Manual (MOS Technology, 1979). Everything I did involving Apple and microprocessors and machine language programming centered on this text. Which simply and fairly clearly described the 6502 microprocessor data set. I used it for ten years in a micro intro course.

PostScript Reference Manual II, by Adobe (Addison Wesley, 1991). I read this book an average of ten minutes each day. All of the fundamentals of PostScript, by far the finest general purpose hardware hacking computer language. Oh yeah, PostScript also can dirty up sheets of otherwise clean paper. As a very minor and almost inconsequential afterthought. Covers the PostScript levels I and II, Display PostScript, EPS formats, and the file structuring conventions. I do stock these if you need one.

I'd also include the *Radio Amateur's Handbook* as crucially important to me. But others have already said enough on this indispensable title.

I guess I've also got an "overflow list" of not-quite classics that that I've sure spent a lot of my time and effort with. These ancients would include Milliman and Taub's *Pulse and Digital Circuits*; Fink's *Television Engineering Handbook*; Floyd Gardner's *Phaselock Techniques*; Louis Weinberg's *Network Analysis and Synthesis*; H. Skilling's *Electrical Engineering Circuits*; that hoary old "Rad Lab I" which refuses to die, also known as Rideneour's *Radar Systems Engineering*; and R. Landee's *Electronic Design Handbook*.

Plus, of course Buckminster Fuller's *Synergetics*. Important enough to me that I named my business after it.

Finding Technical Books

Good technical books are hard to find. Many very much so. Your last place to look is some mall storefront that has a sign out in front that says "bookstore" on it.

Start off by using *Books in Print* and that *Forthcoming Books in Print* on the reference shelf of your local library. Then pick up the main technical book publisher catalogs. But note that any particular publisher will only carry one or two real classics, a few current winners, several marginally useful texts, and a bunch of second rate titles or otherwise remaindered dogs.

By far your best book sources are those who do have a vested reason to

stock special interest titles. We have seen in previous columns and in the *Resource Bin* reprints how outstanding book collections are available from such places as SAE (automotive); *Mix Bookshelf* (for audio and video); *Whole Earth* (access to tools); *High Energy* (pseudoscience); *Lindsay Publications* (machine shop and radio); *Synergetics* (PostScript and guru titles); *Antique Radio Books* (guess what?); *Tesla Book Company* (and guess again); *Knollwood* (astronomy); *Singing Wind* (Southwest and lost mine tales), *Bob's Electronics* (radio astronomy); or even that *UFO Bookstore* (yup, you got it).

There are dozens of rather useful technical bookstores in various parts of the country. Many are associated with or across the street from large universities. But the only five I now know about and can recommend are *Reiter's* in Washington, DC; *Op-Amp Books* in Southern California; and the *Stanford Bookstore*, *Computer Literacy*, and *Stacey's*, all in Silicon Valley.

This Month's Contest

So, why don't you tell me instead? For this month's contest, just tell me about any larger technical walk-in bookstore that you happen to favor. Or any other source for unusual or specialized books. We'll try to build up a coast-to-coast directory for a future column.

There will be a dozen of my newly republished *Incredible Secret Money Machine II* book prizes awarded to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

As usual, we've gathered our *Names & Numbers* together into one sidebar. Be sure to check out the sidebar first before you contact our voice helpline for further technical help. ♦

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Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

RESOURCE BIN

Secret sources for desktop publishing stuff.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

This month, I thought we might take a look at some resources for low end desktop publishing. Why? Mostly because there are so many emerging hacker and tech opportunities here. Stuff easily done on your own.

We might start off with...

Laser printers

The desktop publishing universe, of course, centers on laser printers. I overwhelmingly feel that the genuine Adobe PostScript level 2 printers are the *only* route to go here. Once you do start using real PostScript, everything else is an outright joke.

The two best machines these days are the *LaserJet IV* by *Hewlett-Packard*, or the brand new *LaserWriter Pro* from *Apple Computer*.

If you can't afford a real PostScript printer, the *GhostScript* shareware on *GENie* PSRT can temporarily get you started quickly and cheaply, using *any* printer of almost any type.

We saw a lot more on PostScript in the October 1992 *Nuts & Volts*. Which is currently available as NUTS9.PS on *GENie*, or as hard copy in my *Resource Bin* reprints.

Based on all of my own needs for Book-on-demand publishing, here's what I feel is absolutely essential for a decent and usable printer...

- Genuine Adobe PostScript level 2 or higher. No clones.
- Duplex (two sided) printing option available.

- Turbo, RISC, co-processor or otherwise enhanced CPU.
- Full SCSI hard disk support.
- 600 DPI minimum plus edge and photo enhancements.
- Canon engine or better.
- Toner costs under 0.15 cents per page side.
- Service and repair manuals cheaply and readily available.
- 12 PPM minimum; 11 x 17 size option available.
- Easy toner end-user cartridge refilling/recycling.
- All repair parts conveniently end-user available.

A "perfect" PostScript laser printer does not exist today, but the last cut sure got close. HP misses bad mainly on the SCSI hard disk support and halftone photo enhancement; Apple misses mainly on the duplexing.

Three good resources to start you on PostScript are those blue and red books from *Adobe Systems*, (otherwise known as the *PostScript Tutorial and Cookbook* and the *PostScript Reference Manual II*), and my *PostScript Secrets* book/disk combo. All three are now

NEXT MONTH: Don looks at all the perils and pitfalls of patents and patenting.

available through *Synergetics* per my nearby ad. Lots of on-line tutorials, utilities, and other PostScript support appears on *GENie* PSRT.

Keeping a printer alive

For sane operating costs, you *must* do your own machine maintenance and all toner cartridge refilling. For instance, doing your own cartridge

recharges can lower your toner costs from five cents on down to a mere 0.2 cents per page. And a twelve second service trick can eliminate the need for your replacing a \$12 fusion roller or paying a computer store \$300 for the privilege of replacing it for you.

Sadly, Apple refuses to sell you their repair manuals. But the *Hewlett Packard* service manuals apply to the Apple and QMS machines, as well as any of the others that employ similar *Canon Engines*. HP now has overnight VISA service on major parts.

The best in laser printer training and individual parts (unlike HP, who usually only offers whole modules) is available from *Don Thompson*. Don also offers fuser rebuilding kits and occasional buys on used or exchange machines.

There are now lots of sources for refill toner. Most of them advertise in *Recharger* magazine. The typical refill costs are in the \$5 per bottle range.

Papers

Out here in Arizona, we have these *Price Club* warehouse stores. And they sometimes will loss lead paper at \$16 per case. Which is less than the large quantity wholesale truckload lot price of most major paper distributors. So, for plain old white laser/copy paper, try your nearest discount outlet.

There is a nationwide *Paper Plus* chain, with around a hundred outlets in thirty states. They are an excellent walk-in source for plain or fancy ream or case lots of papers and desktop supplies. All at reasonable to great prices. They are my first and foremost source for just about everything I do here at *Synergetics*. Because of where I live, I split my business between their Tucson and Mesa stores.

For ultra fancy papers in smaller quantities, the *Paper Direct* mail order service seems to be a winner. Prices are usually higher than Paper Plus,

but you don't have to buy more than you need. Paper Direct also offers a sample pack which is chock full of useful ideas.

Several imitators are beginning to copy the Paper Direct concept. A high profile one is *Quebolo*.

Paper-like stuff

Business cards are an first obvious desktop product that doesn't look like a plain old sheet of paper. You can easily use most any cover stock or parchment here.

Two firms now do offer pre-perfed business card stocks in a fair variety. One retail source is *Cards Now*. For a larger quantity source having lower prices and more material, color, and thickness options, use *Blanks USA*. Note that the positioning details vary slightly different between these two supply sources.

I've posted full layout utilities on both business card systems as files #505 CARDSNOW.GPS and that #521 BLANKUSA.GPS to my *GENie* PSRT.

Both sources are only 10-up instead of the 12-up you can easily get doing your own layouts. I'd guess this has to do with old Cunieform-on-clay-tablet printers that are PostScript illiterate. Dumb move, folks.

Certificate and border blanks are available from *Goes Lithography*. You can also make great ones of your own using parchment stocks.

The most obvious source of badges and badge kits is *Badge-a-Minit*. But lower prices are now available by way of *Super Badge and Button*.

Ticket blanks are offered by *Blanks USA*, *Ticket Express*, and *Quick Tickets*.

A wide variety of bumpersticker stocks, peel-and-sticks, fluorescents, foils, and similar specialty items is available in those *Wasau Print Packs*. Paper plus is one retail source.

Paper can be easily converted into notepads, forms, calanders, or other ripoffs by use of *Padding Compound*. This is cheaply available at *Paper Plus* or any other printshop source. While red and white are the only colors, you could add food coloring or ink to the white to make it any color you like. Real *Post-it Notes* blanks are available from 3-M. In several colors.

Applique transparent stick-ons for architectural use or whatever are sold by *Saga Stickybak* and *Stanpat*.

Direct-to-press laser printing plates are offered by both *REL Graphics* and *Dominick Argenino*. But the word on the street has it that plain old paper

plates can simply be laser printed and they will work just fine.

A good selection of perforated and die cut blanks is found at *Die-O-Perf*. Tickets, door hangers, tents and tags, etc... I really like their self-respons mailers. The menu covers are usually stocked by *H. Risch*, *Menu Graphics*, *Menu Cover*, or *MenuTech*.

Labels for VHS video splines and cassettes are carried by *Polyline*. And the 3-Up postcard mailers come from *Quill Office Products*.

Beyond paper

An incredibly wide variety of paper and plastic items can be run through most laser printers. But one definite no-no is *tyvek*. Besides the toner not sticking, *tyvek* can turn into a Black Lagoon style gloppy syrup at the fusion rollers. Yummy.

Most polyester and mylar products work just fine. Especially overheads and self-sticks. The lower temperature plastics, such as signcutting vinyls or acetates, usually also melt or at least soften. And some of the static cling plastics may be too thick.

But if any of these are paper or carrier backed, and are reasonably thin, and if you trim the edges, and if you are super careful, you can print these, at least sometimes. But do use extreme care, and experiment with a smaller piece first.

One interesting thin vinyl product that can print well with care is the *Form-X Film* from *Graphic Products*. Plenty of different colors and special effects here. Some new *Etch-and-Peel* polyester masking films are offered by *Kimoto* as *Rubylith* replacements.

Pellon is a popular nonwoven fabric interfacing product found in sewing stores. You can laser print on those thinner *pellon* gauges, creating a cloth transfer pattern. Or as a stencil for primary education kiddy stuff. The image isn't all that great, but it sure is useful. Do be absolutely sure to use the "regular" *Pellon*, rather than the "heat fusible" type!

One interesting color-over-clear polyester material is *Color Key* from 3-M. While intended for prepress proofing, all sorts of exciting color apps are possible.

Extensive self-stick products are available from *International Films*. Others advertise in *Converting* and the *Paper, Film, and Foil Converting* trade journals. Insider stuff.

Heavier stock for point-of-purchase displays or architectural models is

new from DON LANCASTER

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Whole works (all PostScript)	\$350.00
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A Book/Disk combination crammed full of free fonts, insider resources, utilities, publications, workarounds, fontgrabbing, more. For most any PostScript printer. Mac or PC format. \$39.50

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The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. \$18.50

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Access Laser Press 3502 W Earll Phoenix AZ 85019 (602) 272-2525	Crane Typesetting PO Box 487 Barnstable MA 02630 (617) 362-3441	International Film/FSK 45 Industrial Pkwy Woburn MA 01888 (800) 633-0140	PosterWorks 1 Kendall Sq. S323-600 Cambridge MA 02139 (617) 395-8350	Sunraise PO Box 487 Lexington, MI 48450 (800) 521-6367
Adobe Systems 1585 Charleston Rd Mountain View CA 94039 (800) 833-6687	Die-O-Perf Inc 1721 E Pioneer Dr Irving TX 75061 (800) 843-2807	Kepro Circuit Systems 630 Axminister Dr Fenton MO 63026 (800) 325-3878	The Printer's Devil PO Box 66 Harrison ID 83833 (208) 689-3738	Super Button & Badge 2338 W Burnham Milwaukee WI 53004 (800) 328-8272
American Safety Razor Razor Blade Ln Verona VA 24482 (703) 248-8000	Dominick Argenio Box 651 Park Meadows Pl W Patterson NJ 07424 (800) 631-0039	Kimoto 2915 182nd St Redondo Beach CA 90278 (213) 370-7411	Printer's Shareware 5019 West Lovers Lane Dallas, TX 75209 (214) 350-1902	Synergetics Box 809 Thatcher AZ 85552 (520) 428-4073
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Atlas Steel Rule & Die 2000 Middlebury Street Elkhart, IN 46516 (800) 255-8786	Font & Function PO Box 7900 Mountain View CA 94039 (800) 833-6687	Menu Graphics 3133 Chester Ave Cleveland OH 44114 (800) 321-9482	Quick Tickets G-3030 W Pasadena Flint MI 48504 (800) 521-1142	Don Thompson 23072 Lake Center Dr #100 El Toro CA 92630 (714) 855-3838
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Black Lightning Riddle Pond Rd West Topsham VT 05086 (800) BLACK99	GEnie 401 N Washington St Rockville MD 20850 (800) 638-9636	MICRTECH Group 12 Bartal Court Atco, NJ 08004 (609) 753-8502	REL Graphics 218 N Clinton St Chicago IL 60606 (800) 521-1080	Ticket Express 366 Melody Ln Casselberry FL 32707 (800) 544-8520
Blanks/USA 2722 Fernbrook Ln N Minneapolis MN 55447 (800) 328-7311	Gerber Scientific 83 Gerber Rd S Windsor CT 06074 (203) 644-1551	Midnight Engineering 111 E Drake Rd S7041 Ft Collins CO 80525 (303) 491-9092	H. Risch PO Box 567 Rochester NY 14602 (716) 232-6938	Transfer Magic/EZ Intl 130 Grand St Carlstadt NJ 07072 (201) 935-9005
Bove & Rhodes Reports Box 1289 Gualala CA 95444 (707) 884-4413	Goes Lithographing 42 W 61st St Chicago IL 60621 (312) 684-6700	OmniPress 454 W Johnson St Madison WI 53703 (800) 828-0305	Saga Stickyback 400 Hwy 69 South, S105 Minneapolis, MN 55246 (800) 328-0727	TypeWorld One Technology Park Dr Westford MA 01886 (508) 392-2157
HS Boyd 6915 E 14th St Tulsa OK 74112 (918) 835-9359	Grantham/Polly-Stamp 418 Central Ave NE E Grand Forks MI 56721 (218) 773-0331	Paper Direct 57 Romanelli Ave S Hackensack NJ 07606 (800) A-PAPERS	Seybold Publications 428 E Baltimore Pike Media PA 19063 (215) 565-2480	U&Ic 2 Dag Hammarskjold Plaza New York NY 10017 (212) 371-0699
Cards Now 6401 Odana Road Madison, WI 53719 (800) 233/9767	Hartco 1280 Glendale-Milford Rd Cincinnati, OH 45215 (800) 543-1340	Paper & Foil Converter 29 N Wacker Dr Chicago IL 60606 (312) 726-2802	SignCraft PO Box 06031 Ft Myers FL 33906 (813) 939-4644	Unibind/Pelsaer 4125 Prospect Dr Carmichael CA 95608 (916) 967-6401
Challenge Machinery 1810 E Industrial Park Dr Grand Haven, MI 49417 (800) 866-7800	Hewlett-Packard PO Box 10301 Palo Alto CA 94303 (415) 857-1501	Paper Plus 3820 S Palo Verde #108 Tucson AZ 85714 (520) 889-9500	Specialties Bindery 4815 Lawrence St Hyattsville MD 20781 (800) 638-LOOP	USI Image Creators PO Box 644 Branford CT 06405 (800) 243-4565
Coburn Corp 1650 Corporate Rd Lakewood NJ 08701 (201) 367-5511	H-P Manuals 19310 Pruneridge Ave Cupertino CA 94014 (800) 752-0900	Photolabels 333 Kimberly Dr Carol Stream IL 60188 (708) 690-0132	Stanpat Products 366 Main St Port Washington NY 11050 (516) 883-8400	Velo-Bind 650 Almanor Ave Sunnyvale CA 94086 (800) 538-1798
Converting 301 Gibraltar Dr Morris Plains NJ 07950 (201) 292-5100	HIX Corporation 1201 E 27th St Pittsburg KS 66762 (800) 835-0606	Polyline/PolyQuick 1233 Rand Rd Des Plaines IL 60016 (708) 390-6464	R.A. Stewart 641 S Palm Unit H La Habra CA 90631 (213) 690-4445	Wausau Paper Wausau Coated Sales Wausau WI 54401 (800) 835-7117

available through *Fomeboards*.

The interesting alternate materials, including holographics, prismatic, foils, glow-in-the-darks and such are offered by *Coburn*. Some are directly laser printable, but most are not.

Toners to print your own checks and other banking documents are sold through the *MICRTECH Group*.

An older product is called *Transfer Magic* and should be findable at your local notions store. This instantly but

destructively will convert any toner image into a heat transfer applique. The product works by dissolving the paper out from behind your toner image. For T-shirts.

Sandblasting or glass etching from

toner? Why not? Check *Hartco* for the masking materials.

The options on scoring, slitting, or perforating include *H. S. Boyd*, *Atlas Steel Rule*, or *American Safety Razor*.

Unusual pad printers are available which can let you print on *anything*, including watermelons or eggshells. See my #170 PADPRINT.TXT on *GENie* PSRT for full details.

Your custom photographs on thin peel-and-stick make a great way to add full color to any desktop product. One source is *Photolabels*.

We've seen in previous columns how toner can make an excellent etch resist for printed circuits. Two new and exciting products are the *Toner Transfer System* from *DynaArt Designs* plus the direct transfer system from *Techniks*. The *DynaArt* product also can be used for decals and transfers. One traditional source for all printed circuit supplies is *Kepro*.

Magnetic sheeting for everything from business cards to truck signs is offered by *The Magnet Store*. Smaller pieces, of course, are also found at your nearest Wal-Mart.

You can create metal dialplates and museum displays using either *Fotofoil* or *Metalphoto*. *Fotofoil* also ended up with 3-M's older *Scotchcal* vinyl label system. Now renamed *Dynamark*.

You can easily convert PostScript images into rubber stamps by using the photopolymers available in small quantities from *Grantham*. Or in larger lots from either *R. Stewart* or *Merigraph*. Some really neat stuff.

Thermal transfer toners for T-Shirt printing are sold by *Black Lightning*. But these are still costly and give only mediocre results.

Fuzzy stuff for T-shirts and Gimmie caps is offered as flocks by *Hix* and as hot split plastisols by *Gerber*.

Real thermography ("raised" print) from toner? Yup. Check into the new *Bennett LaserBrite* system. A spray on glop softens the toner. You then dust on thermography powder, and apply some heat. Even a high intensity desk lamp could be used. Two traditional sources for thermography powders include *Sunray* and *Therm-O-Type*

More info on unusual toner tricks appears in my #435 TONERTRX.PS on *GENie* PSRT.

Bound and determined

It's real hard to find decent and useful ways to hold pages together. There's a lot of obscenely overpriced atrocities out there masquerading as

TRADITIONAL PRINTSHOP TRADE JOURNALS

American Printer

29 N Wacker Drive
Chicago, IL 60606
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California Printers

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(714) 836-9653

Graphic Arts Monthly

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Graphic Arts News

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High Volume Printing

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Impressions

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New York, NY 10036
(212) 869-1300

In-Plant Printer

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(312) 564-5940

InPlant Reproductions

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Instant Printer

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Northbrook, IL 60065
(312) 564-5940

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Printer's Hot Line

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(515) 955-1600

The Printers Shopper

PO Drawer 1056
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(800) 854-2911

Printing Impressions

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Printing Journal

Box 91447
Pasadena, CA 91109
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Printing News

245 W 17th Street
New York City, NY 10011
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Publishing Technology

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Philadelphia, PA 19108
(215) 238-5300

Quick Printing

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Port St Lucie, FL 34984
(407) 879-6666

Screen Printing

407 Gilbert Avenue
Cincinnati, OH 45202
(513) 421-2050

useful binding systems. In general, the bigger the company, the *worse* the system and the bigger the ripoff.

Saddle stapling is a useful low-end method, but it usually needs special costly *long throw* staplers. One thin document solution for such things as proposals or Fire Department annual reports is that *Personal Velobinder*. Of the dozens of those thermal binding systems offered, I have found the *Unibind* system to be the best choice. Even better is Unibind's new *Pelsaer* binders. These are just a flyleaf pair holding a U-shaped hot glue channel. Any cover material of any style can be used, including spline binding. I feel that this *Pelsaer* is by far the most outstanding binding system available today. Bar none.

Cover durability can be upgraded by *Bakerizing*, a zero cost process that dramatically improves the toner gloss and density. *Kroy Color* is a system that lets you overlay hot stamp foils over toner. Of the many laminating systems, *USI* offers the lowest costs and widest selections. A more costly competitor is *GBC*.

There is no sanely priced way to trim books or other stacks of paper. Your best bet is to borrow or trade time to someone who has a guillotine cutter. A quality cutter will set you back at least \$1500. Of these machines,

the best two selections are either the 14 inch *Triumph* electric or the 18 inch *Challenge* manual.

More on Bakerizing, cutters, and binding in general appears in my #569 BINDCUT.PS.

Going beyond yourself

What if you need more quantity or higher quality than you can deliver on your own? The intermediate step up is a *service bureau*, while the ultimate trip is to pick the traditional volume printing route.

David Seid of the *Access Laser Press* operates a superb Book-on-Demand operation in Phoenix. It is based on PostScript files electronically sent to his high speed Xerox *Docutech* system. And backed up by the full bindry and all the "real ink" traditional printshop techniques. Costs are unbelievably low for books in dozen to hundred lots. So is the typical turnaround time.

David also offers free boomerangs. But he has been getting a high return rate on these.

Uh, I'd guess we had better call this next one large format printing. The *PosterWorks* service bureau offers full color PostScript Printing of any larger formats, up to and including those a *quarter acre* (!) in size. Which is right up there in the "adequate" range.

Be sure to check your local zoning

first. One use is 1:1 scale roadmaps.

In general, a plain old printshop or jiffy printer is a poor place to get a book produced. Chances are they will farm it out to a specialized *short run* book publisher.

One of the highest quality short run outfits is *Thompson Shore*, who also offer a very nice free newsletter and sample hardbound books. My current favorite here is *BookCrafters* who did my *Incredible Secret Money Machine II*.

One rather low cost outfit is *Crane Duplicating* who specialize in the fast turnaround of *bound galleys*. Bound galleys are "sort of" books that get sent ahead of time to reviewers so the reviewer's comments can appear on the "real" book copies later sent out in much higher volume.

Two firms that center on printing the wire bound and "lay-flat" manuals and directories are *Specialized Bindry* and *OmniPress*. *Specialized* has a free video available.

Useful magazines

I've found most of the slick desktop publishing magazines to be less than useless. At least for me. These are usually so strongly advertiser driven that they positively refuse to ever give their end users any critical, genuinely useful, or cost saving low-end info. They are forever getting their "before" and "after" examples mixed up on all their page makeup stories. And they don't have the foggiest notion how to properly test a PostScript printer.

But I have located several useful desktop related magazines. We have already seen how the *Recharger* mag is essential for toner refilling, repairs, and maintenance.

One freebie is *TypeWorld*, who have just renamed themselves *Electronic Publishing*. This one is mostly for new high end product announcements, but is rather well done. Funny editorials too. Intentionally so.

A great typography magazine is *U&lc*, otherwise known as *Upper and lower case*. Great heaping bunches of font stuff here. It also is in the running for the most bizarre mag anywhere ever. Sadly, qualifying for free subs has recently gotten harder. Pretend you are an ad director and see what happens. Even paid for, this one is a valuable asset.

Adobe's own *Font and Function* is another useful info source.

Two expensive insider newsletters are the great *Bove and Rhodes Insider's Report*, and that "industry standard"

but unbearably stuffy *Seybold Report on Desktop Publishing*.

Joe Singer's *Printer's Devil* is one absolute gem of a low-cost, low-end, and labor-of-love newsletter. Whose motto is "A press in every home. A home in every press. This one is also a must have.

My favorite magazine for the sign painting trade is *Signcraft*. It's got lots of immediately useful desktop ideas in it. One of their competitors is *Sign Business*, which just barely misses.

And, of course, Bill Gate's *Midnight Engineering* has lots of desktop stuff in it, along with even more on making it while running your small scale tech ventures. By one of those astonishing coincidences that infest these pages, I do seem to have a *Blatant Opportunist* column in *Midnight Engineering*.

Traditional printshop resources

Many of the tools, supplies, ideas, and the tricks for desktop publishing ultimately get stolen from traditional printshop supply sources. The bad news here is that traditional prices are nearly always outrageously high, and much of the sales help is uncaring, incompetent, or worse. It is trivially easy to get badly ripped off on used printing machinery.

The good news here is that there are lots of printer's trade journals out there. Many of them are free, and just about all of them do have useful ideas and leads for you.

I've created a second and separate sidebar for these traditional printshop trade journals. Your best single choice is probably *Quick Printing*. *Quick Printing's* answer to our Resource Bin is *Helene's Hotline*; she finds obscure sources of supply for really unusual printing materials and services. An on-line service and data base is also newly offered.

Instant & Small Commercial Printer and *Printing Impressions* are both pretty useful, as is the *Graphics Arts Product News*.

Note that the *Printer's Shopper* isn't what you think it is. It is just a single source supplier catalog. Complete but costly. The leading national printer shopper magazine is really *Printer's Hot Line*. Regional variations include my western favorite, the *HorseTrader*, and the *California Printer*. Chances are there are others out in your neck of the woods.

Please let me know about them. A free ISMM for your trouble.

The *Impressions* trade journal is

intended for the T-shirt and gimmie cap printers. It's likely that the heat transfer toners will show up here first, along with plenty of other new laser printing apps and opportunities.

I suspect I may have missed a few other mags here, so let me know what you can come up with.

There's also a great new printshop shareware service known as *Printer's Shareware*. Mostly IBM based, though.

This Month's Contest

For this month's contest, tell me about any obscure or off-the-wall resource for desktop publishing. But keep it low end or little known.

There will be a dozen of my newly republished *Incredible Secret Money Machine II* book prizes awarded to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

As usual, we've gathered our *Names & Numbers* together into a pair of sidebars. One for desktop publishing resources and one for printshop trade journals. Be sure to check out these first before you do contact our voice helpline for further tech help.

The future...

A crying need still remains for a no-nonsense or strongly user-oriented and advertisers-be-dammed desktop publishing magazine which honestly and outspokenly covers the *real* low end issues and problems. So, there's this ugly rumor circulating that it is going to be called *On-Demand!*, and otherwise known as *The Journal of Alternate Publishing*.

Write or give me a call if you are interested in subscribing, advertising, authoring, or co-publishing in such a new venture.

Let's here from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number thirteen

Perils and pitfalls of patents and patenting.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

This month, I thought we'd take a slightly different tack. Instead of my showing you lots of great places to get stuff, I will be showing you the *one* resource that you should studiously avoid at all costs. Because it is *certain* to waste your time, energy, money, and sanity.

The term *mark* first came from the carnival midway. Any time a scam operator (the *rube* in carneyspeak) had significantly lightened a prospect's wallet, he would give him a friendly exiting pat on the back. Along with a supporting "Gee Fella, that's too bad."

Unmentioned and unbeknownst to the lightenee was the fact that the rube had secretly dipped his hand in a hidden stash of powdered chalk just before the pat on the back. And thus *marking* a large "X" on the lightenee, clearly identifying him as worthy of special treatment by the next rube on down the line.

Eventually, every non-rube who so much as entered the carnival midway area became known as a mark. And were contemptuously treated as such.

These days, we no longer have too many marks left. So, you substitute the term *inventor* instead. Any time an "inventor" context crops up, you are assured of an uneven playing field very much comparable to a carnival midway or a casino floor. A scene which is intended primarily to (A) liberate as much money as possible from the mark, and (B) to keep the status quo exactly where it is.

The foremost reason to studiously avoid any "inventor" context is the totally absurd popular mythology which now surrounds patents and inventing. Nearly all of which is dead wrong. To prove this to yourself, just mention the word "patent" at any party and then observe the ludicrous disinformation heaped upon you.

Then challenge them to name *one* individual anywhere, ever, *whom they personally know* that, *in a small scale context*, has shown a net positive cash flow from their patent involvement. A cash flow that was worth the time and effort involved.

No, the windshield wiper guy has not collected yet. The Sears wrench dude has wasted his entire lifetime by tilting at windmills. To me, Hyatt looks like a rube. Tesla died a pauper. The patent system drove Armstrong to suicide. And Edison was a ripoff artist who made most of his bag by simple theft, using the most ruthless gaggle of renegade patent attorneys ever assembled anywhere.

So much for urban lore.

Now, patents might or might not retain at least a marginal utility in a Fortune 500 context. Our concern here

NEXT MONTH: Secrets of starting up your very own craft or tech venture.

is simply whether patents are a useful or appropriate tool for a small scale startup or an individual.

Out of some *six million* patents filed to date, I have yet to find *one* example of a lone individual who has profited from patents. On the other hand, my patent victim files are bursting at the seams. Putting my money where my mouth is, a free new *Incredible Secret Money Machine II* to any current *Nuts & Volts* subscriber who is now able to

personally claim a worthwhile net positive cash flow from their patent involvement done as an individual or small scale startup.

As a mark and not a rube, of course.

Your second largest reason for the uneven playing field is the patent system itself. Over the years, I have observed that *any individual or other small scale involvement in the patent system is virtually certain to end up as a net loss of time, energy, money, and sanity*. Most often, your state lottery is a vastly better investment.

Very simply, patents are almost always inappropriate, time-wasting, counterproductive, vibe-destroying, and totally unnecessary tools. At least when misapplied within small scale or individual contexts.

It is fine to serve as an *industrial product developer*, or run a *prototyping house*, be a *concept consultant*, or work as an *evaluation specialist*. All of these form acceptable roles in society for which, at least occasionally, you might end up being well rewarded. These are also the sorts of things you should be striving towards.

Now, I simply cannot fathom why anyone would ever purposely refer to themselves as an "inventor". This is the same as pre-chalking yourself up before you enter the carney midway. Which leads us up to Horschnogge's first and second rules...

RULE #1- Do not ever, under any circumstances, refer to yourself as an inventor or behave like one. To do so will open you to interminable scams. Don't even let anyone else so much as suspect that you are even capable of inventing or marketing anything.

RULE #2- If you ever do associate yourself with any inventor's resource, use a fake name and wear a disguise. Remember that you are an impartial observer and a disinterested outsider. You are neither a mark nor a rube.

The Facts

Let's replace the popular myths with some cold, hard facts...

(A) A patent is only the right to sue someone in a costly and lengthy civil court action.

(B) The cost and time to get a patent is utterly negligible compared to the cost and time required to defend and maintain a patent.

(C) Fewer than one patent in one hundred ever shows any net positive cash flow. Your state lottery is a *much* better investment.

(D) Fewer than one patent in one thousand could survive any diligent enough search for prior art in obscure enough places.

(E) Prior art is not needed to bust a patent. All you have to do is show it was obvious to a practitioner in the field. All prior art *must* be shown.

(F) Ideas are worth less than ten cents a bale in ten bale lots. It is only the final out-the-door products that potentially have any value.

(G) Most firms would rather pay their legal department \$100,000 to bust your patent than stoop to paying you \$10,000 in royalties.

(H) Winning ideas are *always* stolen. You *will* get ripped off.

(I) To work within the US patent system takes a lifetime commitment to lawyers, courtrooms, and legal issues. Time infinitely better spent improving your products.

Inventor's Organizations

Yes, there are a lot of inventor's organizations out there. Hundreds of them in fact. I've recently spent a lot of time and effort gathering together what I believe is the most recent and complete list available anywhere. I've now posted this resource as my #538 INVENORG.PS up to GENIE PSRT. This unique listing is also available in my *Blatant Opportunist* reprints from my *Midnight Engineering* columns.

I like to think of these groups as a meadow that is full of wolves, sheep, shepherds, and watchdogs. The wolves are all of those commercial invention marketing services. The sheep are the inventor's self-help support groups. The shepherds are those government bureaucrats, who'll usually do more harm than good. And the watchdogs

are the few unique individuals who have dedicated their lives to keeping all the sheep out of trouble.

The three organizations that I can personally recommend include Bobbi Toole's *United Inventor's Association*, Ray Watts of the *Inventor's Assistance Program*, and Ed Zimmer, who works with the *Michigan Inventor's Council*.

Invention Marketing Services

Everybody picks on poor old lobo. Yet *canis lupis* gotta eat. And they do cull the herd of the weak, the infirm, or, in this case, the abysmally naive and the monumentally dumb.

The wolves, of course, are all those invention marketing firms. You can get a complete list of these by cutting out all the fine print classified ads in *Popular Science* or *Popular Mechanics*, *Entrepreneur*, and similar places that scream "Inventions Wanted".

Just as typical vanity publishing offprints form the kiss of death for a first novel, many invention marketing firms are the kiss of death for any developable product. These outfits are basically hired guns, who, for a price up front, do perform various services. Such as patent searches, data bases, press releases, or invention fairs. You already know what an invention fair is - That's a place where you go to steal the few good ideas and laugh at all the rest of them.

You normally would not ask an ad agency if you needed an ad. Nor a used car dealer if you needed a car. Nor a mugger if you needed mugged. So what answer would you expect if you asked an invention marketing firm if your new idea was worthy of development? Give me a break.

The wolves are largely responsible for all of the absurd popular patent mythology. That quarter you sent in for your *inventor's idea kit* from a classified *Popular Mechanics* ad in the seventh grade has caused far more damage to far more people than you could possibly imagine. The whole "Get an idea" - "Patent It" - "Beat the cash-waving Fortune 500 companies away with a stick" - "Retire rich and famous" outright ludicrousities can all clearly be traced to these insidious, vile, and despicable classifieds.

One of the largest and oldest of these invention marketing firms has recently decided (possibly with the slightest of federal nudges) to include their track record with their original mailings. The odds of them licensing an accepted and prepaid idea has

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US Dept of Commerce
Patent & Trademark Office
Washington, DC 20231
(800) 359-3997

Raymond Watts
Inventor-Assistance Program
Battelle NW Box 999 K6-54
Richland, WA 99352

Ed Zimmer, MI Inventors
1683 Plymouth Road
Ann Arbor, MI 48103
(313) 663-8000

been 100:1 against, and the odds for any positive cash flow comes in at 700:1 against. Of the few which did show positive results, most of them flat out were not worth the effort.

Now, some people may be appalled at these figures, but they sound about right to me. Successfully turning any raw concept into a positive cash flow is one very rough row to hoe. These odds may in fact be much *better* than you can do on your own.

In many ways, the wolves are just selling wish fulfillment and dreams. Again similar to a vanity publisher or, for that matter, an X-rated vid rental. If anything, I pretty much admire the wolves rather than condemn any of them. After all, a well executed scam is a joy to behold.

And an art form unto itself.

Typical inventors who actually use these invention marketing firms have already preshot themselves in the foot before they've begun and literally do not have a snowball's chance in hell of accomplishing anything.

Almost always, your "new" and "unique" idea is not. Chances are that others have plowed this ground long ago. If not, "synchronicity" just about guarantees that lots of others are now thinking along the same lines.

Over the years, I have developed many ideas and concepts. Several of which I have or continue to receive royalties over. And continue to center my lifestyle on. Countless others of which have failed miserably. On the basis of my own track record and on those of some winning associates, I strongly feel that the following are *absolutely essential* if you are going to

profit from a concept or idea:

(A) You must now be a reasonably experienced industry insider, who is eventually capable of turning into a guru or expert.

(B) You have to very aggressively subscribe to all of the more popular industry trade journals.

(C) You must know and love the mainstream industry tools and their supporting math, along with all of the theoretical underpinnings.

(D) You must tune in to the related trade groups, scholarly organizations, on-line resources (especially Dialog), and industry shows.

(E) You must be very aware of the political, legislative, competitive, and marketing realities of the target field.

(F) You must be in an area where innovation by individuals on a small scale is welcomed, rather than being regulated, legislated, or adjudicated excessively. Put another way, if it is automotive, forget it.

(G) Your preproduction prototypes must be in or beyond their advanced beta testing stage and have to clearly fill some unique needs or perceived needs in the mind of your end users. And, of course...

(H) You must studiously and very religiously avoid any and all contact with the patent system in any way, shape, or form.

I very strongly feel that omitting any of these core requirements can cause your new idea or concept to fail.

Many users of those wolf resources fail on *all* counts, not just a few.

Invention Pitfalls

What are the usual mistakes that beginning inventors and small scale startups usually make? Based on my patent victim files and your helpline calls, here's a bunch of them...

(A) The tendency to grossly and obscenely overvalue all unproven or undeveloped ideas; to assume that patents are somehow central to idea creation and marketing rather than an avoidable, costly, risky, and largely unneeded sideshow; and to assume that others are as excited as you are about your product or will place your interests over their own.

(B) Not recognizing that the *only* three responses to a "you are violating my patent" letter are to ignore the letter; to bust the patent; or obsolete the technology. Besides the obvious side effect of permanently pissing off your potential finest customer and making yourself an enemy for life. The totally unthinkable possibility of voluntarily paying patent royalties just does not come up. Ever.

(C) To assume that big industry (especially Fortune 500 companies) are actively seeking new products. In reality, most large organizations will avoid all change and will categorically refuse to so much as look at *any* outside submissions because of all the liability hassles. Innovation *always* comes from individuals and smaller startup firms.

(D) Trying to work towards the spectacular (and nonexistent) big win, rather than accepting simple and solid returns done over and over again. An average well developed idea should typically return around \$400 or so. If you are playing at a million to one odds, then you don't want to put more than a dollar of time or effort up for every potential million in expected returns. Ever.

(E) Assuming that others may be willing to pay more for some mythical and unproven sheet of paper instead of buying the solid risk reduction of beta tested, fully working prototypes and ready-to-use production artwork.

(F) Forgetting that not less than 95 percent of most any survivable patent search must be done in the industry trade journals, scholarly publications, and the on-line resources. The patent

system is your very *last* place to look for prior art.

(G) Failing to recognize that trying to profit from the patent system takes a lifetime total commitment to courts and courtrooms, to lawyers and legal hassles. Compared to lots of creative lab time spent actually developing and improving products.

(H) Not remembering that ideas are like pancakes or children. You should always throw the first one away.

Alternates to Patenting

The alternate to patenting that have worked best for me are...

(A) *Totally* avoid any and all contact with anything even remotely patent related. In any way, shape or form. Do so religiously.

(B) Do not even think of creating anything in any field in which you are not eventually certain to become an expert. An expert who is thoroughly familiar with the technical literature, the history of the field, the marketing realities, the insider trade journals, and the mainstream tools in use.

(C) Publish all your key secrets and ideas in a major magazine, leaving out no details, and omitting no insider secrets. This immediately produces positive cash flow for you and safely tucks all your ideas away in the public domain, preventing most others from attempting to patent them. This also exposes your new ideas to the widest possible audience.

(D) Attempt to set up some royalty arrangement with a small to medium firm in some position to market and distribute your invention. A normal royalty payment is typically in the five percent range. Now for the tricky part: *They must come to you*, and *never* vice versa. That is why it is super important to publish your ideas and creations and expose them as widely as you possibly can.

You should have one and only one defense against getting ripped off in any royalty setup – the expectation that you will be delivering newer and better stuff in the future. That's all.

(E) Apply the *shotgun* technique. There is no way that one single idea or product will hack it. To survive in this game, you'll need hundreds or even thousands of new ideas and concepts working for you on a total lifetime and total lifestyle basis. The

chances are that one or two genuine winners will pay for all the others lost or inevitably stolen.

(F) Be realistic. You do not create things to get filthy rich. Instead, you create things just because you like to create things and seem to have some compelling desire or need to do so. As long as there are still enough nickels to keep you going, that's all that really should matter.

This Month's Contest

For this month's contest, just tell me a patent horror story that involves an individual or a small scale startup. There will be one dozen of my newly republished *Incredible Secret Money Machine II* book prizes awarded to the best, along with an all expense paid (FOB Thatcher, AZ) *tinaja quest* for two going to the very best of all.

As usual, send your entries to me here at *Synergetics* and not to *Nuts & Volts* editorial. Let's hear from you.

For More Info

Two more *GENie* PSRT files about patents are my #477 NOPATENT.PS or #162 NOPATENT.TXT. And, of course, the "full set of plans" appears in my revised and updated *Incredible Secret Money Machine II*, available to you per my nearby *Synergetics* ad.

At this writing, an attempt is being made to convert the patent system into a "first to file" fiasco. Otherwise known as the *Patent attorney and patent examiner's relief act of 1993*. I am very much in favor of this legislation in that it will once and for all stamp out any remaining vestige of credibility of the US patent system, at long last revealing it for the utter ripoff it is for virtually all individuals and smaller scale startups. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number fourteen

Starting up your own technical venture.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENIE* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. You can call (800) 638-9636 for your voice connect info.

By the way, *GENIE* has just made two major improvements: There are now 800 numbers for those of you who live in really remote areas. A brand new visual screen interface makes things faster and friendlier for Mac users. PC users have already had the automated *Alladin* system in place.

I'm deeply saddened by the local version of *Elector Electronics* shutting down after only twenty some issues. The immediate causes seemed to be ads which cost too much and projects perceived as "too European".

Nonetheless, they published more hacker projects and better thought out hacker projects in each issue than just about anyone. Some back issues do remain in stock.

The European edition of *Elector* is still available.

There are bunches of good hacker mags left, though. You've probably figured out by now that *Nuts & Volts* has by far the widest selection of ad resources and has greatly expanded its construction projects and technical info columns.

The oldest continuously published newsstand magazine with the most

advanced tech coverage remains *Radio Electronics*. They've recently renamed themselves as *Electronics Now*. Their sister publication *Popular Electronics* is more for the beginners and low end projects. But note that this is *not* the one-and-only uniquely original PE of "Carl and Jerry" fame; only the name still remains.

Steve Ciarcia continues to publish his *Circuit Cellar Ink*, which is big on embedded controllers and computer aps. Like *Elector*, his projects are all thoroughly tested, well supported, and carefully developed. Most are also available as high quality kits.

The U.S. republishers of *Elector* do continue offering several well done specialty audio electronics magazines. These include *Speaker Builder*, *Audio Amateur*, and *Glass Audio*. The latter is for people still using vacuum tubes for their amplifiers.

To me, if you want to get a "tube sound", you just take a decent solid state amp and add some extra noise, hum, and distortion. Then you give yourself some second degree burns in embarrassing places. Similar to the ones caused by getting too personal with a 6L6GTB. The morphine-like endorphins released by the brain in

NEXT MONTH: Don reveals his professional prototyping tips, tricks, and techniques.

response to the burn pain seem to be the primary cause of the perceived sound differences.

Let's see. We've already covered the labor-of-love technical newsletters in the previous columns and in my ongoing *Resource Bin* reprints. And I will get around to the ham magazines sometime. Five other magazines of hacker interest include Forrest Mim's *Science Probe*; *Midnight Engineering* for

technical startups; *Whole Earth Review* for access to tools; Jeff Duntemann's great *PC Techniques*; and *Electronic Servicing* for handling all of your own consumer electronics repairs.

Are things really that bad?

It is real easy to get very depressed over the current hacker scene. A fine magazine has died. Heathkit has more or less folded. Although they do still offer some educational stuff. Several major tech book publishers are only the hollowest shadows of their former selves. Nearly all backlist titles have vanished entirely. Alarmingly, many community colleges are dropping their electronics programs entirely. Or sharply scaling back.

But the worst of all is the following horror story: I walked into Safeway and saw an "All paperback books 25 percent off" sign. I got to the register and a checkout person tried to charge me the full \$5.99. To make a long story short, I suggested I had this oddball hunch that the correct price might lie somewhere around \$4.49.

Two checkout persons, a bagger, an assistant manager, and even the store manager were *totally unable* to figure out just how much to charge me. After fumbling around for a quarter hour, they finally used my wild guess. They also were *totally unable* to determine how much vendor credit was needed to reconcile the register totals. As a wild stab in the dark, I told them I did feel that \$1.50 might come close.

Naturally, I got blamed for all of this. I was this here problem that had to be dealt with. Who was obviously ruining their day. And making them look real dumb to their boss. Yes, I was very polite.

It just never occurred to any of the Safeway employees that there was this thing known as "math". Or that you could do this math stuff without using any special machines. In your

head, even. One quarter of sixty is fifteen. Times three is forty five. A fraction of a penny is still a penny.

Or that far too many people still spend way too much time vegging out on that tapioca pudding scene in *Godzilla versus the Night Nurses*.

James Glick makes an observation on where all the American technical excellence of the earlier decades has come from. In his well done *Genius* biography of Richard Feinmann, he points out that practically all of the older engineers and scientists got that way by tearing apart table radios, fixing and modifying them along the way. Skills that any reasonably swift seventh grader could have very easily picked up on their own.

If this country is in fact going to hell in a handbasket, then there are obvious emerging opportunities in handbasket creation and distribution. Everybody will now want one. Get in ahead of the hoarders.

The other side of the coin, of course, is that we are now sitting on the most incredibly stupendous new collection of hardware and chips and systems and software. Many lifetimes could not even remotely begin to even start to exploit what we've now got.

So, what's in all of this for you? More specifically, just how do you go about starting...

Your very own venture

In the real world, the perception is the reality. Under no circumstances would you ever decide to volunteer that you were a student or a hacking hobbyist or a small scale startup. And *never* say that I sent you. That's almost as dumb as purposely calling yourself an inventor.

Only when and where absolutely necessary, you'll want to cause "them" to think they heard what they thought they wanted to hear. For "them" is in business to sell stuff. And "them" will show interest in you only as long as you appear to be a potential buyer.

Or in fact become one.

So, the best method to unstack the odds against yourself is to set up your own smaller technical business. The main reasons you would want do this initially is just to be able to qualify for those crucial free trade journal subs, and to provide some apparently valid place to receive data books and other useful tech info.

Much more on this in the *Resource Bin* reprints. Later on, you can worry about such things as actually doing

"real" business activities or even trying to make a profit.

Anyone could quickly and cheaply start their own technical business. I feel that the best startup form is called a *proprietorship*, otherwise known as "The business is you". Depending on where you live, your startup costs can be well under \$50.

First, you go off to your Secretary of State's office at your state capitol, or else play several rounds of telephone roulette with them. In Arizona, what you want is known as the *Trade Names Registry*. In this, you want to place the name for your new enterprise. They will probably insist that nobody else is using the name, and that the name is not deceptive or obscene. Although a local boiler room diamond scam did get away using "DeBeers" hoping the marks would confuse them with the real "DuBeers" diamond consortium.

You'll want to pick out something flexible and rather vague, high tech sounding, and expressing a "funkily cautious optimism".

Whatever that is.

My original trade name choice was *Synergetics*, largely because I do very much believe in Buckminster Fuller. But I have had several scam operators try to steal this name for everything from Oriental Rug ripoffs to hot office products. Later, when I became a "real" book publisher (You wouldn't believe the high you get over seeing your first ISBN number in real ink!), I added my *Synergetics Press*. There's apparently another *Synergetics Press* in Tennessee, but our paths don't seem to cross all that often. And the master ISBN directory carefully warns each about the other.

Bee registered Abeja, whose utter and profound significance becomes apparent to anyone with even the slightest smattering of espanol. She will sometimes go by *Abeja Associates* or *Abeja Discount Software*.

Some of the others around here are starting to look more and more like a free form Medieval guild. And all the much better for it.

Kathy St. George selected *Special Editions* for all her PostScript desktop publishing and script writing. Henry and Lamel Schneiker have used *HDS Systems* for their software consulting and multimedia productions. While Kate Daniel (my assistant sysop on *GEnie PSRT*) uses *Dantech*.

In Arizona, the costs are \$25 for a five year registration. In certain high tech parts of the country, a city or a

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county registration might also be a good idea.

Going further

A simple trade name registration is all you'll need to go into business for yourself. That's all there is to it.

Your next step is to go to the Post Office and add the name of your new company to the "alias list" or the "who resides there" card for your address, informing them that you will accept mail addressed to this new name. You keep this action as low key as you possibly can.

Also inform UPS and any express services that you are likely to use.

I feel that a separate post office box for your new venture is a very good idea. Here in Thatcher, it is the *only* route, as there is no home delivery.

At your bank, quietly add the new name to your signature card, and get yourself some checks printed up that include both your name and that of the business. Always start the new check sequence with number 4000 or higher. Again, do this as quietly and simply as you can.

With any of today's PostScript laser printers, it is utterly trivial to make up your own letterheads, stationary, and business cards. The cost is negligible, and you can do it yourself in minutes. Companies such as *Paper Plus*, *Paper Direct*, *Blanks USA*, *Cards Now*, and *Queblo* now offer you high quality full color blanks that you simply can't tell from the real thing. Lots of good examples are on my *GENie PSRT*.

You'll want to start answering your phone professionally, treating *all* calls as if they went to the switchboard of a Fortune 500 company. You can ease the burden on friends or family with email, selective ringing, or caller id. One source is *Hello Direct*.

Several things you probably do *not* want to do: One is to put a sign out front or let the neighbors know in any way that you've got a business. It is also *not* a good idea to tell the phone company, for your rates will go up.

The same goes for special business checking accounts.

From day one, you should keep accurate and meticulous records for all your business transactions. And

carefully separate the time and place you conduct your business from all of your other activities. The IRS defines the difference between a business and any hobby as "the genuine intent to show a profit" and "a conduction of affairs in a business-like manner".

Before you are allowed to deduct your business expenses, they require you to potentially show a profit at least two years out of five. Complete receipts and records are totally and absolutely essential here.

Certain hobbies, such as *Sears*, *IBM*, *Boeing*, or *Westinghouse* seem exempt from this two out of five rule. It sure would be interesting if they enforced the 2/5 rule as vigorously with the big hobby 500 firms as they do with the innovative small scale startups.

The IRS has recently gotten very ugly over the deduction of any home office space and costs. For instance, it is nearly impossible for any building contractor to try to deduct his home office expenses.

To get away with a home office deduction, this essentially has to be the *only* place you conduct business or meet *all* of your customers, and has to be clearly and exclusively dedicated as a work area. If you have *any* other employer, or if you go to somewhere else to do things for money, don't even think about a deduction.

I've found it pays to change your name slightly on most professional inquiries. So you can immediately sort business from pleasure. For instance, I consider "Donald E. Lancaster" to be unbearably stuffy. There is no way I would *ever* call myself that. Except to identify a professional request.

I've found that putting your phone in someone else's name (such as a wife's maiden name) is the ultimate in unlisted numbers. It also immediately separates the regular scams from the business ones.

Another trick that's revealed here for the very first time in print: *Never* answer the question "How are you today?" over the phone. *Say nothing!* The next person to speak *always* loses. People who are useful to you will go right on with their conversation, and never skip a beat. But those who are about to rip you off will pause and then lose their place in the script they are reading. Try it. This works 100 percent of the time.

Your first activities

The very first thing you will want to do after your business is up and

running is go to the library and spend several *days* very carefully studying the *Standard Periodicals Guide* and *Uhlricht's Periodical's Dictionary*.

Pick several thousand likely trade journals and phone or mail *each* of them. Get a subscription qualification card. Assuming they are a controlled circulation publication. If not, request a sample copy and their advertising rate card. The SCAR technique.

Once you subscribe to a few trade journals, the rest of them will climb all over themselves desperately trying to get you to subscribe.

After these start pouring in, you use the bingo cards to instantly become a technically literate and an up-to-date industry insider.

For more information

Scads more on all of this appears in my newly revised and self-published *Incredible Secret Money Machine II*, available per my nearby *Synergetics* ad. Autographed, even. And you can reach me electronically via *GENie* PSRT. Other *GENie* RoundTables of interest to you should include RADIO, IBM, MAC, HOSB (home office and small business), and DTP (desktop publishing). There's hundreds more where these came from. I've also got the no-charge voice helpline that you can access per the end blurb.

This month's contest

Let's have three different contests for this month. If you are in any way involved with ham radio, please send me a copy of the table of contents and the masthead of any and all ham mags you know about. Especially any of the oddball and obscure stuff on packet, RTTY, amateur tv, weather sats, key collecting, crystal sets, QRP, antique electronics, and such. And maybe tell me why you do or do not like your particular choices.

Or, to test your "any old seventh grader" radio repair skill levels, just tell me the purpose for the filament tap on a 35Z5.

Or, if you are a Safeway employee, please send me a copy of the tapioca pudding scene in *Godzilla versus the Night Nurses*. Unsplattered copies of this cross-genre classic are getting real hard to find.

There will be some newly revised *Incredible Secret Money Machine II* books going to the dozen or so best (or earliest) entries, along with an all-expense-paid *tinaja quest* (FOB Thatcher, AZ) for two going to the

best of all.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number fifteen

Secrets of professional prototypes.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENIE* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. You can call (800) 638-9636 for your voice connect info.

One door closes and another opens. Last month we saw the US version of *Elector Electronics* fold. But this month the Gernsback folks (aka *Electronics Now*, *Popular Electronics*, and *Science Probe*) are newly publishing a local reissue of *Silicon Chip*, a very popular Australian hobbyist magazine. Time will tell how good a hacker resource this turns into.

Secrets of professional appearance

Getting a new project to look decent can be a real hassle. This month, I thought I'd review some of my tricks and techniques needed for making prototypes and models that are both attractive and professional.

If you are not really into models and mechanical stuff yourself, you may want to check around and see what resources you can find locally. For instance, a neighbor who is also a retired machinist can be an extremely valuable source of low cost help and ideas. So can non-obvious sources as a trailer hitch works, a blacksmith, or an air conditioning shop.

Do you have a nearby community

college? Do they offer a *Basic Machine Shop 102* course? This can give you an unrestricted access to an incredible set of tools for a few dollars per month.

Which tools?

I've got my own little shop I use for mechanical work. It is separate from my electronics lab. There's actually very little in it. A small but quality multi-speed drill press. Be sure yours provides a quill feed and has enough precision to put a #67 printed circuit drill exactly where you want it.

A *rotary table* is an unusual drill press accessory that I've found very useful. This basically has three cranks on it for X, Y, and rotation. Besides light milling, this table is real handy when you want to drill two or more holes a precise distance apart.

Everybody's gotta have a lathe, right? Wrong, actually. Lathes are highly overrated. But I do have an old six inch *Sears/Atlas* version, plus all its usual accessories. Plus, of course, a small grinder for the tool bits. Sadly, I have done very little with this superb machine. Possibly more coil winding than anything else.

A small circuit board shear is a must. The only reasonable choice here

NEXT MONTH: Don looks at several ongoing robotics opportunities.

is the twelve incher available from *Kepro*. Hint: glue some small mirrors on the table under the shear and cut things *marked side down*. This greatly improves your accuracy.

You will want several small but sturdy work tables. And, of course, a decent and somewhat largish bench vise. Non-obvious but very valuable is a small punch set. I use the *Roper Whitney XX*. This is a half ton job with

a four inch throat. It can punch up to a half inch or so in light aluminum or circuit boards. The round punches are surprisingly cheap. And even some fancy rounded rectangular punches I needed for a custom keyboard were not all that bad.

A small collection of hand tools is also useful. Among the more oddball items I find essential are an automatic center punch, a scribe, and a nibbling tool. A table mounted router can also be surprisingly versatile.

Cases and enclosures

These days we have lots of low cost plastic cases available in a stunning variety. Even including battery cases and belt clips. While *Radio Shack* is your cheapest and most convenient source, a very wide variety of these boxes are available from *Bopla*, *Bud*, *EAI*, *Hammond*, *LMB Heeger*, *PacTec*, *Serpac*, *Vector*, and *Vero*.

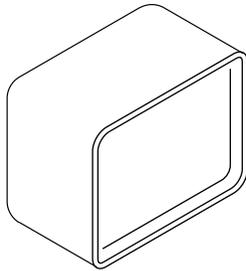
Be sure to select a case that uses a modern engineering thermoplastic. There are still a few older *Bakelite* or phenolic cases kicking around. These are much harder to work with and shatter quite easily. Your usual clue here is a case that is offered only in black or dark brown.

Naturally, you'll find all sorts of case options from our various *Nuts & Volts* advertisers. At great prices.

My favorite low cost ultra rugged outdoor rated waterproof plastic case is the one offered by *Pelican Products*. This dude is ideal for a solar pump controller or a hot tub timer. And can end up fairly cheap when ordered in reasonable quantities.

I guess I've tended to build up my own enclosures, rather than buying ready-to-go ones from others. This can give you exactly what you want exactly how you want it. Custom enclosures can also be much cheaper, especially if you are going to go into limited or small volume production.

Let's look at three of my favorites. The first is the *Zero Box*....



Zero boxes are simply deep drawn aluminum shells provided in a wide variety of sizes. While many of the *Zero Manufacturing* products are ultra fancy Mil-Spec offerings, their basic boxes are not all that costly.

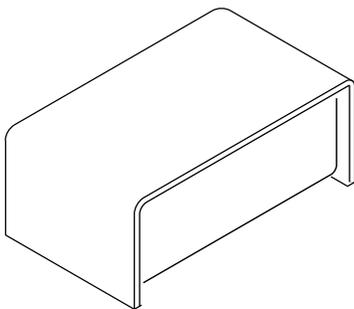
You can use the box on its side as shown here for traditional electronic projects. Such as an audio oscillator or a color tv pattern generator. Or you can use a shorter box on its back for flat projects such as an stereo mixer or a psychedelic lighting control.

Many Zero boxes are available with optional tight fitting inside or outside lids. A recessed inside lid is shown above. A *MetalPhoto* dialplate also works beautifully here.

Zero also offers a nice gray epoxy splatter finish as an extra cost option. Being aluminum, these boxes also can anodize beautifully in dozens of bright colors. Check your local plating shop for more details.

Do note that any sealed box can let internal parts overheat badly. Limit these boxes to lower power systems. Use the box itself for a heatsink. Or add external heatsink extrusions. Or provide enough ventilation. Vented hole plugs are available at low cost from *Stimpson*.

My second favorite prototyping box is the *clamshell*...



What you have here is simply two "U" shaped pieces of aluminum or other sheet metal. The bottom piece can be finished by a heavy textured sanding followed by a clear epoxy or urethane overcoat. The top cover has a fake Naugahyde vinyl glued on.

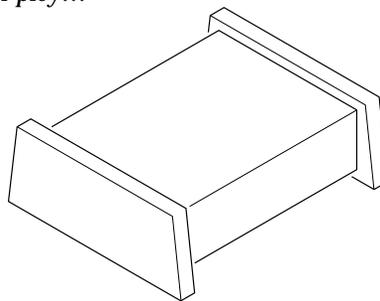
Don't feel bad about all of those cute little Nauga pups that gave their life for your project. The ones with those big, sad eyes. The pups are all bludgeoned at an early age and never knew what hit them. Besides, there are at least a dozen or two of them left. At last count.

Any accessories such as a carrying handle or a "tilt-up" base stand are conveniently available. One trick I've used for a comfortable handle grip is to simply use a many-turn vinyl wrap over a heavy aluminum bracket.

Two or more ordinary "L" brackets can be used to hold bottom to top. Knobs for tilt-up bases and such are offered through *Dimco-Gray*. *Keystone Electronics* is one low cost source for case hardware. Other useful sources do include *Bead Manufacturing*, *Micro Plastics*, and *ITW/Fastex*.

For model and display materials, *FomeBords* is the source to beat. A final resource for just about all case and hardware materials is *Small Parts*.

My third favorite is the *wooden end rail ploy*...



Your main chassis is simply a bent piece of aluminum. Again finished by a heavy sanding and a clear overcoat. The plain old bends can be done on any sheet metal brake. Your end rails can be an exotic hardwood of your choice that has a groove milled or routed in it with a Moto-tool, rotary table, router, or whatever.

I've found that older scrap forklift skids can have some beautiful small pieces of recoverable oak in them. A good source for exotic and unusual woods is *Edelco*. My current choice is pecan, since I live in a pecan grove undergoing heavy pruning.

For projects which will rarely be assembled and disassembled, you can make use of "L" brackets and wood screws. Access these from an open bottom. For removable end plates, use some sort of threaded insert or glue a bracket in place.

Pop rivets are another very useful fastening method. But do note that these are semi-permanent. You'll

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have to drill them out if you ever need any access. Which might be just what you want. For a plug in dimmer or other "live" power line project.

A variation on pop rivets can give you "instant threads" in thin metals or even in wood. Squeezing an insert will cause a portion of it to collapse, locking a threaded cylinder into your panel. Early sources included *Rivnuts* from *B.F. Goodrich*, but I'm not sure these are still available. Their fancy "industrial grade" tools cost much more than a pop rivet gun. Any larger hardware store should have pop-rivet compatible thread systems.

Panels and artwork

It is now ultra trivial to get first rate and fully professional artwork for all of your dials and panels. The secret is the incredibly stupendous PostScript computer language. We have seen details on this back in *Resource Bin #9*, also available in my Resource Bin reprints and as file #511 NUTS9.PS on my *GEnie PSRT*.

I've got bunches more for you on PostScript. Just write or call for your free *PostScript Insider's Secrets* mailer.

And my *Synergetics* stocks everything you'll need to become a PostScript pro. Hundreds of PSRT library files are also downloadable. This is by far your fastest and lowest cost method to get started in PostScript.

The simplest and cheapest way to get great looking prototype panel art is to use raw PostScript to print onto the self-stick mylar sheets offered by *Paper Plus* or *Paper Direct*.

You then take a *second* and *clear* or *see-thru colored* self-stick mylar sheet and apply it *over* the first sheet, thus locking the toner inside a two layer mylar sandwich. Then you just stick these onto your panel.

If you are extremely careful, you can also use your final artwork as a drilling and punching guide.

A new and extremely promising hacker prototype imaging system is known as the *Toner Transfer System* offered by *DynaArt Designs*. We've seen in past columns how useful this product is for any direct toner printed circuit prototypes. Where you directly transfer your toner from PostScript to the circuit board for direct etching.

The *DynaArt* material can also be

used in its *decal* mode. The material is basically a stable transfer sheet onto which a thin high temperature but water soluble glue has been applied. You can try the same thing yourself by using a premium white glue from the art store and a windshield wiper for an applicator. But the *DynaArt* stuff is low in cost and ready to use.

At any rate, you laser print your PostScript artwork to the *DynaArt* material. Their decal method differs slightly from their printed circuit transfer method. To use their decal method, you'll first print. You next overspray your choice of a removable lacquer or a permanent urethane clear coating over the toner images and beyond their edges. When dry, you cut the individual images somewhat oversize and soak them in water. The backing coat dissolves and the toner can be slid onto the panel. Just like a traditional model railroad decal.

Pressure and heat can be applied to help fuse the toner to your panel. You can optionally remove the lacquer with a suitable solvent, giving you a "silk screen" effect.

Speaking of which, silk screens

have been the traditional method of doing panels for limited and small volume production. Because of the front end expense and time cutting a screen, these work best for a dozen or more identical panels. Three good sources for silk screen materials and supplies include *Dick Blick*, *Advance Process*, and *Southern Sign Supply*.

And, of course, your leading source for all printed circuit materials and supplies is *Kepra*.

While you'll still find traditional electronic decals offered by some old-line sources, these simply aren't worth the time and effort. These are basically a sucker bet guaranteed to give second-rate results that range from unprofessional to atrocious.

For totally superb panel artwork, consider linking PostScript to those old anodized aluminum dialplate systems offered by *MetalPhoto* or *Fotofoil*. These are somewhat pricey but are ideal for rugged and durable one-up or small quantity panels. They are also useful for museum signs and electronic relay rack panels. Picture an aluminum sheet which has only partially gone through the anodizing process, leaving a brightly colored but a very open and spongy surface. A photo emulsion is then applied. You later expose the emulsion through your custom PostScript artwork. A contact printer or an enlarger can be used. Followed up by a traditional darkroom slopping-in-the-slush.

After developing, you can boil the panel in a magic glop that reseals the surface, closing a sapphire (literally!) hard surface and locking your image *inside* the panel. The results are quite durable. It takes a highly dedicated vandal to harm a Metalphoto panel.

While the lettering and images are normally black, a wide range of bright colors are offered. Also the "plain old gray" of traditional anodizing. You might use a *reverse* technique to give you a black panel having colored or gray lettering. Again, this is utterly trivial with PostScript.

There is also a slightly cheaper self-stick vinyl based system. This one used to be called *ScotchCal*, but has been renamed *Dynamark*. Picture a white self-stick vinyl with a colored photoglop on it. You contact print the vinyl using strong sunlight or some other u-v source, again through your PostScript artwork.

Where present, the light hardens the photoglop against chemical attack. You then use a Webril wipe or other

nonwoven pad to apply a chemical that removes the color from all areas which were not photohardened. The result is white over a color or vice versa, depending on whether you've used normal or reverse artwork.

A clear epoxy overcoat gives you reasonable scratch resistance. You can then peel and stick your vinyl over your aluminum or other panel. Once again, if you are very careful, the vinyl can also be used as a punching and drilling guide.

Kits are readily available, both in single and assorted colors. Very thin aluminum versions are also offered.

There is also a non-stick product called *Scotch Color Key* offered to the printing industry. This gives you a mylar film having color selectively photoapplied to it. Many dozens of colors are offered. There are lots of prototyping opportunities here.

Injection molds?

The rule here is simple. *Don't even think of it!* These are *certain* to end up a net loss of time, energy, and money in any small scale setup. No matter that you can walk into the hobby shop and pick up a two dollar kit with a dozen precision molded parts in it. The economics simply do not apply to you. Your costs are ridiculous.

Yes, there are low end injection molding machines. But they produce small, weak, and cheap looking parts. The *Quick Shooter* is one of these that uses a stock drill press for cylinder pressure. A much better machine in the two kilobuck range is offered by *Delvies Plastics*. Who also offer a wide variety of sanely priced plastics, tools, and books.

Two more reasonable alternatives to cast parts are to use extrusions or to do vacuum forming. One good source of vacuum forming books is *Lindsay Publications*. Who also stock a wide variety of machine shop texts, both old and new.

Finding prototyping components

As with any technical field, your foremost resource to tune yourself into who makes what are the trade journals. Many of these are free on professional request. We've seen lots more on trade journals way on back in *Resource Bin #8* and *#495 NUTS8.PS*.

Start off with *Machine Design* and *Design News*. Then go to the two big free throwaways that are chock full of prototyping stuff: *Industrial Product Bulletin* and the *New Equipment Digest*.

The latter often has great free product samples on bingo request.

Three little known sources of useful prototyping materials, supplies and ideas do include *Appliance*, *Appliance Manufacturer*, and the *Appliance New Product Digest*.

The school shop magazines are also very handy. These include *School Shop* and *Industrial Education*, among a dozen others. A source of vocational ed shop supplies is *Satco*.

Do not overlook the good old *Model Railroader* magazine on your favorite newsstand. They are particularly big on smaller wood, plastic, and metal parts. Along with tools hard to find elsewhere. Not to mention the finest technical writing of any publication. Anywhere, ever.

There are also a bunch of home machinist and live steam mags, but I think we'll save them for a possible future column.

This month's contest

For this month's contests, just tell me about your favorite little-known prototyping resource or technique. The more obscure and unusual, the better. Or just tell me the address for the *Quick Shooter* folks. Uh, it seems I misplaced it at deadline time.

Actually our new pup may have eaten it. Last week she ate a one dollar bill. Her tastes are improving though; she did a ten in yesterday.

No, she is not a Nauga. At least not yet, anyway.

There will be some newly revised *Incredible Secret Money Machine II* books going to the dozen or so best (or earliest) entries, along with an all-expense-paid *tinaja quest* (FOB Thatcher, AZ) for two going to the very best of all.

Let's hear from you. ♦

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Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. You can contact GENie at (800) 638-9636 (voice) for connect info. Or you can reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number sixteen

Opportunities in hacker robotics.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

A free *GENie* brochure if you voice call (800) 638-9636.

Some more magazine comings and goings: *Science Probe* has apparently ceased publication. I'd guess a lack of appropriate advertisers was the main reason. *Wired* is a brand new mag published out of Multimedia Gulch. Their first issue had articles in it on cellular phone hacking and virtual reality, among others. Not a "real" technical magazine, but one certainly worth a look.

I am deeply saddened by a local college completely dropping their full electronics program. This faced the realities of a monumental lack of any real student interest (caused mostly by local high schools whose technical offerings are best described as an outright atrocity); and by the total absence of instant and high paying aerospace jobs. But it sure seems short sighted to me.

Like eating your seed corn.

Yeah, there's only a dozen hi-tech employers in the entire Gila Valley. And only two of those are beyond the

hand-to-mouth stage. But *not one* of them can find the quality of technical help they need. Or the motivation.

Enough already. Our 35Z5 contest was the most popular one ever. After awarding 35 of the promised 12 new *Incredible Secret Money Machine* books, I shut this one down. My apologies to the many hundreds of you who have entered too late to win.

For those of you that didn't know the answer, here's two hints: (A) The 35Z5 is located right beside the 50L6, and (B) Trace out that wire on pin 3 and see where it goes.

Robotics hacking

I do get a lot of helpline calls over robotics topics. But the bottom line is that there is very little overall interest in hobby robotics these days. There is virtually *no way* to make any profit offering hobby robotics projects, kits, products, or services.

At least not today.

One reason is that the "trashcan" and "android" role model images of robots are just about totally useless. An outright joke for sure. One of the favorite stunts in any intro robotics course is to have the students design a robot to clean up their dinner plates.

NEXT MONTH: Don takes a look at the ham radio scene.

Only one student in a dozen picks up on the fact that *Sears* has been selling these for decades.

When and if we pick up effective speech recognition, useful fuzzy logic algorithms, autonomous nav, and some non-klutzy "end effectors", then maybe the trashcans and the androids may get better. But only after their computing and reasoning ability gets at least up to the pussy cat level.

Till then, the hobby robotic scene seems an unmitigated disaster. Yes, there are low end toys and high end industrial robotic systems. As with any product anywhere, a new robotic project must do some task cheaper, better, and far more conveniently than older "non-robotic" solutions.

Or your dog flat out won't hunt.

Another problem is that robotics is best done as a team effort. The skills needed include a precision machinist, a kinematics specialist, an electronic supertech, a nav-literate EE, and a few software specialists well qualified in machine language, C++, AI, and fuzzy logic. Plus someone who knows how to sell something. It is rare that a one person show can put the needed act together by themselves.

And, right now, there flat out isn't near enough underlying cash flow to attract that quality of hired help.

While there is no "hobby robotics" industry as such, there sure are lots of potential resources out there. I'm left with the feeling we have a technical field with a fringe but no center.

Robotic suppliers

The leading hobby robotics supply house in the world is *Small Parts*. The folks here stock everything that your hardware store never heard of. They also custom cut metal and plastic sheet, rod, and tubing. Their catalog is a must. Yes, they do welcome small orders. From anybody.

Surplus stores are a rather obvious source of robotic parts and ideas. The foremost surplus store in the world, of course, is *American Science & Surplus* who used to be *JerryCo*.

The highest profile outfit is *Edmund Scientific*. Their catalog is also a must. For motors and similar heavy iron, try *C & H Sales*, *Burden's Surplus Center*, or *Northern Hydraulics*.

Plus good old *Fair Radio Sales* for military electronics and raw iron.

The "big three" of precision parts are *PIC Design*, *Stock Drive Products*, and *Winfred M. Berg*. If you have to ask how much all their products cost, you cannot afford them.

For reasonable robotic gears, try *Plastock/Plastimatic*. For rubber sheets and tubing, *Hygenic Manufacturing*. For pins, axles, and such, try *Robert A. Main*. A most unusual supplier.

The traditional industry superstores are another obvious robotics resource. Be sure to check *Grainger* for motors and pumps. And *McMaster-Carr* for just about everything industrial.

There are a lot of specialty houses that are in some other business, but just happen to have lots of neat stuff useful for robotics hacking. Several obvious examples include the *Player Piano Company*, *Aircraft Spruce and Specialty*, *Outwater Plastics*, *US Plastic*, and *Satco*. The latter is a technical education supply house.

Heathkit did have their *Hero* series of robots before they went out of the hobby kit business. Some robotics and training material does remain in their industrial education division, which is apparently still active.

Finally, don't forget the hobby and toy stores. Some toys have all sorts of robotic possibilities. Not the least of which is Radio Shack's *Armatron* and all the great imported pneumatic kits from Fischertech. Start off with those *America's Hobby Center* catalogs.

Magazines and trade journals

There are a dozen or so robotics magazines. The *SRS Encoder* is a new labor-of-love newsletter, published by the *Seattle Robotics Society*, a leading amateur robotics group. There is also a *Robotics Experimenter* magazine. The rest are industry trade journals or scholarly publications. I've tried to list most of them in our *Names & Numbers* sidebar.

I was unable to review all of these by column deadline time, so do let me know which ones you find useful.

Electronics Now runs an occasional robotic project or tutorial.

Many trade journals focus on some other field, but may happen to have great robotics info in them. The two best mechanical trade journals are *Machine Design* and *Design News*. The largest industrial supply throwaway mags are *New Equipment Digest* and *Industrial Product Bulletin*.

Appliance, the *Appliance New Product Digest*, and the *Appliance Manufacturer* trade journals sometimes have motor

info and other ads for materials with robotics potential. As do pubs from the SAE library, formerly the *Society of Automotive Engineers*.

For lots of sensor and transducer info, check into *Sensors* magazine, and *Measurement & Control*. For the motion control info, your best trade journals include *PCIM*, *Motion*, *Motion Control*, and *MotorTechniques*.

There are a number of vocational education magazines that may get into robotic topics. Typical examples include both *School Shop* and *Industrial Education*. There are a dozen more.

And don't forget *Model Railroader*. Their ads do offer a great selection of unusual tools and materials. These folks have been in the robotic business for years. They just do not seem to want to admit it.

Robotic opportunities

OK, so what can be done in hobby robotics today? With the possibility of a reasonable cash return for your time and effort? I see several areas where original thought might come up with several long term robotic solutions....

low pressure pneumatics- We saw back in *Resource Bin #7* and in my *Resource Bin Reprints* available from *Synergetics* how you could buy a low pressure 3-way air valve for only a quarter each. Low pressure air has yet to take off but it's got outstanding robotics potential. Aquarium pumps can be used as compressors, and your actuators can be nothing but a balloon, bellows, or some rolling diaphragm. You can get much more force much more linearly than you could ever hope to with a solenoid or another electronic solution.

autonomous nav- The key to any robot is knowing where it is at and which way it is facing. What is ultimately needed is a \$5 *Navicube* that once and for all solves nav problems. Several approaches to the navicube include fluxgates, accellerometers, gyros, IR sensors, or GPS receivers. The time is long overdue for lots of creative new solutions to "Where am I?" and "How did I get here?" problems.

linear steppers- Another underrated product is the *linear stepping motor*. Which is just a regular stepper motor with an added nutplate on its front. Connected to an Acme threaded but non-rotating shaft. As the nutplate steps, the shaft moves in and out with surprising force. The *Hurst* model *SLS*

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American Sci & Surp 601 Linden Place Evanston, IL 60202 (708) 475-8440	Fair Radio Sales 1016 E. Eureka Street Lima, OH 45802 (419) 227-6573	Model Railroder 1027 N. Seventh Street Milwaukee, WI 53233 (414) 272-2060	Robomatrix Reporter 121 Chanion Road New Providence, NJ 07974 (908) 771-7714	SAE 400 Commonwealth Dr Warrendale, PA 15096 (412) 776-4970
Appliance & ANPD 1110 Jorie Blvd CS9019 Oak Brook, IL 60522 (708) 990-3484	GENie 401 N. Washington Street Rockville, MD 20850 (800) 638-9636	Motion Box 6430 Orange, CA 92613 (714) 974-0200	Robot Experimenter Box 458 Peterborough, NH 03458 (603) 924-3843	Satco 924 S 19th Avenue Minneapolis, MN 55404 (800) 328-4644
Appliance Manufacturer 29100 Aurora Road #200 Solon, OH 44139 (216) 349-3060	Grainger 5959 W. Howard Street Chicago, IL 60648 (312) 647-8900	Motion Control 800 Roosevelt Dr E408 Glen Ellyn, IL 60137 (708) 469-3373	Robot Times 900 Victors Way, Box 374 Ann Arbor, MI 48106 (313) 994-6088	Sensors 714 Concord Street Peterborough, NH 03458 (603) 924-9631
Automation 600 Sumner Street Stamford, CT 06904 (216) 696-7000	Heath Company PO Box 217 Benton Harbor, MI 49022 (616) 982-3200	Motor Techniques 120 S Chapparral Ct #200 Anaheim, CA 92808 (714) 283-1123	Robotica 32 E. 57th Street New York, NY 10022 (212) 924-3900	Small Parts Box 381966 Miami, FL 33238 (305) 751-0856
Winfred M. Berg 511 Ocean Avenue East Rockaway, NY 11518 (516) 599-5010	Hygenic Manufacturing 1245 Home Avenue Akron, OH 44310 (216) 633-8460	New Equipment Digest 1100 Superior Avenue Cleveland, OH 44114 (216) 696-7000	Robotics 655 Americas Avenue New York, NY 10010 (212) 989-5800	SRS Encoder Box 30668 Seattle, WA 98103 (206) 362-5267 [E-mail]
Burden's Surplus Center PO Box 82209 Lincoln, NE 68501 (800) 488-3407	Industrial Prod Bulletin 301 Gibraltar Drive Morris Plains, NJ 07950 (201) 292-5100	Outwater Plastics 4 Passaic Street Wood-Ridge, NJ 07075 (800) 526-725-7112	Robotics & Mfg Maxwell Hs, Fairview Pk Elmsford, NY 10523 (914) 592-7700	Stock Drive Products 2101 Jerico Turnpike Hyde Park, NY 11040 (516) 328-0200
C & H Sales 2716 E. Colorado Blvd. Pasadena, CA 91107 (213) 681-4925	Robert A. Main 555 Goffle Road Wyckhoff, NJ 07481 (201) 447-3700	PCIM 2472 Eastman Avenue Venture, CA 93003 (805) 658-0933	Robotics Newsletter 1730 Massachusetts NW Washington, DC 20036 (212) 371-0101	Synergetics Box 809 Thatcher AZ 85552 (520) 428-4073
Design News 221 Columbus Avenue Boston, MA 02116 (617) 536-7780	McMaster-Carr Box 54960 Los Angeles, CA 90054 (213) 945-2811	PIC Design Benson Road Middlebury, CT 06762 (203) 758-8272	Robotics Database Box 617024 Orlando, FL 32861 (407) 295-1094	US Plastics 1390 Neubrecht Road Lima, OH 45801 (800) 537-9724
Edmund Scientific 101 E. Gloucester Pike Barrington, NJ 08007 (609) 573-6250	Machine Design Penton Plaza Cleveland, OH 44144 (216) 696-7000	Plastock/Plastimatic Three Oaks Road Fairfield, NJ 07006 (201) 575-0038	Robotics Today One SME Drive, Box 930 Dearborn, MI 48128 (313) 271-1500	Wired 544 Second Street San Francisco, CA 94107 (415) 904-0664

is typical. But these even appear on some auto carburetors as engine idle controllers.

the visual mouse– Some lower cost method to cause certain actions to happen just by *looking* at something. Obvious aps include menu selections, handicapped aides, virtual reality, "if looks could kill" video games. Maybe a pair of glasses with a laser diode and an attitude detector.

printed circuit drills– The single most important new breakthrough robotics project anytime ever would be a \$250 device that automates the drilling of small printed circuit boards. Perhaps two linear steppers, one to move the board and one to position the drill. Maybe a dentist's air turbine drill to keep the mass down. Once this new breakthrough project exists, larger models could lead you to animation stands, low priced vinyl sign cutters, computer embroidery machines, the whole nine yards.

car alternator steppers– "Real" stepper motors in the high power sizes are horrendously expensive and hard to drive. But these are what you need for CAD/CAM milling, for Santa Claus machines, automated woodcarving routers, and similar projects. It should be possible instead to take a \$5 car alternator and convert it into a three phase stepping motor or even into a switched reluctance servo motor. I've seen some videos of hobbyists who have successfully done just this. But nobody has done the fundamental engineering here to see what is and is not possible.

This month's contest

Again, I do have the hollow feeling that I have missed some really major hobby robotics resources. So, for this month's contests, just tell me about any resource that is potentially useful for hobby robotics. If possible, send me a catalog or sample copy and get me on their mailing list as well. There

will be some newly revised *Incredible Secret Money Machine II* books going to the dozen or so best entries, along with an all-expense-paid *tinaja quest* (FOB Thatcher, AZ) for two going to the very best of all.

Let's hear from you. ♦

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RESOURCE BIN

number seventeen

Exploring ham radio publications.

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Ham Radio

I guess I have mixed feelings over amateur radio. At one time in the dark and distant past I was K3BYG. And very proud of it. But I'm not currently active. Back in those days, ham radio was the central core of the technonerd universe. Hams were in the forefront of stunning new tech developments. Such as bouncing radar signals off the moon, building parametric amplifiers, pioneering the single sideband comm, helping the *International Geophysical Year*, and testing out new distributed amplification concepts.

Happiness was a warm 807. And incredible comm gear for pennies was a phone call to *Fair Radio Sales* away. A "Q-5er" anyone?

These days, technical innovators are far more likely to be lurking on an electronic BBS than on the ham radio bands. And if you just want to talk over the radio, there's the CB citizens band and several new wireless comm

bands. Competing for your time and attention are such obvious gee-whiz tech wonders as personal computers, cable, video gaming, virtual reality, satellite tv, robotics, and plain old VCR rentals.

The number of radio hams is down and their average age is sharply up. They are overwhelmingly male. And a strong case could be made that the ham bands serve mainly as a gutless whipping boy for the mindless FCC bureaucracy in a never ending petty quest for control and dominance. The FCC's insistence on using Morse code decades after its utter obsolence is one big example here. Or restricting ASCII and other data communications long after they were an industry standard. Or their current foot dragging coming down over any innovative ham use of spread spectrum techniques.

Only recently were the ham band Morse requirements eased somewhat.

Today's Action

So what is Ham radio today and why would you want to get involved?

Hams are really great at emergency comm. If an earthquake, tornado, or flood occurs, they can quickly set up reliable and high power long distance

**NEXT MONTH:
The furry with the
syringe on top.**

comm without any need for power lines or working electrical utilities.

Locally, radio hams tend to be very active in Search and Rescue groups. They can range the gamut from fully professional EMT organizations on down to beer-sloshed and gun-toting wannabe cowboys tooling around the boonies in old pickup trucks. But the better S&R ops are outstanding.

To practice emergency comm, hams

have an annual *Field Day*. Often in late spring. The goal of any field day is to quickly start up and operate as much emergency communications as you can. Off line and off grid.

Hams also have *hamfests*. These are absolutely incredible technical flea markets where outstanding bargains abound. The biggest and best is the Dayton Hamvention. Most any state should have dozens of hamfests each year. One tip: Be sure to show up very early. Well before sunup even. The best stuff vanishes in a flash.

There are lots of ham radio clubs. Where all of the usual club stuff gets done, like setting up the steering and bylaws committees. Or playing those king-of-the-hill power games. Hidden agendas fer sure. The main purpose of a club is to give you access to fancier antennas and better equipment than you can personally afford. A rotatable 160 meter, twenty element Yagi with a 30 db gain can be tricky to set up in a small apartment.

Another goal of many ham clubs is installing and maintaining repeaters and phone links. Repeaters let you talk across the country or around the world from a small and low power handheld transceiver. *Packet Radio* is the buzzword here.

Clubs also offer classes to help you pick up your ham license. Very often, both tech theory and code courses are offered. At several skill levels.

And a final goal of certain clubs is working with military personnel to pass personal messages around the world. As part of the *MARS Military Amateur Radio Service* program.

You'll find lots of group sponsored contests. Most of these seem very similar to birdwatching lists. Let's see. Two penguins, one emu and a great auk. A typical contest might involve working as many states or countries as possible. Or using QRP ultra low power. Fancy awards are offered.

We've seen in recent columns how many of the opportunities for low cost technical training appear to be drying up. Quite a few community colleges are scaling back on all their electronics programs or are outright eliminating them. *Heathkit* has largely packed it in. Lots of technical book publishers are the tiniest shadow of their former selves. But ham radio still remains a useful and effective way of learning electronics and related tech topics. Especially when done one on one on a mentor-apprentice basis.

Yes, there are still plenty of hams actively involved in tech innovation. Two hot areas are amateur television and spread spectrum comm. The ATV amateur tv demands an unusual mix of ham radio, R/C model, microwave design, and tv production skills.

The different ham bands do tend to attract different types of people for different purposes. The older short wave bands include 160, 80, 40 and 20 meters. These get used for traditional QSL contacts, rag chewing, for world wide "penpal" contacts, and certain radioteletypes.

The six meter band is used for some local handheld comm. But it is not all that popular because of its potential television interference problems.

Most of your mobile and handheld action comes down in the two meter band at 144-148 Megahertz. As does a lot of search and rescue activity.

The UHF ham bands at 220 and 440 Megahertz are used for satellites, for amateur television, repeaters and for additional shorter range mobile and handheld work.

Finally, all those highest frequency microwave bands are used for spread spectrum, full bandwidth television, and various experimental comm.

Getting Started

There's a number of good ways to get started in Ham Radio. Check the listings right here in *Nuts & Volts*. Or check the offerings on *GENIE's* RADIO RoundTable. Or the other on-line BBS posts. Or contact the *American Radio Relay League*. Who are the largest ham organization in the country. Of their many fine books, the *Radio Amateur's Handbook* is the "must have" starting point. This one is the center of the ham radio universe. This should be available in just about any library or larger bookstore.

By far your quickest and simplest way to reach a real live radio ham is to phone your local sheriff. On their

non-emergency number, of course. You then ask to be put touch with a Search and Rescue person. Who, in turn, will line you up with some local ham operators.

Ham Radio Resources

I was amazed by how many ham radio magazines there are. Around fifty in the US alone, I would guess. I have tried to gather some of these together into our resource sidebar. Some of these are "pure" ham radio pubs, while others zero in on special technical interests that hams might be attracted to.

The three hardcore magazines are *QST*, *CQ*, and *73 Amateur Radio Today*. *QST* is published by the ARRL and is a non-commercial venture having the highest technical standards. The cost is \$30 per year and includes the ARRL membership. *CQ* seems to be the most successful commercial ham magazine and has a lively audience. At \$23 per year. And *73 Amateur Radio Today* is a Wayne Green publication. There is probably no one individual anywhere ever who contributed more towards ham radio and hobby computing than Wayne Green. On the other hand, the mere mention of his name in any crowded room can be a cardiologist's delight. The subscriptions are \$25 per year. Lively reading.

A fourth and newer publication is *The Amateur Radio Communicator*. This is published by a maverick alternate to the ARRL known as the NARA or *National Amateur Radio Organization*. Their bimonthly subs are \$10 per year, including membership.

And, of course, our own *Nuts & Volts* is the place to go for bargains on ham gear and for announcements on upcoming hamfests and such.

Special Interests

There are lots of specialty areas to ham radio. And a unique handful of supporting newsletters.

The *RTTY Digital Journal* is for FAX, radioteletype, and digital comm. This one is already up to volume number 40 and costs \$15 per year.

The *Repeater Journal* is published by the *SouthEastern Repeater Association*. \$6 per year for quarterly newsletters and association membership. A lot here on regional packet radio.

A group called *Worldradio* publishes a special interest mag that covers ham satellites, digital comm, search and rescue, MARS, and similar areas. All at \$14 per year.

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VIC 3162 AUSTRALIA
(03) 528-5962

Amateur Radio Action
250 Spencer Melbourne
3000 AUSTRALIA
(03) 601 4222

Am. Radio Communicator
PO Box 598
Redmond, WA 98073
(206) 869-8052

Am. Television Quarterly
1545 Lee Street Ste 73
Des Plaines, IL 60018
(708) 298-2269

AMSAT Journal
850 Sligo Avenue
Silver Spring, MD 20910
(301) 593-6136

Antique Radio Classified
One River Road
Carlisle, MA 01741
(508) 371-0512

Communications Quarterly
PO Box 465
Barrington, NH 03825
(603) 664-2515

CQ
76 North Boradway
Hicksville NY 11801
(516) 681-2922

CQ-TV
Grenehurst Pinewood Rd
High Wycombe, Bucks
HP12 4DD, UK 0788 890365

Crown Jewels of the Wire
PO Box 38312
Cleveland, OH 44138
(216) 235-2595

Electric Radio
4 Aspen Place
Durango, CO 81301
(303) 247-4935

Lowdown
Longwave Club of America
45 Wildflower Road
Levittown, PA 19057

Monitoring Times
140 Dog Branch Road
Brasstown, NC 28902
(704) 837-9200

Popular Communications
76 North Broadway
Hicksville, NY 11801
(516) 618-2922

Practical Wireless
Enefco House, The Quay
Poole, Dorset BH15 1PP UK
(0202) 678558

QEX
225 Main Street
Newington, CT 06111
(203) 666-1541

QST
225 Main Street
Newington, CT 06111
(203) 666-1541

Radio Age
636 Cambridge Road
Augusta, GA 30909

Radio Observer
7605 Deland Avenue
FT Pierce FL 34951
(407) 464-2118

Repeater Journal
PO Box 215
Tobaccoville, NC 27050
(919) 983-0879

RTTY Digital Journal
9085 La Casita Avenue
Fountain Valley, CA 92708
(714) 847-5058

73 Amateur Radio Today
70 Route 202N
Peterborough, NH 03458
(603) 924-0058

Short Wave Magazine
C&C Mailers International
900 Lincoln Blvd
Middlesex, NJ 08846

Spec-Com
PO Box 1002
Dubuque, IA 52004
(319) 557-8791

Speleonics
PO Box 5283
Bloomington, IN 47407
(812) 339-7305

SPRAT
St Aidan's Vic, 498 Manchester
Rochdale, Lancs OL11 3HE UK
0706-31812

Spread Spectrum Scene
PO Box 2199
El Granada, CA 94018
(800) 524-9285

VHF Communications
5 Ware Orchard
Barby, Rugby CV23 8UF, UK
44 788 890365

Weather Sat Ink
4821 Jessie Drive
Apex, NC 27502
(910) 362-5822 FAX

Worldradio
520 Calvados Avenue
Sacramento, CA 95815
(916) 457-3655

Xtal Set Society
RR1 Box 129A
Lawrence, KS 66044
(913) 842-1227

in *Communications* and their *Amateur Communication*. Both are published by the same outfit in Florida.

The *Communications Quarterly* also goes by the subname of *The Journal of Communications Technology*. A lot of microwave goodies here, plus cellular radio info. Quarterly at \$30.

Monitoring Times is mostly for short wave listeners. \$20 per year.

Amateur Television

There are two major US amateur tv magazines. One is *Amateur Television Quarterly*. \$18 per year. These people also run a bookstore that stocks most major ATV texts. Their bound reprints include two volumes of *TV Secrets*.

Another useful ATV publication is *Spec-Com*, who also focus on other specialized communications. Such as RTTY and spread spectrum. Six issues per year at \$20 annually.

Related Tech Newsletters

There are bunches of labor-of-love newsletters that offer technical topics of interest to radio hams. My favorite one of these is Frank Reid's *Speleonics*. This one targets covers. Especially for ultra low frequency communications, the GPS navigation, efficient lamps, digital survey gear, and very rugged phones. The subscription price is \$4 (!) per year. But anything extra would certainly be appreciated.

Randy Robert's *Spread Spectrum Scene* zeros in on this new technology. Spread spectrum comm offers private and largely interference-free schemes to punch long distances through high noise. Licensing requirements are also minimal. \$50 annually. A sample copy is offered for a buck.

Randy's columns can also be seen right here in *Nuts & Volts*.

Bob Sickels *Radio Observer* is the leading US amateur radio astronomy publication. It is associated with the *Amateur Radio Astronomers*. At \$24 per year, it is published monthly.

Weather Sat Ink is Tom Glembocki's fine quarterly newsletter on receiving weather satellite information. Subs are \$15 per year.

Ancient History

There's often a longing to get back to the "good old days" or the "way things were". Several technical pubs address the golden age of radio.

The first of these is *Antique Radio Classified*. It has got zillions of ads for pretty near anybody and everybody doing anything with older electronics.

The ARRL also publishes a specialty mag for technical topics. It is called *QEX*. Otherwise known as *The ARRL Experimenter's Exchange*. Recent issues covered digital filtering and comm.

\$12 per year for members.

There are dozens of ham satellites in orbit. *The AMSAT Journal* focus is on satellite reception and packet radio technical topics.

Quarterly at \$15 per year.

And *The Lowdown* is a publication of the *Longwave Club of America*. These folks explore the spectrum below the broadcast band. No ham bands here,

but bunches of time, nav, and rescue services. Also geophysical stuff like whistlers and such.

At \$18 per year.

Other Hobby Comm

There's a bunch of non-ham mags for others interested in regular old communications. One big newsstand publication is *Popular Communications*. Columns here include RTTY, satellite comm, broadcast DX, the emergency service scanners, and lots more. \$20 per year for twelve issues.

Another pair of publications are *All*

OTHER MENTIONED RESOURCES

Am Longwave Club
45 Wildflower Road
Levittown, PA 19057

Fair Radio Sales
PO Box 1105
Lima, OH 45802
(419) 227-6573

National Am Radio Org
PO Box 598
Redmond, WA 98073
(206) 869-8052

Am. Radio Astronomers
247 North Linden Street
Massapequa, NY 11758
(516) 798-8459

Garden Fresh Replicas
PO Box 208
Neosho, MO 64850
(800) 545-7304

Ragtime
4218 Jessup #AB
Ceres, CA 95307
(209) 668-0366

Am. Radio Relay League
225 Main Street
Newington, CT 06111
(203) 666-1541

GENie
401 N Washington St
Rockville, MD 20850
(800) 638-9636

Roadable Aircraft
338 8th Avenue South
Edmonds, WA 98020
(206) 778-0423

Carnivorous Plant News
Fullerton Arboretum, CSUF
Fullerton, CA 92634
(714) 773-3579

Heathkit
PO Box 1288
Benton Harbor, MI 49022
(616) 982-3200

SouthEastern Repeater Assn
140 Dog Branch Road
Brasstown, NC 28902
(704) 837-9200

All for \$30 per year.

The *Radio Age* specifically addresses ancient comm gear. One recent issue featured long distance reception on the 1922 *Radiola AR*. Twelve issues at \$19 per year. These folks are really into old-style homebrew projects.

One well done smaller and fancier mag is *Electric Radio*. "Celebrating a bygone era". Twelve monthly issues for \$24. Very nice.

The *Xtal Set Society* is a newsletter "dedicated to once again building and experimenting with radio electronics". Bimonthly at \$6 per year. It includes membership and special construction plan reprints.

There seems to be a new resurgence in classic and antique gear. Especially construction and restoration projects. Let me know what your interests are in this area.

For something very oddball, *Crown Jewels of the Wire* is a special interest publication for collectors of telephone pole insulators. Hey, really. No way I could make this stuff up. I find them in the same league as the *Carnivorous Plant News*, steam calliopes offered by *Ragtime*, that *Roadable Aircraft* flying car magazine, and the synthetic kale from *Garden Fresh Replicas*. Synthetic kale is totally indistinguishable from real kale, except by taste.

Crown Jewels subscriptions are \$13 for twelve monthly issues.

Foreign Pubs

Amateur radio is an international hobby that transcends most political boundaries. Several of those foreign publications that I have run across include England's *Short Wave*, *SPRAT*

on ultra low power communications, *VHF Communications*, *CQ-TV* on ATV amateur tv, and *Practical Wireless*.

Two Australian mags are *Amateur Radio* and *Amateur Radio Action*.

This Month's Contest

Once again, I have got this hollow feeling that I may have missed some mainstream publications here. Plus there have to be lots of very obscure ones that may have fallen through the cracks. Somewhere along the way.

So, for this month's contest, tell me about any other Ham radio pub or any mag which a ham might have a passing interest in. If possible, send me a copy of their title page and the masthead. There will be some of my new *Incredible Secret Money Machine II* books going to the dozen or so best entries, plus an all-expense-paid *tinaja quest* (FOB Thatcher, AZ) for two that will go to the very best of all. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, dial (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number eighteen

The furry with the syringe on top.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

A free *GENie* brochure if you voice call (800) 638-9636.

I got my first look at *Silicon Chip*, an Australian magazine that is being sold in the US by *Electronics Now*.

The best way to describe the style of this mag is "what *Modern Electronics* could have been with better editing." There's lots of construction projects here, including such heavy duty stuff as high power sinewave inverters.

On the other hand, this *is* the actual Australian magazine. With Australian ads and prices in Australian currency. Many small technical firms (my own *Synergetics* included) quickly discover that foreign sales and support often turn into a sucker bet. Thus, there are time and availability problems when responding to their ads.

But this is most assuredly a well done technical magazine with lots of understandable and hands-on stuff. It should be able to nicely fill the niche left by the US demise of *Elektor*.

I apparently did miss bunches of ham radio magazines in our previous column. For openers, there's another

Wayne Green mag called *Radio Fun*. Mostly for beginners. Then there's *DX Magazine* on long distance reception. And *Florida Skip*, a regional pub. Or that *Digital Digest*, a pub devoted to ham digital radio comm.

I suspect we may have a few more for you next month. Be sure to let me know about any I have missed.

The Fringe

Any collection of resources has a *normalcy distribution*. Statisticians use a value called σ or *sigma* to measure where any smaller part of the whole belongs. For instance, the 1 σ points include about 63% of the total. The 2 σ points will include the next 63% of the remainder. And so on.

But there's some highly classified info the statisticians don't want you to know about. If you go out just beyond the 7 σ point and look precisely at a location loosely defined by a highly irrational and totally transcendental top secret magic number, you'll find "the zoo".

Look *under* your curve out at that magic 7 σ zoo point, and you'll find *things* there. Stuff, even.

NEXT MONTH: Royalty-free real Adobe PostScript for homebrew lashups!

A lot of which should be left totally unmolested. As Buckaroo Bonzai has said, "Don't touch that! No telling what it's connected to."

But if you are careful enough and brave enough, there is an incredible world to explore here. This month, I thought I'd brazenly guide you out beyond that 7 σ point in our master *Synergetics* resource database. And see some of the wondrously bizarre items which constitute, for want of a better name, *the fringe*.

Let's start off with...

Archie McPhee

There is only one firm that begged to be included in our fringe listing. These folks freely admit to being a few chips shy of a full board. And are busy static damaging the few of their circuits that still function.

Archie McPhee, of course. Who is the world's leading supplier of rubber iguanas. And lots of similar hacker and hobbyist essentials.

Their free catalog is a "must have". And is numero uno at the very top of our fringe collection.

UFO Resources

I recently made a survey of UFO resources, and was astounded to find that this is an enormous *industry* with worldwide sales of tens of millions of dollars. A listing of the more major players appeared in `HACK57.PS` on *GENie* PSRT. On request, I'll throw in a free copy with any *Synergetics* order.

At any rate, there is a combined *Michelin Guide* and *Thomas Registry* to the *UFO* world. This is the *Almanac of UFO Organizations & Publications* by David Blevins. A listing of some 300 groups involved in the investigation of *UFO* phenomenon.

Let's extract a typical random entry from this great resource...

"*StarSystem Sirian Rainbow Lodge* is mostly an ET Alien Outpost program, specializing in providing information from the alien point of view. SSRL is the only ET Teaching Lodge whose ET Teachings are actually taught by the ETs themselves.

"Their stated purpose is to assist humanity in the Stellar Awakening of Terra 14 (Earth), teach their ET star wisdom, ET star paths, and ET stellar knowledge, as well as to bring the ET goodwill of stellar humanity to Terra 14 (Earth).

"The SSRL founders are the Bennu

(who is an actual ET from StarSystem Sirius) and Liah-Maiia GoldenHawk. Who is the Benu's Star Flame and Star Daughter.

"Members receive three newsletters, ET Planetary Origin Reading (which reveals the planet of origin), an ET Star Name, free Quartz crystal, a gold meditation key, the opportunity to learn directly from the Benu, your very own membership card plus the certification, and discounts on all the products offered."

"The Greater Square is their monthly newsletter for members. It offers the Benu's Stellar Messages."

They also publish *Solar Trek*, the ET Alien Quarterly Journal. Costs are \$25 for level 1 awareness, up to \$100 for your full level 4 access.

Hey really. Right on pages 41-42 of the second edition. Check it all out for yourself. There's 299 more where this one came from.

The UFO enthusiasts seem hung up on acronyms such as ICUFON.

Another fine UFO resource is Mike Sherlock, who's now in the process of editing down a video collection called the *UFO Marathon*. Mike also runs the *Black Range Lodge*, a unique, historic, and quite reasonably priced bed and breakfast type place tucked away in the most rugged and remote part of western New Mexico's outback.

By the way, I do have lots of secret escape places hidden quietly away in this neck of the woods. Most of them little known. For obvious reasons, I'm not going to list them all here. But you can give me a helpline call for a hint or two. Maybe more.

I might even join you.

Gurus are supposed to be hard to reach. Firstoff because it adds to the mystique, and secondly because the Gurus and Swamis Union Local #204 rules demand it. But we usually do welcome visitors and *tinaja questors* that call ahead.

Free Energy

I sure do get scads of helpline calls over people seeking out "free energy". Which sounds kinda dumb to me. The desirability for unlimited free energy lies somewhere between Herpes and AIDS. Unlimited free energy would hasten the isentropic heat death of the planet. And would be a heinous crime against humanity.

At any rate, there are those of you out there who are free energy seekers. And there are purveyors of goods and services who will be more than glad

to fill all your needs. Major resources here include *High Energy Enterprises*, *Borderland Research*, that *International Association for New Science*, *Amazing Archives*, *Lor'd*, and *Super Science*.

Tesla

Nikola Tesla seems to draw in a strange crowd of latter-day followers. I'd guess the main problem here is that Tesla was a brilliant inventor and a superb con artist. Despite years of careful reading and study, I've yet to find so much as one credible shred of information that (A) Tesla was an ET alien; or that (B) Tesla energy devices violated the laws of thermodynamics; or that (C) Tesla's "really good stuff" got suppressed by a secret industry and government conspiracy.

There are a number of good sources for Tesla info. Which cover the broad spectrum from historical fact and the actual patents and papers. On down to outright hogwash. As openers, try the *Tesla Bookstore*, that *Tesla Society*, the *Tesla Coil Builder's Association*, or *Resonance Research*.

More Miles per Gallon

Lots of these guys advertise in the classified sections of *Popular Science*, *Popular Mechanics*, and all their clones. One unique source to check out here is *H&A Industries*.

Steam Calliopes

Steam calliopes are becoming really hard to find. There's no good one-stop full-service supplier that I know of.

Ads sometime appear in *Amusement Business* magazine. *PAIA Electronics* once offered synthesized fakes. And *Live Steam* magazine ran a homebrew project a decade or so back.

But there is an outfit called *Ragtime* who custom creates *air* calliopes and orchestrans. They usually build these into older upright pianos. Prices vary with quality and craftsmanship. They have a beautiful \$5 catalog that gives full details on their products.

Somewhat related is *Always Jukin*, a newsletter for juke box collectors; the *Player Piano Company* which is also a great source for low pressure robotic pneumatics; that *Experimental Musical Instruments*; and, for those of you now building your own real pipe organs, the *Classical Organ Builder*.

Synthetic Kale

I do sleep better at night knowing there are people out there who have dedicated their lives to perfecting

new from DON LANCASTER

ACTIVE FILTER COOKBOOK

The sixteenth (!) printing of Don's bible on analog op-amp lowpass, bandpass, and highpass active filters. De-mystified instant designs. \$24.50

CMOS AND TTL COOKBOOKS

Millions of copies in print worldwide. THE two books for digital integrated circuit fundamentals. About as hands-on as you can get. \$24.50 each.

INCREDIBLE SECRET MONEY MACHINE II

Updated 2nd edition of Don's classic on setting up your own technical or craft venture. \$18.50

LANCASTER CLASSICS LIBRARY

Don's best early stuff at a bargain price. Includes the CMOS Cookbook, The TTL Cookbook, Active Filter Cookbook, Micro Cookbooks I & II, newly revised Incredible Secret Money Machine II, and those Hardware Hacker II reprints. \$119.50

LOTS OF OTHER GOODIES

Ask the Guru I or II or III	\$24.50
Hardware Hacker II or III	\$24.50
The Case Against Patents	\$24.50
PostScript Beginner Stuff	\$39.50
Intro to PostScript Video	\$39.50
PostScript Reference II	\$29.50
PostScript Tutorial/Cookbook	\$18.50
PostScript by Example	\$29.50
Understanding PS Programming	\$29.50
PostScript: A Visual Approach	\$22.50
PostScript Program Design	\$24.50
Real World PostScript	\$22.50
Thinking in PostScript	\$22.50
LaserWriter Reference	\$19.50
Type 1 Font Format	\$15.50
Acrobat Reference	\$24.50
Whole Works (all PostScript)	\$350.00
PostScript Secrets Brochure	FREE
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The reprints from all Don's Midnight Engineering columns. Includes the case against patents, book on demand publishing, toner secrets, paradigm stalking, insider research, lots more. \$24.50

RESOURCE BIN I

A complete collection of all Don's Nuts & Volts columns to date, including a new index and his master names and numbers list. \$16.50

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SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

RESOURCES AT THE FRINGE

Aircraft Spruce & Specialty

PO Box 424
Fullerton, CA 92632
(800) 824-1930

Almanac UFO Orgs & Pubs

PO Box 1241
San Bruno, CA 94066
(415) 359-0432

Always Jukin

221 Yesler Way
Seattle, WA 98104
(206) 233-9460

Amusement Business

Box 24970
Nashville, TN 37202
(615) 321-4250

Black Range Lodge

Star Route 2, Box 119
Kingston, NM 88042
(505) 895-5652

Borderland Research

PO Box 429
Garberville, CA 95542
(707) 986-7211

Carnivorous Plant News

Fullerton Arboretum, CSUF
Fullerton, CA 92634
(714) 773-3579

Classical Organ Builder

PO Box 27476
Phoenix, AZ 85061
(602) 973-1395

EDM Today

1212 State Route 23
Butler, NJ 07405
(201) 833-3130

Eisenbrand Hardwoods

4100 Spencer Street
Torrance, CA 90503
(310) 542-3576

Experimental Aircraft

3000 Poberezny Drive
Oshkosh, WI 54903
(414) 426-4800

Experimental Musical Ins

1700 Old Rancheria Road
Nicasio, CA 94946
(415) 662-2182

Experimental Rotocraft

5555 Zuni SE #281
Albuquerque, NM 87108
(505) 298-9362

Foodservice Product News

104 Fifth Avenue
New York, NY 10011
(212) 206-7440

Garden Fresh Replicas

PO Box 208
Neosho, MO 64850
(800) 545-7304

H&A Industries

Rt 2, Box 35E
Bowling Green, MO 63334

High Energy Enterprises

PO Box 5636
Security, CO 80931
(719) 475-0918

Impressions

1515 Broadway
New York, NY 10036
(212) 669-1300

Int'l As for New Science

1304 S College Avenue
Fort Collins, CO 80524
(303) 482-3731

Lindsay Publications

PO Box 538
Bradley, IL 60915
(815) 935-5353

Live Steam

2779 Aero Park Drive
Traverse City, MO 49685
(616) 941-7160

Lor'd Industires Limited

Box 156
Hancock, WI 54943
(715) 249-5611

Archie McPhee

PO Box 30852
Seattle, WA 98103
(206) 547-2467

Outwater Plastics

4 Passaic Street
Wood-Ridge, NJ 07075
(800) 526-0462

PAIA Electronics

3200 Teakwood Lane
Edmond, OK 73013
(405) 340-6300

Penguin Books

375 Hudson Street
New York, NY 10014
(212) 366-2000

Play Meter

PO box 24970
New Orleans, LA 70184
(504) 488-7003

Player Piano Co

704 East Douglas
Wichita, KS 67202
(316) 263-3241

Powder & Bulk Solids

PO box 640
Morris Plains, NJ 07950
(201) 292-5100

Printer's Devil

PO Box 66
Harrison, ID 83833
(208) 689-3738

Printwear

1008 Depot Hill Road
Broomfield, CO 80020
(303) 469-0424

Ragtime

4218 Jessup #AB
Ceres, CA 95307
(209) 668-0366

RePlay

22157 Clarendon Street
Woodland Hills, CA 91365
(818) 347-3820

Resonance Research

E11870 Shadylane Road
Baraboo, WI 53913
(608) 356-3647

Roadable Aircraft

338 8th Avenue South
Edmonds, Wa 98020
(206) 778-0423

Select Information Exch

244 West 54th Street
New York, NY 10019
(212) 247-7123

Skeptical Enquirer

PO Box 703
Buffalo, NY 14226
(716) 636-1425

Standard Periodicals Guide

150 Fifth Avenue #202
New York, NY 10011
(212) 741-0231

Tesla Bookstore

Box 121873
Chula Vista, CA 91912
(800) 398-2056

Tesla Coil Builders Assn

3 Amy Lane
Queensbury, NY 12804
(518) 792-1003

Tesla Society

PO Box 5636
Security, CO 80931
(719) 475-0918

U&Ic

2 Dag Hammerskjold Plaza
New York, NY 10017
(212) 371-0699

Uhricht's Periodicals Dict.

1180 Americas Avenue
New York, NY 10016
(212) 916-1600

WELL

27 Gate Five Road
Sausalito, CA 94965
(415) 332-4335

Whole Earth Review

27 Gate Five Road
Sausalito, CA 94965
(415) 332-1716

synthetic kale. All the folks at *Garden Fresh Replicas* have done just that.

And they do take all their synthetic kale seriously. Genuine kale is used to make the molds, which are broken up after a few dozen impressions. After all, fake kale would look – well, *fake* – if it all was identical. And real kale is used for filler in all the replicas. The result is a product which is absolutely indistinguishable from the original.

Except by taste.

Grecian Urns

It never fails. It is 3 AM and you have this uncontrollable urge to write an ode. And there is no Grecian Urn anywhere in sight to write your ode on. What do do?

It's *Outwater Plastics* to the rescue. Who have got great prices and good delivery on the Grecian Urn replicas. They have also got a humongous free catalog chock full of unusual low cost metal and plastic hardware. Finials, too. And even plinths.

Flying Cars

Gyro Gearloose is alive and well. You see, Gyro is one of my big heroes. Right up there with Scrooge McDuck himself, P.T. Barnum, William Gaines (who was the greatest philosopher of this century), Ed Abbey, Perry Ferrell, and, of course, Bucky Fuller. People real or imagined whom I model my life after.

Roadable Aircraft is a new newsletter about flying cars. Actually, we can't really call it an *unusual* pub. It's just your everyday plain old grunt M1A1 flying car magazine. And obviously well done as a labor of love.

For related publications, check out *Experimental Rotorcraft* and that older *Experimental Aircraft*. A major source here is *Aircraft Spruce & Specialty*.

Carnivorous Plants

And other things that go chomp in the night. Of all places, found inside the *Carnivorous Plant News*. Nuff said.

Exotic Woods

We have seen how *EDLCO* is my favorite. But a brand new flyer from *Eisenbrand Hardwoods* may have just what you need in the way of wenge, goncalo, shedua, or putumuju.

The Mail Order Circle

There is this collection of rather scroungy and mostly-ads newsprint pubs that loosely refer to themselves as the *mail order circle*. Typical among

OTHER MENTIONED RESOURCES

Digital Digest
4063 N Goldenrod Road
Winter Park, FL 32792
(407) 671-0185

DX Magazine
PO Box 50
Fulton, CA 95439
(707) 523-1001

Florida Skip
3840 Conners Cove
Melbourne, FL 32935

GEnie
401 N Washington St
Rockville, MD 20850
(800) 638-9636

Nuts & Volts
430 Princeland Court
Corona, CA 91719
(714) 371-8497

Radio Fun
70 Route 202-North
Peterborough, NH 03458
(603) 924-0058

Silicon Chip
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-3000

Synergetics
Box 809
Thatcher, AZ 85552
(520) 438-4073

the hundreds of participants are such titles as *Money Maker's Monthly*, *Mail Order Bulletin*, *Entrepreneur's Digest*, and *National Marketplace*.

These mags are aimed at the reader that hopes to eventually be able to receive a chain letter.

Or has a wildly impossible dream of someday actually participating in a multilevel marketing scheme. These pubs are the primary home of those "Find out how I make money. Send \$19.95 to..." ads.

I'd bet the total collective IQ of their entire audience doesn't remotely begin to approach double digits.

I find these pubs totally fascinating. First because they are there. And also because good old P.T. "Don't miss the egress" Barnum in his wildest dreams would not have had the unmitigated gall to offer what these mags do.

These are useful because many of them are textbook perfect examples of how *not* to write ad copy, how *not* to spend advertising dollars, and how *not* to desktop publish.

The best way you can cheaply grab a great heaping handful of these all at once is through the *Select Information Exchange*. To me, they seem to be the definitive repository of ongoing cons and scams in the country today. And superbly good at what they do.

Lindsay Publications

Lindsay is certainly unusual. Their big thing in life is reprinting ancient radio texts and turn-of-the-century machine shop information. Plus a full collection of hands-on books on just about any technical, pop science, or hobby subject. Often at very low costs. Their free catalogs are keepers.

Whole Earth Review

If something does seem truly and wondrously bizarre, the chances are pretty good it should sooner or later show up on the pages of the *Whole Earth Review*. This is the ongoing saga of Stewart Brand and all the original *Whole Earth Catalog* crew. They also sysop *The Well*, an innovative West Coast BBS. And are actually about to reissue a new WEC update.

The World of Zines

There used to be a magazine called *Factsheet Five*. Who published scads of reviews. Underground, alternate ops, fanzines, fringe culture, small presses, and anything off the wall.

It is not at all clear to me whether *Factsheet Five* is still being published. But the best of the best (or the worst of the worst) has gotten released in book form as *The World of Zines*. "A guide to the independent magazine revolution".

Published by *Penguin Books* and in stock at many bookstores.

Oddball Trade Journals

We have seen time and time again how the trade journals and specialty magazines are your key resource for picking up insider information in any field. There are over 70,000 magazines of this type in the US alone. Many of these are free to qualified subscribers. The majority of them will send you a free copy if you use my secret SCAR sample-copy-ad-rates ploy.

Much more on all this can be found in my newly revised *Incredible Secret Money Machine II* and in the *Resource Bin* collected reprints.

The keys to the kingdom are on the reference shelf of your nearby library. *Ulrichs Periodicals Dictionary* is your best bet, while the *Standard Periodicals Guide* is a useful alternate that might be slightly easier to find.

A few examples: *Powder and Bulk Solids* ferinstance. Or *EDM Today* for spark machining.

Or *Play Meter* and *Replay* for the video gaming industry. *Printwear* and *Impressions* for the gimmie cap and custom T-shirt trade.

The Barren Observer for the world's dumbest blueberry recipes. *Foodservice Product News*, the world's greatest diet magazine. Simply read it before each meal. And try to guess whether the blue glop in the bottle is a new dessert topping or an EPA approved grease trap clarifier.

A pair of fine desktop publishing magazines are *U&I* on typography plus Joe Singer's *Printer's Devil*. "A press in every home. A home in every press." Highly recommended.

Or the quarterly *Skeptical Enquirer*, authored by "name brand" scientists who try to debunk pseudoscience and the paranormal. While using the very same manic religious fervor that their target subjects do.

This Month's Contest

So, for this month's contest, just tell me about any good source for steam calliopes. Or tell me about anything else that deserves to be an important part of "all of the above". If possible, send me a copy or sample, or adsheet, or whatever. There will be some of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid *tinaja quest* (FOB Thatcher, AZ) for two that will go to the very best of all. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GEIE PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number nineteen

Royalty-free real PostScript for homebrew lashups!

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

A free *GENie* brochure if you voice call (800) 638-9636.

Your very own flutterwumper

Every now and then, a bunch of little things will magically fall in place for a stupendous breakthrough. Some new concept here, an improvement there. Eventually, it all adds up.

This month, I thought we'd review a lot of little things. Not the least of which is that you now are able to use genuine *Adobe* PostScript for custom hacker homebrew projects, *royalty free!* The possibilities here boggle the mind. Especially if fonts, lettering, or smooth curves are involved in any way, shape, or form.

For instance, that back burner long term project of yours. For generality, let's call it a *flutterwumper*.

The flutterwumper you've had in mind has to shove something fairly large in an *x* direction. And do the same separately in the *y* direction. You also need a way of "raising" or "lowering" something like a knife or a pen or a sandblasting head.

Now, your flutterwumper could really be a...

- printed circuit drill
- vinyl sign cutter
- trophy engraver
- pen plotter
- animation stand
- silk screen makeready
- embroidery machine
- CAD/CAM mill
- glass etching sandblaster
- Santa Claus desktop prototyper
- automated barkeep
- air turbine minidrill
- model railroad micro machiner
- billboard maker
- microscope stage positioner
- halftone scanner
- chem lab processing accessory
- automated loom
- wooden sign router
- rock music light show
- sculpting machine
- olive jar stuffer
- waterknife that "cuts anything"
- MIDI player piano
- robotic trainer
- laser marking system

But let's not use such simplistic and horribly restrictive terms here. The

NEXT MONTH: A look at the major semiconductor and IC supply houses.

concept of intrinsic flutterwumptomcity transcends all of these.

All of a sudden, hacker homebrew flutterwumpers are now far cheaper, much simpler, and infinitely more powerful than they used to be. Let's look at the new "lots of little things" that make it all happen...

Servos or steppers?

Unless you get into pneumatics or hydraulics, the muscle to move any

flutterwumper often comes from one of two sources: *servos* or *steppers*.

A servo is simply any reversible variable speed motor that also safely produces a zero speed holding torque. Servos are normally controlled in a *servo loop*. Some precise method of measuring current position is needed by most servo systems. Optical shaft encoders or differential LVDT position transformers are typical.

Because of the expensive external position sensors and the complicated high power control circuits, the servo systems tend to be hard to design and now seem to be largely falling by the wayside. They are not all that popular among hardware hackers. Except for ultra-precision aps and some model remote controls.

Stepper motors, on the other hand, are now coming on like gangbusters. Any stepper motor normally does *not* rotate continuously. Instead, it tries to jump into positions as an *intermittent motion device*. The *step angle* is set by the number of poles and other factors. Thus, a three degree step motor needs exactly 120 steps per revolution.

Steppers could easily be used open loop without any continuous position measurements. Yeah, you do need a way to tell your "home" position, and a way to calibrate for external stuff like backlash and mechanical ratios. But this is almost trivial to do. Which makes steppers fast and easy for a lot of hacker aps.

You will find lots of small steppers right here in our *Nuts & Volts* ads. Prices start around \$3. One traditional stepper source has been *Airpax*. They have several very useful catalogs and ap notes available on request.

One stepper that I have personally found extremely useful is the *Hurst* model SLS. This is a modification of a typical small stepper to form a *linear actuator*. Instead of a shaft, the stepper is designed having a hollow center. A

nutplate is added to the rotor. A long Acme threaded rod goes through the middle. In use, this rod is carefully prevented from rotating.

As the nutplate turns, the threaded rod moves in and out, giving you a linear motion. And producing twenty pounds of force in two or four mil steps. From a twelve watt device! The stock lead screw has an eight inch range. But you could make the lead screw longer if you prevent bowing.

Sadly, at \$80 list, the SLS pricing is way too far up in the "what are they on and where can we get some of it?" range. You'll usually want to use a SLS for your initial development, and then conjure up your own two dollar substitute. Magazines such as *Asian Sources* and *Trade Winners* might be of help in finding cheap equivalents.

Traditionally, high power steppers are expensive and hard to get. One problem is that big steppers are fairly inefficient, so there is a lot of heat to dump if you try to get into serious tail twisting. The leading source of high power steppers has been the *Slo-Syn* series from *Superior Electric*. They do offer data books and ap notes.

Besides the *Nuts & Volts* ads, big steppers are often findable at heavy iron surplus sources such as *C & H Sales*, *AST Servo Systems*, *Fair Radio Sales*, *Burden's Surplus Center*, and at *Northern Hydraulics*.

Yes, there are a bunch of stepper motor trade journals. These form an important resource for current info. In particular, do check out *PCIM*, *Motor Techniques*, *Measurement and Control*, and *Motion* magazines.

But we clearly need a cheap and big stepper that is hacker friendly. Which leads us to our next development...

Car alternator steppers

Can a car alternator be converted into a high power stepper motor? The amazing answer is that it definitely can. The results won't be nearly as good as a real stepper of comparable size. But you could get a surprising amount of tail twisting out of one. And you could pick up an alternator for \$5 at a junkyard. Especially if it has blown diodes and you don't need the companion regulator. And could not care less about make and model.

The trick is to first remove all the diodes, and then break out the buried common and hidden "Y" connection between the three windings. This gets you three phases of windings. A three phase stepper is somewhat unusual,

but there is no reason at all why it would not work. Whap the windings in an ABC sequence to go forward and in a ACB sequence to go backwards. Use the rotor and slip rings as a plain old electromagnet that gets attracted to or repelled from the stator phases currently getting whapped.

There's usually 42 to 48 slots in an alternator, so the per-step resolution will be something like eight degrees or so. Gearing or microstepping tricks can improve this considerably.

It is usually best to rewind your alternator so that each coil only spans one single slot rather than the three normally used. Ampere turns are the name of the game here. You vary the wire size and the number of turns to suit your application. I'll try to work up some more specific details when I get a chance.

Meanwhile, you'll find more info in #284 HACK44.TXT.

A great video

Using alternators as stepper motors seemed to suddenly show up on the scene. Serendipitous synchronicity and all that. Bob McKnight in Phoenix is a semi-retired vocational education teacher, ham, and 4WD enthusiast that first put me on to the idea.

He also taught me the key insider secret in working with alternators: There is a tiny hole in the slip ring holder through which you *must* place a wire pin or a toothpick to restrain the brushes. Fail to do this and your reassembly will be gruesome.

But John Reese on down in Sautee, Georgia seems to be years ahead of the pack. John recently built up a new humongous wooden signage routing system which uses car alternators as steppers. And in its spare time, this incredible flutterwumper also does precision machining of those rigid heddles needed by weaving looms. Yes, this beast is currently producing custom real world products.

And John's entire system is totally homebrew and ultra low in cost.

John has now put together a real down-homey video on his system that shows you car alternators as steppers in action. His vid also proudly shows what a lone hacker can accomplish on their own at home by using a little creative thought.

And a lot of personal value added.

By special arrangement, John has agreed to share a copy of this hour long flick with you for \$19.50. I highly recommend this one.

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A complete collection of all Don's Nuts & Volts columns to date, including a new index and his master names and numbers list. **\$24.50**

FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GENIE PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Modem access: (800) 638-8369, then a HHH. On prompt, XTX99005,SCRIPT.

FREE VOICE HELPLINE VISA/MC

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Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

FLUTTERWUMPER RESOURCES

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Mountain View, CA 94039
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Airpax
150 Knotter Drive
Cheshire, CT 06410
(203) 271-6000

Allegro
363 Plantation Street
Worcester, MA 01605
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Apple
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Cupertino, CA 95014
(408) 996-1010

AST Servo Systems
115 Main Road, Box 97
Montville, NJ 07045
(201) 335-1007

Asian Sources
1020 Church Street
Evanston, IL 60201
(708) 475-1900

Burden's Surplus Center
PO Box 82209
Lincoln, NE 68501
(800) 488-3407

C&H Sales
PO Box 5356
Pasadena, CA 91107
(800) 325-9465

Circuit Cellar Ink
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Vernon, CT 06066
(203) 875-2751

Fair Radio Sales
PO Box 1105
Lima, OH 45802
(419) 227-6573

Galco
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Madison Heights, MI 48071
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Rockville, MD 20850
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Gerber Scientific
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Hewlett Packard
PO Box 10301
Palo Alto, CA 94303
(415) 857-1501

Hurst
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Princeton, IN 47670
(812) 385-2564

Measurement & Control
2994 West Liberty Avenue
Pittsburgh, PA 15216
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Microchip Technology
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Chandler, AZ 85224
(602) 963-7373

Midnight Engineering
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Rocky Ford, CO 81067
(719) 254-4558

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Orange, CA 92613
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Motor Techniques
120 S Chaparral Court #200
Anaheim, CA 92808
(714) 283-1123

Motorola
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Phoenix, AZ 85008
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Northern Hydraulics
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(800) 533-5545

Nuts & Volts
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Corona, CA 91719
(714) 371-8497

Parallax
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Cirtus Heights, CA 95621
(916) 721-8217

PCIM
2472 Eastman Ave #33-34
Ventura, CA 93003
(805) 658-0933

Personal Engineering News
Box 1821
Brookline, MA 02146
(617) 232-3625

John Reese
Rt 1, Box 1551
Sautee, GA 30571
(706) 865-5495

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Phoenix, AZ 85022
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(203) 582-9561

Synergetics
PO Box 809
Thatcher, AZ 85552
(520) 428-4073

Texas Instruments
PO Box 809066
Dallas, TX 75380
(800) 336-5236

Trade Winners
PO Box 2868
Vancouver, WA 98668
(206) 694-1765

jobs for a project. There are dozens of these available. Besides the ads here in *Nuts & Volts*, see the ongoing series in *Circuit Cellar Ink*, or the coverage in *Midnight Engineering*, or in *Personal Engineering News*.

There is now this really great new microcontroller on the scene that is literally blowing everything previous away. This is the *BASIC Stamp* from the folks at *Parallax*. This one costs a mere \$39 and is exceptionally easy to program and use. It is based on a new RISC microprocessor manufactured by *Microchip Technology*.

You run development software on your PC and speak BASIC at it. The available commands are surprisingly sophisticated and include A/D and D/A conversion, some timers, option pickers, random numbers, and single command serial comm.

The host software then tokenizes the BASIC commands and sends them out a short cable to the BASIC Stamp. Where they are semi-permanently stored in serial EEPROM. This indirect route means the full resources of the Stamp are available for your intended use, rather than needing an internal monitor and operating system.

For maximum speed, you can later replace all your tokenized BASIC with optimized machine code in a custom programmed CPU. The new chip used completely blows away most of the current microcontroller benchmarks for speed and code compactness.

There are eight real-world I/O lines included and a small breadboarding area. If you want to, a snap-on 9 volt battery can be used for power. The BASIC Stamp is ideally sized for most flutterwumper uses.

Additional details on this BASIC Stamp appear in my #728 HACK66.PS file on *GENie* PSRT. And many of the fundamental concepts that underlie most microcontrollers appear in my *Micro Cookbooks*.

Royalty-free PostScript!

We've seen in previous columns and in the *Resource Bin* reprints how PostScript could serve as a hacker's universal and very general purpose computing language. Ferinstance, see #511 NUTS9.PS on *GENie* PSRT.

In the past, there have been two really big deterrents towards using genuine Adobe PostScript on your personal homebrew projects. The first is that you will need a rather fancy high-end computer to be able to run PostScript internally.

Stepper drivers

Big old power transistors were once used to power larger stepper motors or alternators-as-steppers. One good source for power electronics is *Galco*. These days though, it's probably both simplest and cheapest to pick some microcontroller to directly generate all your stepper control pulses. There are also older low cost stepper driver integrated circuits available from such firms as *Motorola*, *SGS*, and *Allegro*.

Texas Instruments has just released some impressive new *Power+Arrays* power MOSFET transistors that are ideal for stepper motor drivers. They

only cost a dollar or two each. Free samples are even available.

In particular, be sure to look at the TIPC2301, a *triple* unit which seems to be ideal for alternator steppers.

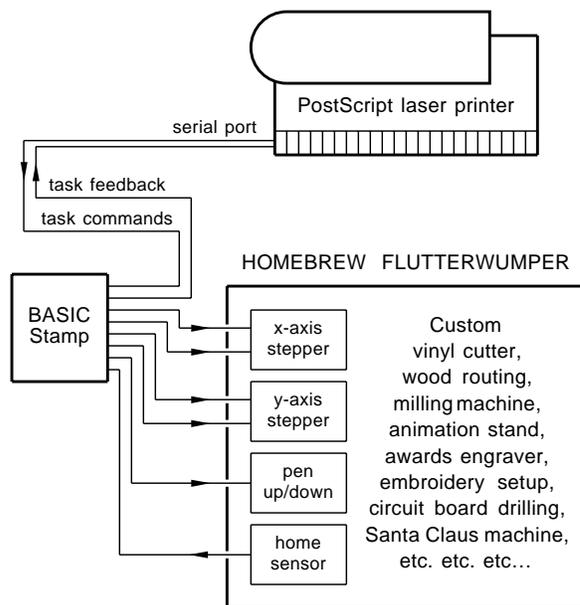
The BASIC Stamp

The steppers could get driven from stepper drivers. The stepper drivers are themselves driven either from older stepper controller chips or from a microcomputer or microcontroller.

A \$30 *Commodore* C-64 from a yard sale can be a good starting point.

An *embedded microcontroller* is just some small computer that is totally dedicated to do one or more internal

ROYALTY-FREE REAL POSTSCRIPT



The second, of course, are all the royalties involved. These could easily approach several hundred thousand dollars. And *Adobe Systems* has been reluctant to spend many development resources on most specialized and niche applications.

But the BASIC Stamp can be used as a simple serial interface between an existing PostScript printer and your flutterwumper. Presto. A full Adobe PostScript level 2. For under \$40.

The figure shows you the details. You take an ordinary PostScript laser printer and connect its serial port to the BASIC Stamp. The Stamp in turn generates all the stepper, positioning, and sensing commands.

The BASIC Stamp offers eight I/O lines. Reserve two of these for serial comm. One for the commands from the laser printer. And a second for feedback of task completions, errors, and position info.

Use two outputs for the x-position stepper phases. Use two outputs for y-position stepper phases. Use one output for pen up-down. And a final line for a home position sensor.

For car alternators, you can add a second Stamp to get the additional phases needed. Or go to one of the fancier *Parallax* microcontrollers.

In use, the PostScript laser printer converts your PostScript artwork and engineering calculations into a group of serial vector commands. These new

serial commands are received by the BASIC Stamp and then converted into flutterwumper motions.

Using PostScript

So how does PostScript make your flutterwumper so great? Let's use a sign router for an example. Say you want to route a fancy large "R" in the bold version of the *Palatino* font.

PostScript gives you many tens of thousands of superb quality fonts to design with. As commercial, public domain, or shareware, or homebrew. Your selection is literally unlimited. And PostScript's *device independence* means that any font character can be made any size and shape. All done with an optimum hinting. No towing humongous bitmaps around for each letter. And special effects distortable six ways from Sunday.

So, you start off with a genuine Adobe PostScript level 2 printer. The LaserJet 4M from *Hewlett Packard* will do, but the LaserWriter Pro630 from *Apple* is a far better choice.

The reason we do want to demand genuine level 2 is that level 2 offers *fully open font paths*. You can instantly extract those exact character shapes. Earlier PostScript versions (and most fake clones) went out of their way to make font path extractions a really major hassle.

At any rate, you use your favorite word processor to select your font.

You then use a *charpath* operator to extract the font path.

In general, the font path will be a combination of *moveto*, *lineto*, *curveto*, and *closepath* operators. The chances are that your flutterwumper does not want to have to internally handle any cubic splines. Instead, you'll want to break any curves down into shorter straight line segments. The size of these vector segments depends on the resolution you are seeking and how much time you want to spend.

So, you now have your font path in PostScript. You next use the *flattenpath* operator to convert any curves into lots of short line segments.

You next use PostScript's *pathforall* operator to generate a suitable textfile that generates all the serial commands needed by the BASIC Stamp on your flutterwumper. Finally, use the stock PostScript *print* command to shove the commands out the serial port.

What goes into your textfile? What commands do you use? The choice is up to you. What your textfile has to do is convert your PostScript path into a series of "move here" and "cut here" flutterwumper instructions. All handled as ordinary printing ASCII characters which can go out any old serial comm port.

There are three popular routes for your codes. The really big boys use a series of codes known as the *Gerber File Format Specification* from *Gerber Scientific*. The wannabee big boys use the much simpler HPGL plotter code. From *Hewlett-Packard*. *Addison Wesley* prints an *HPGL Manual*.

Either one of these standard vector codes can end up gross overkill for a simple hacker flutterwumper. Thus, writing your own serial command set might be a good route to consider.

For instance, you would really only need six serial commands. Say *X* for one step east. *x* for one step west. *Y* for one step north. *y* for one step south. And, of course, *u* to move the pen or cutter up and *d* for down.

Which would be enough to get you started. Later on, you could use the hundreds of other printable ASCII characters for vector moves, multiple steps, repeats, and such.

You have a system here with two computers. There's a turbo enhanced 35 Megahertz 68040 or whatever and ten megs or more of memory and a hard disk in your PostScript printer. Which makes a jim dandy "mother's little helper" coprocessor for the \$2.60 CPU in that BASIC Stamp inside your

flutterwumper.

Sort of a silicon *Au Pair* girl.

Your optimum solution might be to partition things so your big computer does as much as it can and the little one does only what it has to.

So you just may want to make your flutterwumper as dumb as possible. Downright stupid, even. Consistent, of course, with sane file lengths and reasonable response times.

More specific details on PostScript to vector conversion appear in my file #387 POSTVECT.PS.

Do I need the printer?

Should you want to omit using a "real" Adobe laser printer from your flutterwumper, there are two other options to consider.

You can simply use your PostScript printer *once* to print out to disk and generate an ASCII textfile of suitable commands for the BASIC Stamp. Later on, any old comm program or word processor on any old computer can read the file and send the commands to your flutterwumper. Thus, your printer would only be needed for the first use; repeats of the same pattern can be done off line. You could also distribute your runtime files over any BBS system royalty free and license free. A single printer could service hundreds of flutterwumpers.

There is also some really unique public domain shareware known as *GhostScript*. While not remotely in the same league as real PostScript, this one is by far the best of the available clones. This also gives you on-screen displays, a trick that many versions of real PostScript lack.

I've posted the newest and best versions of GhostScript and all their fonts to *GENie* PSRT.

Full sourcecode written in "C" is included, so you can easily recompile to just about any computer system.

For more info

We've also got nearly a thousand PostScript files up on PSRT, so this is by far your best source to get started on this unique new universal and general purpose hacker computer language. Start off with our file #337 STARTUP.PS.

For hard copy, I try to stock nearly everything of value on PostScript here at my *Synergetics*. For openers, start with the Adobe red and blue books and my *PostScript Secrets* book/disk combo. Or, to jump in with both feet, check out *The Whole Works*, one each

of everything by all major PostScript authors.

This month's contests

For our contests this month, just send me some new info on your latest personal flutterwumper idea. A paper design would be just fine. Even just the concept should do if it is unusual enough. But a video of the beast in operation would be better. Along with output samples.

Alternately, (ouch) send me your secrets for alternator rewinding and stepper motor conversion. Or find me a cheap linear stepper source.

There will be several of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 28 books and countless articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number twenty

Starting your integrated circuit databook collection.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

A free *GENie* brochure if you voice call (800) 638-9636.

Several additions to our previous listing on ham radio publications. The *really* mobile hams should subscribe to the *Newsletter of Bicycle Mobile Hams of America*. Or that *Nomadness Report* published by Steve Roberts.

The *Canadian Amateur* is yet another foreign pub. Two mags specializing in Morse code are *Dots and Dashes* and the very British *Morsum Magnificat*.

Key and bug collectors will find the *Vail Correspondant* to be of interest. And also the *N7CFO Newsletter*.

This month, I thought we'd take a look at a popular helpline topic...

Getting chip data

How can you find out more about new integrated circuits? The standard method is to help yourself to a great heaping bunch of integrated circuit *data books*. These are bound collections of data sheets offered by just about all of the ic manufacturers. Sometimes the data sheets stand alone. Other times, ap notes and other info may get

included in the same volume.

If you are in the right place at the right time, and ask nice enough, most data books are free. Others do have a "suggested" price which you can often get around. But several of the larger outfits (especially *Motorola*, *National*, *Intel*, and *Texas Instruments*) often do charge for their tech info. Unless they have something brand new they want to promote in a big way.

Now, if you are new to electronics, or are merely a casual hobbyist, you might be able to squeak by with as few as 45 to 60 data books for your personal resource collection. If you are at all serious over your hardware hacking and learning electronics as a career, a minimum of *one hundred feet* of data books is essential.

But you better hurry in getting your own personal data book stash started. While more data books have gotten published this year than ever before, these are now an endangered species soon to become extinct. The costs are getting totally out of hand, and things are changing way too rapidly for any traditional printing and publishing to cope. So, you should soon be seeing data book alternates in the form of CD

NEXT MONTH: Sources for self-publishing your own Book-on-demand titles.

ROM, company BBS data bases, phone fax response services, and on-demand published info. Adobe's new *Acrobat* system should be a major player here.

Which circuits do what?

How can you tune into which ic's are popular and available? The first way, of course, is through the catalogs and sale flyers of all our *Nuts & Volts* advertisers. Check here first.

A second method is to use the *IC*

Master. This is a large and expensive directory of pretty near all integrated circuits built worldwide. Although a great resource, it doesn't make value judgements as to how economic, how available, or how mainstream your selections will be. The cross references in the *IC Master* are handy for finding oddball part numbers.

A third trick is to browse *backwards* through those *NTE* and *ECG* catalogs. Looking at the block diagrams for the chips to see what they do. When they show up here, the chances are you are dealing with a mainstream part.

By far your most powerful tools for finding circuits and picking up data books are the industry trade journals. We've looked at this in depth a time or two in earlier columns and in our new *Resource Bin* reprints. In order of importance, be sure you subscribe to *E. E. Times*, *Electronic Design*, *EDN*, *Electronic Products*, and that *Electronic Component News*. Any random issue of *E. E. Times* is bound to have a dozen "fax this coupon" pages for no-charge data books. Freebie sample parts, too. Bingo responses to the rest of the ads will get you lots of other info.

Naturally, you want to appear as credible as possible when requesting info. You *always* contact applications engineering at their main plant, and *never* the local sales rep! A company name is a must. Details on starting up your own technical or craft business appear in my newly revised *Incredible Secret Money Machine II*.

A guided tour

Our resource sidebar for this month lists most of the important integrated circuit sources. Let's go through them in alphabetical order. And I'll tell you my personal views of who I feel are the good guys.

Allegro/Sprague is big on interface drivers, *Hall Effect* magnetic devices, liquid level sensors, and automotive

stuff. *Analog Devices* has every flavor of op-amp ever invented. Along with temperature sensors, multipliers, new sound chips, and bunches more. They also publish the free *Analog Dialog*.

Brooktree is kinda pricey, but they do have really great multimedia parts. Especially color palettes and chips for NTSC data conversion. *Burr-Brown* is big on all the D/A and A/D chips, for CD-ROM and digital audio.

California Microwave is mostly for VHF and UHF amplifiers, mixers, and front ends. *Cherry* has interesting and low cost automotive chips.

Crystal is your best source for ultra quality A/D converters for electronic music and precision weigh scales.

Dallas Semiconductor, of course, is by far your all time number one good guy. Mostly because of their single quantity direct order hotline. They are very much into timer and stopwatch products, security devices, telephone interface chips, and comm circuitry. *Harris* is mostly overpriced mil stuff, but they do still stock some ancient and eminently hackable chips from *RCA* and *Intersil*. *Hewlett-Packard* is strong in opto and microwaves.

Integrated Circuit Systems is another good guy. They have totally stunning multimedia chips, music synthesizers, time code generators, and more. *Intel* is, well, Intel. I guess. Yup. There they are. To this day, I still feel than any integrated circuit whose part number starts with an "8" is intrinsically vile and despicable. I definitely remain a "6" person. But I guess that's just me. This, of course, is being written with *AppleWriter* on an *Apple IIe*.

Lambda offers regulators and special power supply chips. *Linear Technology* is another one of the good guys. Lots of op-amps, particularly lower noise ones. And a real innovator for just about anything linear. *LSI/CSI* is another good guy. Great chips here for music boxes, doorbells, counters, alarms, power controls, timers.

Maxim is now tied for first place in intrinsic hackability with *Dallas*. They, too, offer a direct order line, plenty of free samples, sanely priced evaluation kits, and easy lit access. Power supply chips, op-amps, comm drivers, great A/D and D/A systems. They are very strong in micropower aps.

Microchip Technology is yet another hacker friendly outfit. They've got a new PIC series of microcontrollers that is totally blowing all the big boys away. Great applications info, too. *Micro-Linear* has some unusual low

cost digital sinewave generators.

Motorola, of course, is one of the biggies with bunches of reasonably priced analog and digital chips. And an extensive data library. But I have often found better devices elsewhere. Ferinstance, *SenSym* builds a better pressure transducer, *Sierra* has better caller id chips, and *Microchip* has far better microcontrollers.

MX-Com is an obscure outfit that is strongly into speech scrambling chips, pager encoders, tone signalling, and similar specialized comm stuff.

National is another one of the real biggies, with bunches of analog and digital stuff. Along with scads of data books and application notes. OKI is big in speech synthesis chips.

Plessey has lots of specialized high frequency digital and analog chips, remote controls, stuff like this. Their *TV, Cable, and Audio Handbook* is a hacker must. *Rohm* has lots of obscure consumer electronics. The BA1404 FM stereo transmitter is one of the hottest hacker items ever.

Samsung has got three giant linear data books which are crammed full of stunning hacker chips. These are also a must have. *SGS-Thompson* has lots of memory and EPROM chips, plus some brand new GPS receiver front ends.

Sierra builds telephone stuff. They also have just about the best caller id chips anywhere. By far.

Signetics is another one of the good guys. Their NE602 and newer mixer chips have revolutionized ham radio and similar rf designs.

Sony, of course, for all video and multimedia. Especially the high speed A/D converters. *Standard Micro* offers video controllers, keyboard encoders, and "terminal oriented" items.

Try *Stanford Telecomm* for extremely pricey chips which could be used for fully digital receivers and precision numerically controlled oscillators.

Teltone is a leader in the telephone chip field. They have lots of touchtone decoders. *Teccor* is an obscure outfit good for thyristors, light dimmers, and related power control circuitry.

Texas Instruments is another one of the real biggies. With great heaping bunches of data books and ap notes available. I especially like their new *Power+Arrays* driver chips.

Western Design is a maveric outfit still carrying the "6" torch. To 32 bits and beyond, even. My heros. *Unitrode* has some interesting battery charger and fluorescent lamp dimmer circuits. *Xicor* manufactures EEPOTS useful for

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LOTS OF OTHER GOODIES

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PostScript Beginner Stuff	\$39.50
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Real World PostScript	\$22.50
Thinking in PostScript	\$22.50
LaserWriter Reference	\$19.50
Type 1 Font Format	\$15.50
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<p>Advanced Linear Devices 1180 F Miraloma Way Sunnyvale, CA 94086 (408) 720-8737</p>	<p>Elantec 1996 Tarob Court Milpitas, CA 95035 (408) 945-1323</p>	<p>Lattice Semiconductor 5555 NE Moore Court Mt. Prospect, IL 60056 (800) FAST-GAL</p>	<p>NCR Microelectronic 3718 North Rock Road Wichita, KS 67226 (800) 325-SCSI</p>	<p>Silicon General 11861 Western Avenue Garden Grove, CA 92641 (714) 898-8121</p>
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<p>Allegro/Sprague 70 Pembroke Road Concord, NH 03301 (603) 224-1961</p>	<p>Exel 2150 Commerce Drive San Jose, CA 95161 (408) 432-0500</p>	<p>LSI/CSI 1235 Walt Whitman Road Melville, NY 11747 (516) 271-0400</p>	<p>OKI Semiconductor 785 N Mary Avenue Sunnyvale, CA 94086 (800) 832-6654</p>	<p>Sony Corporation 10833 Valley View Street Cypress, CA 90630 (714) 220-9100</p>
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<p>Analog Devices PO Box 9106 Norwood, MA 02062 (617) 329-4700</p>	<p>Gould AMI 2300 Buckskin Road Pocatello, ID 83201 (800) 538-7736</p>	<p>Maxim Integrated Products 120 San Gabriel Drive Sunnyvale, CA 94086 (408) 737-7600</p>	<p>Plessey Semiconductor PO Box 660017 Scotts Valley, CA 95067 (408) 438-2900</p>	<p>Stanford Telecomm 2421 Mission College Blvd Santa Clara, CA 95056 (408) 748-1010</p>
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<p>Brooktree 9950 Barnes Canyon Road San Diego, CA 92121 (800) 843-3642</p>	<p>Hewlett-Packard PO Box 10301 Palo Alto, CA 94303 (415) 857-1501</p>	<p>Microchip Technology 2355 W. Chandler Blvd. Chandler, AZ 85224 (602) 963-7373</p>	<p>ROHM Corporation 3034 Owen Drive Antioch, TN 37013 (615) 641-2020</p>	<p>Teledyne Components 1300 Terra Bella Avenue Mountain View, CA 94043 (415) 968-9241</p>
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<p>Cherry Semiconductor 2000 S County Trail East Greenwich, RI 02818 (401) 885-3600</p>	<p>Intech 67 Alexander Drive Research Triangle, NC 27709 (919) 549-8411</p>	<p>Micro Switch 11 West Spring Street Freeport, IL 61032 (815) 235-6600</p>	<p>Seiko Instruments 2990 West Lomita Blvd Torrance, CA 90505 (310) 517-7770</p>	<p>Toshiba America 9775 Toledo Way Irvine, CA 92718 (714) 455-2000</p>
<p>Cirrus Logic 1463 Centre Pointe Drive Milpitas, CA 95035 (408) 945-8300</p>	<p>Integrated Circuit Systems PO Box 968 Valley Forge, PA 19482 (215) 666-1900</p>	<p>Mitel 2321 Morena Blvd Ste M San Diego, CA 92110 (619) 276-3421</p>	<p>SGS-Thomson 1000 East Bell Road Phoenix, AZ 85022 (602) 867-6100</p>	<p>Unitrode 70 Continental Blvd Merrimack, NH 03054 (603) 424-2410</p>
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OTHER MENTIONED RESOURCES

Adobe Systems

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(800) 833-6687

Bicycle Mobile Hams

Box 4009
Boulder, CO 80306

Canadian Amateur

370 King Street W
Kingston, ONT, K7L 4W2
(613) 545-9100

ECG

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Williamsport, PA 17701
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EDN

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Newton, MA 02158
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E.E. Times

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Manhassat, NY 11030
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Electronic Design

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Sunset Silicon Products

402A Ridgefield Circle
Clinton, MA 01510
(508) 365-6108

Vail Correspondant

PO Box 88
Maynard, MA 01754
(617) 897-2226

digitally controllable potentiometers having memory. And *Zilog* remains a useful supplier of serial comm chips and microcontollers.

Some long goners

Several really great circuit houses have vanished over the years. *Intersil*, *General Electric*, and *RCA* have been combined into *Harris*. Only a few of their great old hacker chips remain. The dregs of *Mostek* got absorbed into *SGS*. But not their fine music circuits. *General Instruments* became *MicroChip Technology*. One remaining source for *GI* sound chips is *JDR Microdevices*.

Sprague recently sold out to *Allegro Electronics*. *AMI* is now *Gould*. And all those small second tier power semi houses change their names and logos as often as most people change socks. Check the power semiconductor trade journals for the latest scoop here.

By the way, if you just gotta have some ancient chip, try *Sunset Silicon Products*, *Rochester Electronics* or else *Pure Unobtainium*. These all specialize in out-of-date and otherwise hard to get parts. *Pure Unobtainium* is a "by hackers" and "for hackers" labor of love operation. Their catalog costs a dollar cash. A gottahave.

But do remember that any ancient chip dies for a good reason. There's either some better replacement, or else a vastly improved way to tackle the same problem.

This month's contest

For our contest this month, just tell me about any integrated circuit or ic house that I don't know about. Ones which are sanely priced and usable.

There will be a large pile of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all.

I have gathered all of my previous columns together into our new bound *Resource Bin* reprints. These include a full index and my master *Names & Numbers* directory. Check my nearby *Synergetics* ad for more info. ♦

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Don Lancaster's

RESOURCE BIN

number twenty-one

Resources for Book-on-demand publishing.

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Recently, BOD has passed a critical *Turing Test* threshold. In which you can not detect any quality difference between your own BOD product and a high volume commercial print job. In

NEXT MONTH: Don looks at new developments in online computing BBS resources.

fact, you can now do a *better* product than most book publishers offer.

You could easily do BOD on your own. Either self-publishing, or as a service bureau for others. Or hacking usable new products such as joggers, shears, and binders.

Or maybe even a popcorn sized CD machine for instant printing of 200,000 titles. And *all* of the rest of them one short phone call away.

The real power of the press lies in

owning one. Does it ever.

BOD insider secrets

After working with BOD for a few years now, I have found several key secrets that make this new technology simple, cheap, and easy...

(1) Use only genuine Adobe PostScript Level II - PostScript is *the* industry standard method for creating graphic layouts. PostScript's strong points do include its total device independence and its ability to freely mix text and graphics in any size and orientation.

There are thousands of top quality fonts available. PostScript is adept at creating smooth flowing curves from extremely sparse data sets. Best of all, PostScript is fast and fun to use. All you really need is your favorite word processor or editor.

Level II adds open font paths, user objects, data filtering, compression options, higher speed, better colors, and direct FAX interface. Level II is as much a step up from level I as level I is over clay tablet and Cunieform.

Be absolutely certain to get the real item directly from Adobe. There are several fake PostScript clones that are outright atrocities.

(2) Use 600 DPI resolution- Earlier PostScript printers offered only a 300 DPI resolution. Which gave serious compromises in the print quality and photo halftones. Properly done today, typical 600 DPI laser printing should end up looking much *better* than most jiffy printing.

On the other hand, there are several good reasons to studiously avoid the higher resolution printers. As you double resolution, you take four times longer to process your data and need four times the memory. You also get into overpriced bizarre low volume machines from oddball companies. Several of which are notorious for using buggy fake PostScript and claim

resolutions beyond what their engine and toner can deliver long term.

Fortunately, there are some newly available tricks that create the *illusion* of effective resolutions well beyond 600 DPI. One is *resolution enhancement*, a simple and cheap chip which adds partial dots to smooth out jaggies. The Apple *Photograde* system gives quality halftones even down at 300 DPI that are the equivalent of an uncorrected 1200 DPI. A brand new *error diffusion* technique can cause any gradient or waterfall printed at 600 DPI appear exactly like it was done on a 2400 DPI phototypesetter.

(3) Use high speed TWO-way comm- PostScript is a totally general purpose computer language. It *has* to be able to talk *both* ways, getting info from a host *and* returning error messages and data back to the host screen.

One-way PostScript comm simply will not do! Do not use it!

In fact, one-way PostScript comm is just about as dumb as computing with your monitor turned off. This literally blindfolds you and ties both of your feet together.

Good ways to communicate include Ethernet, AppleTalk, and Shared SCSI comm. High speed two-way serial is also useful. For PC users, there is a new high speed *two way* IEEE.P1284 parallel interface.

But under *no* circumstances should you *ever* use PostScript with one-way parallel ports! To even *think* of doing so is ludicrous. Similarly, COPYING to a serial COM1 port is a no-no, because of the lack of the reverse data channel. Certain print buffers and networking schemes can also be bad news, unless they also clearly provide for a full and fast return channel.

Many more details on all of this in STARTUP.PS.

(4) The printer hard disk is essential- Most users grossly underestimate the power of the hard disk dedicated to a PostScript printer access. First and foremost, all of your jobs will print faster if you read them off local hard disk files, instead of having to resend all page descriptions each and every time. File access times are five to ten times better than the very fastest of two-way comm.

Second, the hard disk can free up both your host and an operator. Just say "print up four copies of this book" and walk away. Thirdly, your jobs will run faster because the font cache gets preserved when you turn your

printer off. No need to rebuild all of your fonts bitmaps on power up.

Naturally, you can have hundreds or even thousands of fonts on your hard disk. You can also set up *shared SCSI comm*, where host and printer can *both* talk to the same disk system. This is the fastest two-way comm you can achieve today.

Finally, many level II operators will *demand* hard disk access. Especially for video compression, fancy forms, and other user objects.

PostScript level II does let you use certain strings as file objects. This can form a temporary workaround for a diskless system. Especially when flash memory is also available.

(5) Use a bolt-on duplexer- A *duplexer* prints both sides of the page with one trip through the printer. Duplexers dramatically improve throughput and slash your scrap rate. They can greatly raise employee morale.

A duplexer is essential for serious BOD work. Older duplexing printers did include the LaserJet IID and IIID. These worked fairly well, but were slow and lacked hard disk access. The trend today is to *bolt-on* duplexers that upgrade existing machines.

For instance, the duplexer for the *Hewlett-Packard* 4SI lists for \$600. The duplexers should eventually become available for all popular printers.

There are temporary workarounds if you do not have a duplexer. One is to rearrange the sequence your disk files are called up as "even" and "odd" jobs. Another route is UNDEX.PS. This software routine autoprnts odd or even pages.

Note that any duplexer has to be carefully integrated into the printer's firmware code. An add-on homebrew kludge won't hack it. For maximum speed, the pages have to print out in a 2-4-1-3-6-8-7-5... pipelined sequence. And the positioning of the backsides have to offer "normal" and "calendar" *tumble* options.

(6) Optimize speed- One of the really great features of BOD printing is that it is *self-collating*. Your entire volume comes out of your printer ready to bind. Because of this, each page prints *once* in sequence. You simply can't afford to spend any time making up individual pages. You want the pages to pour out of the printer at maximum mechanical speed.

Fortunately, all of those long page makeups most people wrongly blame on PostScript are totally unnecessary.

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Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

BOOK-ON-DEMAND PUBLISHING RESOURCES

Access LaserPress

3502 W Earll Drive
Phoenix, AZ 85019
(602) 272-2525

Adobe Systems

1585 Charleston Road
Mountain View, CA 94039
(800) 833-6687

Apple Computer

20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010

Bennett LaserBrite

720 4th Street SW
Rochester, MN 55902
(507) 280-9101

Blanks USA

2722 Fernbrook Lane N
Minneapolis, MN 55447
(800) 328-7311

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HDS Systems

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Tucson, AZ 85733
(520) 881-2632

Helene's Hotline

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Port St Lucie, FL 34984
(407) 879-6666

Hewlett Packard

19310 Pruneridge Avenue
Cupertino, CA 94014
(800) 752-0900

Horsetrader

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Santa Ana, CA 92711
(712) 921-3120

Kroy

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Paper Direct

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S Hackensack, NJ 07606
(800) A-PAPERS

Paper Plus

300 Oceangate #800
Long Beach, CA 90802
(213) 436-8291

Pelsaer

4125 Prospect Drive
Carmichael, CA 95608
(916) 967-6401

Photolabels

333 Kimberly Drive
Carol Stream, IL 60188
(708) 690-0132

PosterWorks

1 Kendall Sq #323 Bl 60
Cambridge, MA 02139
(617) 395-8350

Printers Exchange

1306 Greenbrier Road
Anniston, AL 36201
(205) 831-5589

Printer's Hot Line

PO Box 1709
Fort Dodge, IA 50501
(515) 955-1600

Printer's Shareware

5019 W Lovers Lane
Dallas, TX 75209
(214) 350-1902

Printers Shopper

PO Drawer 1056
Chula Vista, CA 92012
(800) 854-2911

Procom Technology

2181 Dupont Drive
Irvine, CA 92715
(510) 538-8916

Queblo

131 Heartland Blvd
Brentwood, NY 11717
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Port St Lucie, FL 34984
(407) 879-6666

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G-3030 W Pasadena
Flint, MI 48504
(800) 521-1142

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Thatcher, AZ 85552
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Maspeth, NY 1378
(800) 223-2508

TypeWorld

One Technology Park Dr
Westford, MA 01886
(508) 392-2157

U&Ic

2 Dag Hammarskjold Plaza
New York, NY 10017
(212) 371-0699

Unibind

4125 Prospect Drive
Carmichael, CA 95608
(916) 967-6401

Velo-Bind

650 Almanor Avenue
Sunnyvale, CA 94086
(800) 538-1798

Xerox

404 Washington Blvd
Mundelein, IL 60060
(800) 323-1249

Martin Yale

500 N Spaulding Avenue
Chicago, IL 60624
(312) 826-4444

correctly, the makeup time is less than the paper mechanical feeding time. At any rate, they pour out of the printer at full speed. Page after page after page. From file sizes of 12K or so.

See SPEEDUP.PS for more details on insider speed secrets.

(7) Refill your own toner cartridges- A new toner cartridge might cost you as much as \$145 and may only be good for 2500 copies or so. Which gives you really poor economics. Instead, you could refill your own toner cartridges for as little as \$4.50 a shot and do so dozens of times. The 20:1 or better cost savings here is a powerful incentive to doing your own reloads.

To not do so is sheer lunacy.

Toner reloading is fast and simple. Since the process can take less than two minutes, you just might end up paying others as much as \$1200 an hour to recharge cartridges for you.

The bare bones fundamentals of recharging are shown in my *Intro to PostScript* video. *Recharger* magazine has hundreds of ads for recharging services and supplies. Used cartridges are usually found via your local paper classified ads for \$5 each.

Be sure to watch out for all those obscenely misleading "environmental recycling" hogwash ads. What these folks are really trying to do is get the carts *off* the market to *prevent* their personal recycling and reuse. So they can instead sell more new units. This is ecopornography at its worst.

(8) Do all your own maintenance- A typical laser printer can be used for several million copies. Providing you do your own routine work on it and bolt on new modules as they age.

Simple stunts such as scraping the pickoff pawls with your fingernail can *triple* the life of a fusion roller. And knowing where the smudged hidden mirror is could greatly improve your print quality. So can routine care of the charging wires. Even the slightest amount of dirt on a duplex charging wire can really cause bizarre results on second-side printing.

Many manufacturers will positively refuse to make their repair manuals available. Instead, the *Hewlett Packard* manuals are both readily available and outstanding. And they apply to most competing products.

Use HP both for manuals and larger replacement assemblies. Individual parts are sold by *Don Thompson* and in the various *Recharger* ads.

One little-known repair tip: If your

All those makeup times have nothing whatsoever to do with the PostScript language. They are caused by klutzy applications generators and poorly written code. Why anyone tolerates these at all is beyond me.

There are simple steps you can take to dramatically speed up your print times. Simply leaving your printer on and using decent high speed two-way comm can make a big difference. A hard disk gives you further speedups because it eliminates comm times.

But the real speed secret is known

as *compiling*. You can run routines that create new textfiles which are much shorter and run much faster than the originals. Key software here is the Adobe Distillery, or DISTILL.PS and its improved offspring in *Acrobat*. I also use a MAUDED.PS "double distiller" to further improve all my file lengths and speeds.

For instance, on all of my own BOD volumes, three-column detailed pages with superb text justification, headers, footers, and one or two fancy figures often make up in *zero* time. Er, more

printer makes an intermittent and a muffled yowling noise, open up the lid and let the cat out.

(9) Aim for reasonable costs—\$1900 is a fair price for a BOD printer. Say another \$300 for the bolt-on duplexer. A maximum of 0.15 cents per page toner costs. And a minimum effective life (with care) of 600,000 copies.

As for a computer, a *Commodore-64* is gross overkill. PostScript is such an incredibly powerful printer-resident language, that any old dumb terminal will serve as a jim-dandy host.

The goal here is to actually end up *cheaper* than older jiffy printing. While delivering a higher quality product at a much faster turnaround.

Figure one penny per page for the machine amortization. Say 0.6 cents for the paper. And 0.15 cents per page side for the toner. If you ignore such frivolities as labor and overhead, that is a price of 1.9 cents per double sided page. Add fifty cents for binding, and you're looking at \$2.40 for a 200 page book.

With your costs certain to further improve in the future.

Which printer?

You can fill all of these BOD needs today. Each is a technical reality. But the bad news is that you can't quite get each and every feature on any one printer. So, some compromise is still needed. An ideal BOD printer should arrive "real soon now".

At this writing, I do feel the most bang for the buck by far lies in that Apple *LaserWriter Pro630*. PostScript Level II, high speed two-way comm, great external *and* internal hard disk support, 600 DPI, and high quality photo enhancements.

The two negatives are no duplexer (you might temporarily use software duplexing and disk file rearranging instead), and no service manuals. But the HP manuals apply.

The most obvious choice in a laser printer is the *Hewlett Packard LaserJet 4M*. Genuine Adobe PostScript level 2. 600 DPI. Outstanding repair manuals. Aggressive pricing. Readily available replacement parts. Good toner refill economics. A very slight (and largely negligible) edge in print quality over Apple, owing to the modestly better resolution enhancer. No duplexer.

No hard disk! This makes the 4M almost totally useless for serious BOD work. And incredibly stupid, because HP has another division desperately

seeking aps for their tiny and low cost *Kittyhawk* hard drives.

Street prices are around \$1800 for the LaserJet 4M and \$2050 or so for the LaserWriter Pro630. Because of that hard disk, the Pro630 gives you more bang for the buck.

H-P also has the larger *LaserJet 4SI*. This one is faster and offers a low cost bolt-on duplexer. The 4SI has some new ultra high speed and *two-way* (!) parallel port comm under that new IEEE 1284 standard. But it's not at all clear that the unacceptably bad long term print quality problems of the 3SI have yet gotten cleared up in this upgrade. Once again, no hard disk yet. Which temporarily places this machine beyond the pale. The plug-in hard disk slot is there.

I do not recommend *any* older or lower cost printer. Er, except possibly for a used LaserWriter G. Or an NT or NTX upgraded to a LasG with a new tray. As a group, the others simply do not deliver an acceptable bang for the buck. Besides missing many key BOD features from our list. Going away from *Canon* engines is risky and has worse refilling economics and fewer third party support sources. And fake PostScript is unacceptable.

If you're on a very low budget, try *GhostScript* GHOST261.EXE and your present printer. Later, you can work your way up to a real machine.

A final choice that meets all but one of our BOD printer goals is the *Xerox Docutech* system. Very fast printing. Astonishing *Emerald* speeds. Does an infinite loop in seventeen seconds flat. Internal hard disk support. Enhanced 600 DPI resolution. And even an 11 x 17 option. Great print quality.

Two problems with this beast: The first is its price of a house and two cars. The second is their really stupid per-copy pricing policy. Ten copies of a hundred page document cost much more than a hundred copies of a ten page one. Totally dumb.

There are service bureaus that offer Docutech services. David Seid's *Access LaserPress* is one. He combines BOD with traditional binding and finishing services. He is a tad pricey, but is a rather good example of where people are going with BOD today. And more than cost competitive with old line printing in quantities of 50-500.

My own setup? My main machine is still a LaserWriter Pro630, backed up with a LaserWriter G and a *QMS Turbo 820*. And two old LaserWriters. Which still seem best for covers and

business cards. Duplex stuff still gets done on an older LaserJet IID. Higher volume products do get farmed out to *Access LaserPress*.

What about photos?

By now, you've probably seen some dismal attempts at including photos on laser printed pages. And may have concluded that the results are all just plain awful.

There have been some major photo software and firmware breakthroughs in the past few weeks. These now can let you laser print superb photos in your BOD work. Yes, even at plain old 300 DPI. Although the results are far better at 600 DPI.

You will have to pay attention to detail, follow a steep learning curve, and pick up some PostScript smarts along the way. But top quality photos are now definitely a BOD reality.

The first of these breakthroughs is called *histogram equalization*. If you only have a limited number of grays available, you have to make them all work equally hard. Histo does a photo dodge and burn for you, making sure each gray does its part.

The second is the Apple *Photograde* system, which sets the standard for what can be done with laser halftones. Sadly, Photograde is a real memory hog and is not yet 600 DPI compatible. But the quality here is tops.

The third technique is called *gamma correction*. If you purposely throw a few of your printer's grays away, the rest of them become well centered and balanced. The fourth breakthrough is *in-printer retouching*. Fancy software can help you individually darken or lighten prints. Similar to opening up or closing down one stop or two. Or raise or lower contrast. Like printing one paper grade high or low.

Our final photo breakthrough is the real biggie. This one is known as the *spotless halftone* scheme. The old way, you traded off your halftone spot size versus the number of available grays. The best compromise was often not so great. Especially at 300 DPI, where a 70 line screen of 19 grays was the best that you used to be able to do. With spotless halftones, you can get 64 or more grays out of the same photo. With totally negligible grain.

Now, any sampled data system has aliasing and quantizing noise. The big problem with traditional halftones is that the noise (or dot "grain") is very regular and low in frequency. Spotless halftones make the noise much higher

in frequency and much more random. You simply do not notice it.

Spotless halftones look ridiculously better than traditional ones. You have to see one to believe the improvement here. These do use somewhat longer files and require a tad more front end processing. They work best in one size on one selected printer. These remain experimental. But the results speak for themselves. You could now even beat Photograde at its own game.

Examples of what you can do here include LENA.HIST.PS, RETOUCH.PS, and SPOTLESS.PS.

Binding and finishing

There are all sorts of really lousy ways out there to bind books. Most of them are horribly overpriced and an outright ripoff. After testing dozens of these systems, there are only three I can genuinely recommend.

The first of these is the old *Personal Velobinder* system. This is a cheap but non-perfect way to bind such things as reports or whatever. Size is limited to a few dozen pages. Startup kits are sometimes offered for \$29. Bindings themselves cost a quarter.

There are a number of the hot glue binding systems available, but I like the one by *Unibind* the best. These are simply covers that include a hot glue strip inside them. You put your text into the cover and then apply heat. A special companion toaster is offered to do the job right. Covers are around a dollar each. The toaster is \$200, but *Unibind* will give you one free if you buy enough covers. I particularly like the matte covers. I underlay these with heavy parchment stock.

The third product is by far the best BOD binding system I have ever seen. It is called *Pelsaer* and is also offered by *Unibind*. It uses the same *Unibind* toaster. *Pelsaer* is simply a large sheet of paper that has been folded into a "U" shaped pair of flysheets. Hot glue has been added along the spline. Cost is around thirty cents.

To use *Pelsaer*, you'll print up any old cover any way you like. With any spine lettering and overcoat you like. Drop the *Pelsaer* into the cover and your jogged text into the *Pelsaer*. Pop it in the toaster. Then nuke it.

The ultimate BOD binding system would be a peel-and-stick piece of hot glue over cold glue. These are sold by *Planax*. But with an utterly absurd "What are they on and where can we get some of it?" price.

Regardless of your chosen method,

it is best to jog all your pages before binding. While those real joggers are rather pricey, you can easily build up your own from a \$25 jitter sander. A final edge trimming also can make an important addition to your products. Sadly, there aren't any sanely priced guillotine trimmers. The leader here seems to be *Triumph*, and a 14 inch semi-automatic cutter will cost you \$1700 new, or \$1100 used.

Used printshop gear is notorious for really bad ripoffs. If you do not know what you are doing here, you are pretty near certain to get done in. Used cutters appear in *Horsetrader*.

There are a number of methods to make your covers more durable. One is to use real ink covers. Another is *Bakerizing*, a new zero cost process in which you place a sheet of slip-coated mylar in contact with a toner image and then apply heat and pressure. The resulting calendering melts the toner and makes it ultra black, glossy, and more durable.

Color hot stamps can dramatically improve your covers. *Kroy Color* is one possibility here, albeit an expensive one. You could instead laminate your covers in the matte or gloss materials from *USI*, or else use a varnish or a uv curing overlay.

There's dozens of free print shop trade journals. *Quick Printing* is just about the best of the batch.

Bunches more on cover production, jogging, shearing and related BOD finishing appears in *BINDCUT.PS*.

Some resources

Let's briefly review several of the more important BOD resources:

Access LaserPress is a great new BOD service bureau. *Adobe* for PostScript. *Apple* for printers. Or *Bennett* for laser thermography. Try *Blanks USA*, *Cards Now*, or *Die-o-Perf* for business cards mailers, or forms. *Hewlett Packard* for printers. And *HDS Systems* for custom layout work and BOD consulting.

Horsetrader for print shop products. *Kroy* for hot stamp foil overlays. *Paper Direct*, *Paper Plus*, and *Queblo* for the paper stocks. *Photolabels* for full color stick-on photos. *Posterworks* for prints up to a quarter acre (!) in size.

Procom for the internal printer hard disks. *Printer's Exchange*, and *Printer's Hotline* for resources. *Printer's shopper* as a pricey but full line distributor of print shop needs. *Printer's Shareware* for cheap software.

Quick Printing is the finest of those print trade journals. Especially their

Helene's Hotline finder service. *Quick Tickets* for tickets and *Quill* for office supplies. *Recharger* for parts or toner. *Synergetics* for BOD books, software, and consulting.

Don Thompson for outstanding laser printer training, kits, videos, and all repair parts. *Triumph* for rugged but costly cutters. *TypeWorld* and *U&Ic* as great typography mags. *Unibind* for Pelsaer binders. *USI* for laminating. *Velobind* for the non-perfect bindings. *Martin Yale* for folders or joggers.

The flip side of BOD is marketing. See *BOOKMARK.PS* for details. More on BOD resources in *BODRES1.PS* and *BODRES2.PS*.

This month's contest

For this month's contest just tell me something new about BOD in 175,000 words or less. An idea. Or a concept. Or a hack. Or whatever.

There will be a large pile of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all.

Getting started

I've put together a *Book-on-demand resource kit* which can get you jump started in BOD. I also stock my own PostScript stuff, along with the very best texts by other major PostScript authors. Either by themselves, or all together in our enormous *Whole Works* package. Check my *Synergetics* ad for more details. Or you could call my voice helpline below.

And, of course, there's now over a thousand files that are BOD related up on my *GENie* PSRT. A large handful of these have been mentioned earlier in our story. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 30 books and countless tech articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number twenty-two

A look at online resources & opportunities

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

A free *GENie* brochure if you voice call (800) 638-9636.

They are out there.

Tens of thousands of the online BBS bulletin boards. Through which you can immediately get in touch with the experts in *any* field. Or instantly pick up the latest inside info on *any* topic. Or meet new and unusual people. Or tap all sorts of entertainment services from G+ through XXX-. Or even buy a coconut-anchovy pizza.

The online services have gotten to the point where you can not afford to ignore them. All you'll need for access is a low cost modem and some comm software. If you can not find anything better, try *Crosstalk* or *ProComm* on a PC, *Microphone* on a Mac, or *ProTerm* on the Apple IIe. Just be certain your comm software has a *scrollback* feature where you can see previous screens. Plus a way of logging to disk.

There's also lots of nonobvious uses for BBS systems. Ferinstance, you can use most any old BBS to transfer files between host machines with different operating systems. Or time shift the

transfer for convenience. Simply have your source machine upload and your destination download. Naturally, the moved files may or may not be usable on your second machine. But at least they are on disk and readable.

It never ceases to amaze me that I can press one key on my *GENie* PSRT and instantly send email to zillions of users. At a cost per thousand of - zero. But do note that typical BBS users do not take at all kindly to junk email. It is very easy to do vastly more harm than good. The secrets here are to (A) keep it short, (B) limit it to genuinely useful *news*, and (C) use it rarely.

Let's check into what I feel are the most important online BBS resources today. Before we do, though, let's take a closer look at...

The Downside

What's wrong with telecomputing today? Well, quite a bit.

Online access can be expensive. The only bigger surprise than your first \$468.74 phone bill occurs when your sixth grade son or daughter racks up a \$4,687.40 one instead.

There are lots of ways to reduce all of your telecomm costs. Practice and higher speed modems are the obvious first steps. Use the cheaper and closer

NEXT MONTH: Don looks at the tools & test equipment that can be cost effective.

services until you become comfortable with your BBS comm. Download all the instructions and the menus so you can avoid relisting them online. There are quite a few programs (such as *GENie's Alladin*) that can give you a faster and automated access. Knowing all your phone fees and the hours they apply can also help a lot.

Simply LISTING files can be faster

and cheaper than using XMODEM or its improved offspring. But note that a listing permits comm errors. Still, if you have clean lines and are looking at tutorials, text, or at uncompressed code in a language that you are adept at, you might save big bucks.

At worst, you might have to relist every now and then.

Most BBS stuff is extremely diffuse. You have to wade through a lot of chaff to get to the wheat. Just about all of the services need vastly improved *you are here* coding, better *sideways* navigation, and new *global* all-forum search capability. Cross linked access gateways between the main services also need to be provided. There is no sane reason why you should not be able to instantly flip between a *GENie* Roundtable and a *CompuServe* Forum.

User interfaces on most boards are still rather primitive. Cuniform and clay tablet even. Old text interfaces are absurd in this day and age. And those graphic user interfaces are still poor. Most users quickly abandon any on-line graphic interfaces for better third party host-based ones.

Your four most desirable BBS info interfaces are (A) Device independent, camera-ready, and license free total text/graphics pages; (B) Ready-to-use software program files; (C) CD quality digital audio; or (D) HDTV animated MPEG compressed video.

I routinely offer (A) all the time on my *GENie* PSRT. Our ultra-short and ultra fast textfiles instantly give you camera ready art on *any* computer. At 11K for routine uncompressed pages. License free and with no special user software. I use the *triple distilled raw PostScript* method we looked at in my previous columns and in those *Blatant Opportunist* reprints.

Others will shortly begin offering Adobe's *Acrobat* system, which is far klutzier and requires special software to run their longer and slower files.

As before, I'd be most happy to help you offer cheap device-independent and camera-ready text/graphic files. All you have to do is ask.

Compression remains an absolute zoo. Among the main platforms, there are a dozen choices in use. Many BBS systems might serve a wide variety of users on an even wider assortment of host computers. You'll see everything from Crays to Commodores.

Now, there are a very few system specific files in which it might seem reasonable to insist on one particular compression scheme. But it makes far more sense to offer a choice of *global compression* to the user.

Wherein *everything* requested gets squashed using their favorite scheme. Each BBS would have some internal compression they use. On a request, they could decompress to raw text or re-encode to any desired format on your downloading.

I have found that compression can often *increase* your downloading costs. Especially if you can LIST a raw file, instead of having to XMODEM one or more squashed file.

On my PSRT, we studiously avoid compressing files under 100K, unless they are extremely host specific. We do try to make as many of our files as device independent as possible. Most of them will run equally well on any Mac or PC, an Amiga or an Apple, an Atari or a Commodore. And produce identical camera-ready output from the very same textfile.

Finally, you are likely to run into some very strange denizens on those BBS systems. Many who prefer heat to light. All bets are off anytime after 3 AM. Pretend it is a zoo. But watch out for those aardvarks.

They will get to you every time.

But don't let any of these negatives stop you. These are all problems that are quickly getting repaired. Ignoring telecomputing in this day and age is sheer stupidity.

On to the major players...

Dialog Information Service

I still get all of these mind-numbing helpline calls from people who claim they live in such a "remote" area that they can't find technical information. From such places as Cambridge, MA and Palo Alto, CA even.

Well, here I am sitting on my sand dune in the the Upper Sonorian desert watching Gila Monsters. I have done first rate research up on wilderness fire towers or worked underground in

largely unexplored caves.

So, I can assure you first hand that today, *there is no location on, beneath, or above this planet that is still "remote"*. Period. So don't give me any "remote" bull. Tell it to your therapist.

If you can't find it, you ain't lookin'.

The online research resource which has been the greatest equalizer for me has been the *Dialog Information Service*. Yes, they are obscenely expensive and are woefully old line. Until you work in that good old *Uh, compared to what?* factor. Then it is no contest.

Dialog is largely a broker of online information compiled by others. They have some 400+ services they provide. Nearly everything from Medline to the Denver Post. At last count, they had a half *billion* references instantly available. Areas covered are science, technology, law, medicine, patents, history, reference works, political, economics, and bunches more.

My three favorite data bases here are COMPENDEX, MATHSCI, and INSPEC. Not too long ago, I needed an update on fluxgate magnetometers for my *Hardware Hacker* column over in *Electronics Now*. These are *the* solution to solid state compasses, robotic nav, and archaeological exploration. Well, getting the key abstracts of the latest and best info available through Dialog only took a few minutes and cost me around \$24.

I also like the library resources that Dialog offers. Especially *Uhlricht's, Books in Print*, and the *Encyclopedia of Associations*. Others might find their extensive patent resources helpful. Or all their employment listings. Or their thesis abstracts. Or their listings for thousands of foundations which give lots of money away.

Dialog has recently shown up on CompuServe and GENie. Actually, the GENie service is really a CompuServe top secret crosslink.

These new services are cash and carry, meaning that you pay only for results and nothing extra for online time. Ferinstance, a search that finds something costs you \$2.50. If it misses, it is only \$1.50. A listing of found titles is thirty cents per title. The abstracts do remain pricey at \$3 each.

All of which usually ends up only somewhat cheaper than using Dialog from your local library. Searches cost less, but the abstracts cost more. But it sure is convenient to instantly have 24 hour home access to all the significant research ever done anywhere.

Dialog also provides direct subs at

new from DON LANCASTER

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FREE SAMPLES

Well, nearly free anyway. Almost. Do join us on GENie PSRT to sample all of the Guru's goodies. The downloading cost on a typical Guru file is 21 cents. Modem access: (800) 638-8369, then a HHH. On prompt, XTX99005,SCRIPT.

FREE VOICE HELPLINE VISA/MC

SYNERGETICS
Box 809-NV
Thatcher, AZ 85552
(520) 428-4073

Write in 146 on Reader Service Card.

ON-LINE AND RELATED RESOURCES

Adobe Systems Acrobat
1585 Charleston Road
Mountain View, CA 94039
(800) 833-6687

America Online
8619 Westwood Center Drive
Vienna, VA 22182
(800) 827-6364

CompuServe
5000 Arlington Center Blvd
Columbus, OH 43220
(800) 848-8199

Dialog
3460 Hillview Avenue
Palo Alto, CA 94304
(415) 848-2700

Electronics Now
500-B Bi-County Blvd
Farmingdale, NY 11735
(516) 293-3000

GENie
401 N Washington Street
Rockville, MD 20850
(800) 638-9636

Midnight Engineering
1700 Washington Avenue
Rocky Ford, CO 81067
(719) 254-4558

Nuts & Volts
430 Princeland Court
Corona, CA 91719
(714) 371-8497

PC Techniques
7721 E Gray Road #204
Scottsdale, AZ 85260
(602) 483-0192

Synergetics
Box 809
Thatcher, AZ 85552
(520) 428-4073

The WELL
27 Gate Five Road
Sausalito, CA 94965
(415) 332-4335

Whole Earth Review
27 Gate Five Road
Sausalito, CA 94965
(415) 332-1716

several hundred dollars per year. Plus two dollars a minute typical connect time. They also now have a lot of info available on CD ROM. Plus all sorts of publication services.

They have a really great index and catalog. Free even. But you have to act as if you are *seriously* interested in a direct subscription before they agree to send you one.

InterNet

InterNet or *Usenet* is the largest BBS in the world. This one started out as a federally funded ARPANET gateway for all UNIX users, especially teachers and researchers. Most of the original users get paid to participate through tax subsidies. Some carefully hidden, others quite obvious.

Anything can and will happen on Usenet. *Anarchy 101* reigns. The time from when someone decides to keep a secret until a vastly improved public domain version is Usenet revealed often gets measured in nanoseconds.

In several cases, the response time has clearly exceeded the speed of light. Ferinstance, every math freak in the world knew about the probable proof to the *Fermat's Last Theorem* less than five minutes after it happened.

Usenet has no sysop as such. Nor any central repository. Instead, each user can be a sysop if they want to. Some elect to ride herd on specific file collections or special interests.

At one time, Usenet was very hard to access. It was mostly by invitation only from sponsors that paid steep annual fees. Usenet gateways have recently been offered by all of the major online services. Including *GENie* and *CompuServe*. And also by high schools and colleges.

So, your private Usenet access is trivially easy to pick up today. Either free or, at the very least, without any surcharges. And several of the online services are now switching from plain gateways to total access setups.

There are now a dozen books out on navigating Usenet. Check those ads right here in *Nuts & Volts*, or any larger technical bookstore.

My own current Usenet address is SYNERGETICS@GENIE.GEIS.COM. My answers to most Usenet email are then posted at no charge to my *GENie* PSRT where they can best be shared. Response time averages an hour or so during normal use patterns. Private email answers are also available at my standard consulting rates.

I'm often asked why I don't make all my files available free on Usenet. Well, I don't slop at the public trough. I am an independent and a for-profit venture that has to see an underlying cash flow to continue. Exactly like the Safeway folks or those Purina Doggy Chow people.

The Imminent Disaster

A major disaster of unprecedented proportions is now stalking InterNet. One that is certain to profoundly and dramatically alter Usenet forever.

At one time, Usenet was largely a closed club of tightly knit researchers, teachers, and similar academic types. The average user went far out of their way to contribute as much as they took. Caring and sharing were the watchwords for the day. If someone had a problem, you personally did what you could for them.

But all of a sudden, great hoards of unwashed masses have discovered the Usenet. *Newsweek*, talk radio, and

the feds, even. The number of users is now exploding at *twenty* percent per month. Fast and easy access links are now offered all over the place. Most community colleges and many high schools now have an InterNet access. Anyone who wants to get on Internet can now do so. Cheaply or even free.

Most of the new users are a totally different breed of animal. Some of them are *lurkers* who steal all they can but never contribute. Others are those *flamers* who go out of their way to be obnoxious troublemakers. Yet others are "free email" scamming refugees from the *Prodigy* debacle. Still others are junk mail marketing pros.

Your bottom line is this: The few people still paying for the Usenet are vastly different than the many people now using it for free. The new users are literally choking the network to death. And it is going to get worse.

No way can it continue.

I don't have an answer to this. I suspect what will happen is that some of the original Usenet people will start up *Usenet II* with a highly restrictive access which once again restores the original caring and sharing scholarly environment. Perhaps by demanding UNIX-only compression schemes to keep out the riff raff.

Stay tuned on this one.

GENie

Your three best commercial online services are *CompuServe*, *GENie*, and *America Online*. Because I am a *GENie* sysop, I tend to be biased here.

CompuServe is the largest while America Online is the friendliest. But *GENie* is widely regarded as having the most and the finest of technical downloads in their library files. *GENie* is also the lowest cost service. At last count, something like 135,000 library files are now available on *GENie*.

All three services have hundreds or even thousands of local call numbers across the country. So they are likely to be a local call away for you. *GENie* usually costs \$3 per hour, starting off with an \$8 per month flat fee which gives you four free hours.

Besides all their shopping services, email and the Usenet gateway, *GENie* now offers many hundreds of special *RoundTables*. Each of these will often include a news feature, some direct user-to-user message system, special online group conferences, and an extensive download library.

Of the many *GENie* RoundTables, try IBM for PC, MAC for Mac, and A2

or A2.PRO for you Apple II folks. The RADIO board has thousands of library files. Especially for ham radio info and other hobby comm.

And there's hundreds more where these came from. Everything from pet advice to airline schedules to science fiction to stock quotes.

My own portion of *GENie* is called PSRT. Short for *PostScript RoundTable*. We've now got a thousand files up that include all of the latest and best on PostScript. Which is by far the best Hacker's universal general computing language, anytime, ever. We also offer a unique forum for *Book-on-demand* publishing and assistance to anyone who wants to cheaply send device independent camera-ready copy out to anyone anywhere.

We also do provide special reader services for *Nuts & Volts*, *Midnight Engineering*, *Electronics Now*, and *PC Techniques* magazines. I also do stock online reprints of most of my *Resource Bin*, *Blatant Opportunist*, *Hardware Hacker*, *Ask the Guru*, and other stories. Plus ap notes and tutorials not offered elsewhere. And once again, available device independently and full camera ready at an average downloading cost of *twenty one* cents each.

GENie provides an *Alladin* scripting supervisor free for the downloading. *Alladin* can greatly reduce your costs. This can automatically call up in the middle of the night, grab your email, check into selected RoundTables, or even download programs and other library files. A number of new *GENie* graphic interfaces are now available, but they are admittedly still weak in this crucial area.

For a free brochure, give them a call at (800) 638-9636. For online access, use the info in the end blurb below.

The Well

One of my favorite west coast BBS resources is *The Well*. Sysoped by the people who publish the *Whole Earth Review*. You'll find lots here on new age topics, small-is-beautiful, home power, alternate energy, and holistic topics. An unusual BBS for sure. But a very well done one.

These folks are a very important resource and certainly deserve your support. Give them a try.

Your Own BBS?

Starting your own BBS is probably *not* a good idea. Most people grossly underestimate all of the time and the effort required and the quantity of

hardware and software that has to be tied up. And obscenely overestimate just how many users will call for how long or how often.

Figure a bare minimum of *twenty* hours per week for each sysop. And that's slicing it *mighty* thin.

Most of the big BBS services offer free local calls nationwide. So it will cost your average national user *more* to call your "free" board than using a commercial service. And hourly long distance phone rates are *much* higher than typical commercial BBS charges. Alternatives such as the *Fidonet* have their own limitations.

With many thousands of bulletin boards currently active, your chances are overwhelming that more info and better info is already on-line.

If your board is typical, you can plan on getting *one* upload for each 2000 downloads. Unless you offer an extremely special interest, an absolute minimum of one thousand downloads in your library is essential.

Very few people actually buy stuff online. This simply does not happen. Ferinstance, my *GENie* PSRT is now up to 50,000 library downloads spread over one thousand files. Not half bad. Most of these files do include one or more hard sells for all my *Synergetics* stuff. The total direct email sales these generate? Less than *one* per week.

Not to mention that picking up a VISA or *MasterCard* merchant status for telephone or direct mail orders is still very hard to do in most parts of the country. Or that some BBS comm software is easily tampered with by outsiders. Or that others might use your service for different purposes than you first intended. Especially for junk mail, file transfers, or free email mass distribution.

Or that you could conceivably be held legally liable for any postings that anyone takes an exception to.

Alternates to your own board are becoming a sysop for someone else. Or offering your information over the InterNet. If you do have access to a specialized resource, the chances are fairly good that one of the commercial online services might be interested in working with you. Besides paying you as much as twenty to thirty cents an hour, the commercial services offer such perks as unlimited free access to everything else online. Plus valuable networking contacts.

Nonetheless, if your main goal is something other than making money via direct email sales, your own BBS

may be an interesting thing to do. If it fills local needs. Especially if you can charge local sponsors to prepay for board services. Say ten bucks a month to carry all of the activities of a local church or club. Or school menus and special events. Say twenty bucks per month to offer reviews of all videos a local rent-a-flick has in stock.

The rules here for success are to (1) Keep it local; (2) Seek out sponsors; (3) Fill lots of urgent community needs; (4) Don't expect much in the way of direct sales, and (5) Offer dozens (and preferably hundreds) of services.

There are national franchises that sell computer work-at-home schemes that involve email. These can end up quite expensive and the cash flows may be overstated.

As always, look before you leap. And talk to others about them.

Much more on starting your own ventures of this type appears in my newly revised *Incredible Secret Money Machine II*.

This Month's Contest

Let's have a pair of contests for this month. First, put me on to any cheap sources for all the stuff *Dialog* offers. Most especially *Inspec*, *MathSci*, and *Compendex*. And all the library stuff such as *Books in Print*, *Encyclopedia of Associations*, and *Uhlricht's Periodicals Dictionary*.

Or simply tell me about any other unusual online resource that I may not know about.

There will be a large pile of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 30 books and countless tech articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number twenty-three

Tools for electronic prototyping.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

By the way, be sure to enter your HHH *immediately* after your modem software reports a connection. This is how *GENie* recognizes your baud rate. If you get gibberish on the screen, you were too slow with your HHH.

A free *GENie* brochure if you voice call (800) 638-9636.

A reminder that all of our previous columns appear in my *Resource Bin* Book-on-demand published reprints. You can check my nearby *Synergetics* ad for more details.

The tools needed by any hardware hacker sure have changed.

These days, your most important tools are tech publications, the online resources, and your own self-written software. The stuff on your test bench places a distant fourth.

As we've seen a number of times in the past, by far your most important hardware hacking tool anytime ever is that *Ulrich's Periodicals Dictionary*. Found on the reference shelf at your local library. Also newly available as an easily searchable CD ROM.

And these days, you always want

to ask *Is this trip really necessary?* Instead of building up some hardware kludge, would you be better off using a \$30 *Commodore 64* from a yard sale instead? Or that superb *Basic Stamp* from the *Parallax* folks?

Or modifying or rebuilding some already existing consumer electronics product? There is no way you could cheaply build a stopwatch that even remotely approaches the performance of a \$4 import from *K-Mart*. And individual liquid crystal displays can cost you far more than an entire mass marketed consumer electronics item.

On the other hand, there is a big resurgence in the need for traditional hardware skills. Sure, Heathkit is now gone and many community colleges have stupidly flushed their electronics programs. But that's all history. The reality is that there's dozens of new small kit outfits springing up.

And typical employers now find it impossibly difficult to locate decent technical help with traditional hands on skills. What is sorely needed is someone who can solder *and* write software *and* communicate.

This month, I thought we'd look at all those traditional hardware hacking hand tools. At least those that I still personally use. Most of which are

NEXT MONTH: Don looks at the opportunities and pitfalls of electronic collectibles.

available through our many *Nuts & Volts* advertisers. Three reasonably priced sources are *Mouser*, *DigiKey*, and *MCM Electronics*.

There are also outfits that specialize in stocking nearly any higher quality electronic tool. The two biggies here are *Jensen Tools* and *TechniTool*. Both also offer all sorts of ready-to-go kits and assortments. This may be a good

way to jump in with both feet. While you certainly can find lower cost tool sources, their all-at-once "one stop" service is a big plus.

Small Hand Tools

We might as well start off with some screwdrivers. A small jeweler's set and a pair of pocket ones, regular and *Phillips*. Then some full size ones, again in regular and *Phillips*. Be sure to pick up some extra long shaft ones (these can be *very* hard to find). The long reach drivers are super handy for stuff like laser printer work.

In fact, I'll be happy to trade you an *Incredible Secret Money Machine II* for a number one *Phillips* with a nine or ten inch long blade.

On regular drivers, the flush *cabinet* tip is usually preferable over the more common *keystone* tip. Particularly for setscrews or close work.

You may also want to add a special purpose driver or two. Say a stubby regular and a stubby *Phillips*. Or an *offset* screwdriver for more torque.

Or special drivers for tamperproof *Torx* screws or those oddball fasteners used for video games. *Evco* is one source for special *Torx* bits; *MCM* or *Parts Express* have the *Nintendo* tools.

Avoid junk tools. Use at least *Xcelite* or *Proto* quality if you can possibly afford them. The bargain bins at the grocery store simply are not worth the trouble they are bound to cause.

While there are lots of different magnetized or screwholding drivers, I've found most of these less than useless. The holders tend to trash if you look at them sideways. Instead, I use a block of plain old beeswax. And put a *tiny* amount on the tip before you pick up a small screw. But don't try it on anything ultra-clean.

Try an apiary supply or some craft candle store if you've got problems finding beeswax.

Nutdrivers are not as essential as

they used to be, but they still are a worthwhile addition to a hacker bench. These are handy for volume control nuts and sheet metal screws. Start off with small and regular 1/4 inch nutdrivers. Or get a complete set.

Some tool systems offer snap-on handles to keep the cost down. I don't care for these. First because changing handles is a real pain. And secondly, because the driver you need the most will usually be misplaced or lost.

Pliers

The foremost electronic plier is the *diagonal cutter*. Aim for first quality here. The smaller four or five inchers are the best choice. Number two is a needle nose plier. There are several variations possible here, including a chain nose or a duckbill. My third choice is the *traverse cutting plier*. This one nips at the end, and is particularly handy for pc board trimming.

Let's see. You also may want a heavy electricians plier. And maybe a slip-joint one or a *ChanneLock* style. Plus *Vise Grips*, of course.

I guess wire strippers are also pliers of sorts. Those big expensive ones are probably not needed. Unless you are involved with bunches of stranded wire or special coax. The whole trick here is to not nick any solid wire or break any strands on stranded wire. If you are careful, this can easily be done with an ordinary pair of dikes.

Some people purposely notch their diagonal cutting plier blade so it can strip hookup wire. The *Amp* crimping tool has a built-in wire stripper. Low cost wire stripping tools are easy to find. Some include depth stops.

Special strippers and related tools are usually needed for wirewrapping. *Radio Shack* has some in stock.

Soldering

You will do far more damage than good if you try to use the wrong size soldering iron. Or run it at the wrong temperature. Or fail to keep it cleaned properly. Most cheap soldering irons from the hardware store are less than useless. Avoid these at all costs.

A temperature regulated system is pretty much a must these days. The 20 or 40 watt *Controlled Output Soldering Station* from *Weller* or that *Electronic Soldering System* from *Ungar* are both good choices. Watch for sales.

If you try using an older or cheaper unregulated iron, be *absolutely certain* you plug it into a lamp dimmer or a power tool speed control. And keep it

set to the *minimum* power level needed to do the job. Especially when idling between jobs.

An older and unregulated soldering iron plugged directly into the wall is sure to cause you no end of grief!

There are several styles of soldering iron tips. These are usually replaceable. If you ever burn the plating off a tip, it *must* be replaced. There are special "anti-sieze" lubricants that should be put on a tip before it is installed.

There are a few essential soldering accessories. A stand, of course. If it is not already provided for by the soldering station. Some way to keep the tip cleaned and brightly tinned. A moist sponge, fine steel wool, a polishing bar, or tip cleaners based on Sal Ammoniac.

Chances are you will be doing a lot of unsoldering as well. Useful tools here are a bulb-type solder sucker, a pump-style solder extractor, and a few rolls of desoldering braid.

You'll also find various "soldering aide" tools, useful for pointing and probing. In metal, nylon, or wood.

As to the solder itself, 60/40 rosin core solder is a useful choice, with *Kester* the preferred brand. You will probably want the "regular" thickness around 50 to 60 mils. And some "fine" solder in the 20-30 mil range.

Additional liquid flux just may be needed if you are soldering shields or anything that's not squeaky clean. Flux remover may also be useful. One supplier is *Miller-Stephenson*.

Needless to say, you *never* use acid core solder or acid fluxes for anything electronic. Those products belong in a sheet metal shop and can cause long term electronic damage.

Oddball Stuff

An *X-Acto* knife with a #10 blade fer sure. I also like that little *X-Acto* saw and miter box. And the modelmaker's answer to a tiny hacksaw. *Brookstone* has lots of this sort of stuff. As do the many ads in *Model Railroader*.

Sets of Allen wrenches in English and Metric. Ditto for an assortment of small end wrenches. A magnifier. A micrometer. Needle files. A plastic nutstarter left from the glory days of Heathkit. A small oiler. Tweezers. An integrated circuit extractor.

A pin vise. I usually use a double ended one with a 1/16 inch drill in one end and a #67 in the other. Plus a miniature push drill, again with a #67 drill in it. A pushdrill acts like a pin vise, but it has a slider that runs up

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and down a helical track. As you raise and lower the slider, the drill spins and lets you do careful work.

Vises and Such

More often than not, you will be soldering to or desoldering from a small circuit board. It is extremely important to hold your board rock solid while you are doing this.

My favorite here is a hinged clamp that mounts on the edge of your test bench. This holds a circuit board by the edge. You can easily flip the board over for component test, insertion, or soldering tasks.

Panavise makes an interesting series of electronic vises. You usually mix and match all the individual pieces. There are three base types. Bolt-down, vacuum, and wide footed.

Those vacuum jobs are nice when new, but they do tend to get skitterish with age. The positionable tops can

include a long vise, a circuit board holder, and a plain old vise.

My personal choice here is a wide footed base with a long vise top.

Being able to see just what you're doing is essential. So you'll want lots of good light and a magnifier or two. Besides adequate room lighting, you might want a high intensity lamp or two and a circular fluorescent lamp with a built-in large magnifier.

Plus, of course, a mini-mag and a regular flashlight.

Mechanical Stuff

Larger and heavier tools are needed if you are going to build up your own cases and enclosures. It's usually best to have a traditional "machine shop" area that is separate from your "test bench" area.

It is super easy to buy a tool that you never really learn to use and that never pays for itself. Can you instead

sign up for some community college course that gives you access to the needed tools? Or work with a local machine shop, air conditioning firm, or blacksmith? My own favorite here is a trailer hitch works. Who I have found great for providing, cutting and shearing heavy sheet metal.

At least in smaller towns, you can sometimes swap services. Say some business cards for repairs to your paper cutter. Or whatever.

You may want to check into leasing. Either long term or hourly from your local rental outfit.

I will assume you already have the usual home shop stuff like hammers and tinsnips and hacksaws and socket sets and crescent wrenches. Plus, of course, a power hand drill. Preferably variable speed and reversible.

Step number one in setting up a machine shop is a decent bench. With a decent bench vise on it. Something rock solid for the bench, and a vise size of at least five or six inches.

A Drill Press

The most important tool for hacker prototyping is probably a good drill press. I use that *Jet USA* five speed import myself. Three very essential things to watch for: A way to change the speed over a very wide range. A chuck that can fully close. And a true wobble-free *quill feed*. These are all important for circuit board drilling.

I have added a rotary table to my particular setup. This is a fancy bench vise that you can precisely adjust in X, Y, or circular directions. You can do a surprising amount of light milling or precision drilling with these.

A circuit board shear can be rather expensive, so you may want to try to find one you can use elsewhere. If not, *Kepro* is the only way to go. One tip: glue some mirrors to your benchtop under the shear blade. Then cut with your marks upside down. Be sure to clamp before you cut; otherwise you'll get out of square in a hurry.

Useful lighter tools are a scribe and an automatic centerpunch. Plus the usual Moto-tool type beastie. A nibbling tool for sure. And a reamer.

A pop riveter and a glue gun. Note that "instant threads" are now offered for all pop riveters, similar to the old Goodrich *Rivnut* series. And that any glue gun can be fed polyethylene rod stock for plastic encapsulation, odd connectors, and whatever.

I also use a *Roper-Whitney* type XX punch. This dude is a remarkably low

priced one ton bench mounted punch press. It does square and round holes, custom cutting, hogging out larger sheet metal areas, and scads more. The XX has a much deeper throat than the smaller model usually offered in the catalogs. It can also be hand held.

A Lathe?

Machine lathes are probably the most highly overrated shop item. I've got an ancient six inch *Sears/Atlas*, but don't use it much except for a rare coil winding. If you get one, be sure it pays for itself, either in useful output or pleasure provided. Most of those little toy lathes are a sucker bet and are best avoided.

Try the yard sales, auctions, and estate sales for used lathe bargains.

If you have a lathe, you will also need a grinder. A milling attachment is also a good idea.

Sources for the traditional shop stuff include *McMaster-Carr*, *Master Specialties*, *Woodworker's Store*, *Tools Unlimited*, *Wholesale Tool*, *Trendline*, or *Woodworker's Supply*.

Low cost shop info is offered by *Lindsay Publications*. There's also lots of specialty mags such as *Home Shop Machinist*, *Live Steam*, and *Wood*.

This Month's Contest

For this month's contest, just tell me about your favorite electronic tools. Or low cost sources for them. Or any unusual home shop publications that you have found useful.

There will be a large pile of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 32 books and countless tech articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENIE PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005,SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

Don Lancaster's

RESOURCE BIN

number twenty-four

A look at electronic collectibles.

Our usual reminder here that the *Resource Bin* is now a two-way column. You can get tech help, consultant referrals and off-the-wall networking on nearly any electronic, *tinaja questing*, personal publishing, money machine, or computer topic by calling me at (520) 428-4073 weekdays 8-5 MST. I've got a free pair of insider secret resources brochures waiting for you when you call or write.

A portion of my PSRT RoundTable on *GENie* has also been set aside for you *Nuts & Volts* readers. This is the place to go for instant tech answers. Among the many files in our library, you will find complete reprints and preprints for all of my *Resource Bin* columns. I've just added a new "fast access" feature for you. Have your modem dial (800) 638-8369, followed by HHH. Then `XTX99005,SCRIPT`.

By the way, be sure to enter your HHH *immediately* after your modem software reports a connection. This is how *GENie* recognizes your baud rate. If you get gibberish on the screen, you were too slow with your HHH.

A free *GENie* brochure if you voice call (800) 638-9636.

A reminder that all of our previous columns appear in my *Resource Bin* Book-on-demand published reprints. You can check my nearby *Synergetics* ad for more details.

This month, I'd thought we'd take a look at some resources for electronic and some other technical collectibles. Before we do, though, I want to start off with a very strong warning:

Collectibles are NOT investments!

There's all sorts of reasons why you just might like to gather up old radios, wireless sets, televisions, WWII mil electronics, juke boxes, vacuum tube amps, player pianos, video games, pinball machines, steam tractors, or even windmills. Perhaps you want to save a slice of history. Or maybe you think they just don't build 'em like

they used to. Or you appreciate the joy of finding a worn-out pile of junk scunging away in a barn and restoring it back to factory fresh condition. Or maybe the older gear brings back fond memories of long, long ago.

The only reason or justification you need to ever collect anything is simply "Because I want to."

If it trips your trigger, have at it.

But do not *ever* get snookered into thinking that you can make big bucks by buying up bunches of old stuff, do nothing with it, and then wait around for the price to jump up. It just ain't gonna happen.

Why? Well, firstoff because sales commissions on most collectibles are outrageously high. Instead of the 0.6 percent on a stock or the 6 percent of real estate, you are looking at more like 60 percent markups.

Sometimes much higher.

Second, because most collectibles are *extremely* non-liquid assets. There is simply no way to sell one in a hurry without taking a big loss. Collectible prices vary wildly, depending on the popularity and its availability. Worse yet, everybody else is likely to want to sell at the same time you do.

There's also a tendency for most outsiders to grossly overvalue plain

NEXT MONTH: Don looks at hacker friendly options in test equipment.

old junk. Or badly underestimate how common their new discovery is.

Every field of collectibles has its professional insiders whose entire lives are centered on their work. They have the contacts and know what's coming down. It is unlikely you can beat them at their own game. At least as a rank beginner.

Much of collecting is based on the

greater fool theory. Blindly hoping that someone even dumber eventually is bound to come along.

So, one more time...

Collectibles are NOT investments!

On the other hand, there are lots of creative ways you might make a buck off collectibles. You could do this by either (A) filling one or more needs for other collectors, or (B) adding bunches of personal value added to increase the perceived value of any collectible. Ferinstance, you might start a buy-sell newsletter or run a swap meet. Or offer exact dialplate replications or a speaker reconing service. Or actually do the harder parts of the restoration work yourself. Preferably done as an hourly charged service.

Much more on this sort of stuff is found in my newly revised *Incredible Secret Money Machine II*.

There's a lot of electronic collecting going on. Let us look at some of the more important areas...

Radios and TV Sets

Perhaps the most obvious electronic collectibles are classic radios and tv sets. Collectors usually will draw the distinction somewhere around 1930 with *wireless radio* being older and *antique radio* being newer. In general, an antique radio will be plug-and-go, while a wireless radio will typically need some operator skill.

The leading resource here is *Antique Radio Classified*, who offer free sample copies. They are mostly a listing of collector-to-collector classified ads, along with announcements of shows and swap meets. Plus commercial ads for restoration services, schematics, loudspeaker rebuilding, and such.

One "must-have" classic book is *A Flick of the Switch* from *Vintage Radio*. They also publish the *Radio Collector's Guide*, reprints from Gernsback's 1927 *Radio Encyclopedia*, and several books of schematics. A great source for these

and a wide variety of other old radio and electronics books is *Lindsay*. They also offer a free catalog.

A major supplier of vacuum tubes and older replacement parts is *Antique Electronics Supply*.

One very important gotcha: If you ever find an old radio scunging away in a barn hayloft somewhere, do *not* plug it in to see if it works!

Those electrolytic capacitors in the power supply are absolutely *certain* to be shorted. If the set has a power transformer, it is likely to burn out on power up if the electrolytics are bad. At the very least, the rectifier tube or tubes will be ruined.

A burned-out power transformer has a distinctive smell that lasts for decades. All radio and tv collectors will instantly recognize this one. So sniff carefully before buying!

By the way, if the smell seems more like "overcooked cabbage" rather than "burned transformer", the culprit is usually a shorted selenium rectifier.

Before power can be safely applied, every component in your radio or tv must be carefully tested to make sure it will not overload the power supply. The first step is to use an ohmmeter to make pin-by-pin resistance checks to try and spot anything strange.

A schematic is an absolute must!

First time power should be applied very gradually and carefully, using a *Variac* or other variable transformer. While carefully monitoring all of the supply voltages and currents.

Also, you *never* tighten any "loose screws" you might find on top of the metal can IF transformers. These are adjustments needed for proper tuning or *alignment* of the circuit.

And a final warning: Most of the smaller "AC-DC" sets had a hot chassis that was connected to one side of the ac power line. *Any missing knob or a cracked case can make these lethal!* It is better to do *all* of your radio testing with an isolation transformer.

Many quick and dirty repairs on an AC-DC set can be done using nothing but a neon test light. For instance, you can hold one test light lead and touch the other to the frame as a safe hot chassis test. If the lamp weakly lights, remove your power plug, and then plug it in the other way.

By far the most common problem found (assuming your power supply electrolytic is not yet shorted) is an open filament tap on the 35Z5 or 35W4 rectifier tube. All of the tube filaments are in series. Try placing your neon

test lamp across the filament pins (often pins 2 and 7). The lamp will brightly light when you are across an *open* filament, but should stay dark otherwise.

Note that a burned out pilot lamp can also take out the rectifier tube in these circuits.

After all your tubes light, a working power supply should brightly light up your neon test light when it gets placed between the positive lead or terminal of the largest electrolytic and ground. Naturally, if you cannot get supply power, the rest of the radio will not work. Note that the lack of supply voltage could be caused either by a defect in the power supply or by a short or other load that is too high.

Fixing the supply without removing the short will only blow out all the new replacement parts!

After you're certain that your set is plugged in, the chassis is safely cold, all of the tubes light, and you measure supply power, you might touch the center arm of the mid-range volume control. A loud hum here means the audio is working and you have a rf problem. Nothing means you have an audio problem. This quickly divides your task in half.

The usual audio problems are bad speakers or a leaky 0.05 microfarad coupling capacitor between the first and second audio stages. These caps are often mechanically intermittent.

Typical rf problems are a missing or broken antenna. Or being badly out of alignment. Note that WWII combo AM and shortwave receivers often had the shortwave bands purposely disabled.

My favorite antique radio story? I was once reviving this 1939 *Majestic* "Mighty Monarch of the Air" receiver, and it suddenly started playing 1939 music! Seems an obscure station was into golden oldies that night.

Military Electronics

There's long been lots of interest in restoring or reusing military WWII electronics gear. Usually to adapt or modify in some way for ham radio. For years, the ham magazines have done conversion stories. We looked at these resources a few columns back. You can find this in my full *Resource Bin* reprints or as my NUTS17.PS over on *GENIE* PSRT.

Two important magazines here are *Electric Radio* and *Radio Age*.

The best source of military surplus is *Fair Radio Sales*. Who offer free flyers. Yes, you can also buy military

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Optimistic Pezzimist
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(512) 858-7720

Play Meter
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New Orleans, LA 70184
(504) 488-7003

Player Piano Company
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Wichita, KS 67202
(316) 263-3241

Radio Age
636 Cambridge Road
Augusta, GA 30909

Ragtime
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Ceres, CA 95307
(209) 668-0366

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Woodland Hills, CA 91365
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Alexandria, VA 22320
(512) 339-6229

Ten Thousand Hits
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Bellmawr, NJ 08099
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Vail Correspondent
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Vintage Radio
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Windmillers' Gazette
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Wurco, Inc
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N Tonawanda, NY 14120
(716) 694-6247

Frank Zygmunt
PO Box 542
Westmont, IL 60559
(708) 985-2742

Juke Boxes

There are an amazing number of jukeboxes and jukebox collectors out there. Many working units are not in the least rare. But absolute gems do remain to be found.

The leading magazine seems to be *Always Jukin*, with *Jukebox Collector* a close second. *Always Jukin* is in a two section oversize newspaper format. It is chock full of detailed tech info. And "who bought what" reports.

There's bunches of parts suppliers out there. Both originals and replicas of varying cost and accuracy. In fact, it is just about as easy to pick up a part for a classic *Seeburg* or *Wurlitzer* as it is for a ten year old Ford. There are literally hundreds of suppliers.

You can also obtain replica systems which look like classic jukes from the outside but have modern CD audio inside. And a zillion selections.

Yeah, there are even outfits that specialize in re-releasing old records in your choice of 78, 45, or CD format. Yes, the original singers. Typical firms include *Wurco* and *Ten Thousand Hits*.

There's a few non-obvious places to look for old jukeboxes. Try the *candy and tobacco* ads in your local yellow pages. Or a nearby large city.

Player Pianos and Orchestrons

Player pianos are another obvious technical collectible. I don't know of any collector mags as such, but they almost certainly exist. Several good books are now out there, though. One important parts supplier here is the *Player Piano Company*. One source for ready-to-go units is *Mechantiques*.

A unique company who starts with conventional old upright pianos and installs new orchestron components (drums, symbols, air calliopes) into them is *Ragtime*. They also stock many thousands of player rolls. They have a beautiful full color \$5 catalog.

Classic band calliopes sometimes show up in the *Amusement Business* trade journal.

Vacuum Tube Amps

There's lots of enthusiasts out there who do feel that there was something special or unique about that sound produced by the vacuum tube guitar amps and similar "hi-fi" sets.

There are several magazines here. One middle-of-the-road one is *Glass Audio*, while the rabid extremists do appear to center on *Sound Practices*. These folks use mostly ancient ultra

electronics directly from the military. More details on this in NUTS6.PS and the *Resource Bin* reprints.

But most of the really ancient stuff is long gone from fed auctions.

There once was an outfit over in Hunlock Creek, Pennsylvania that stocked just about every manual and conversion article on pretty near all military electronics. Uh, I seem to have lost track of them. Do any of you know their whereabouts?

My favorite piece of surplus gear? Those old *Bendix* MN26-C or MN28-C radio compasses. These are fairly easy

to convert into super long range am broadcast band radio receivers for DX uses. The first time I fired one up, it got a station on every channel.

These days, though, with dimmers and other local am noise sources, you might not do quite as well. Especially since those powerful "clear channel" stations are long gone. Be sure to get the essential remote tuning box with either of these units.

Recently I've been playing with mil surplus F241/U tunable cavities for improving distant FM reception. More on this whenever.

high voltage triodes in all their amps. The favorite tube is the 211.

The sources of supply here include *Audio Electronic*, *Handmade Electronics*, and *Antique Electronic Supply*.

One source for ready-to-run classic tube amps is *Elderly Instrument*.

I personally feel that the so-called vacuum-tube sound was just so much noise, hum, and distortion added to an otherwise clean audio channel. If you like certain combinations of hum, noise, and distortion, that's just fine. But recognize them for what they are.

And don't pretend otherwise.

Naturally, your best route to add hum, noise, and distortion to an audio channel is to pick a new digital signal processing chip and any decent DSP algorithm. You can even get vacuum tube sounds from vacuum tubes that haven't been invented yet.

Or answer questions like "What would a Williamson sound like if you used hundreds of 12AY7's in parallel for its output stage?"

And similar profound topics.

Slot Machines

Uh, this one can get tricky. Many states have very stringent laws that prevent you from owning or using a slot machine in any way, shape, or form. But when and where you are allowed to do so, slots can make an excellent collectible.

I suspect that slot machines will be totally legal nearly everywhere in a very short time, say in five years. At that time, they are likely to pick up sharply in popularity. But, be *certain* you know your local laws before you do anything here.

At any rate, five sources for classic slots are *Coin Op Amusement Co.*, *John Johnson's Vintage Slots*, *Jukebox City*, **RJB**, and *Frank Zygmunt*. Yet another obvious place to look, of course, are the Las Vegas yellow pages.

Tilting at Windmills

People will collect nearly anything. Ferinstance, the *Iron Man Album* is a journal for collectors of steam tractors. But don't try this if you live in a small apartment. The same folks also now publish *Gas Engine*, for antique gas engines, stationary and mobile. Even old *Maytag* washers appear here.

Telegraph key folks have the *Vail Correspondent* and the insulator people have *Crown Jewels of the Wire*. I've got a friend who collects old gas pumps. The hand-cranked, gravity-fed glass cylinder types go for \$900 as absolute

junkers and as much as \$8000 fully restored. Let me know if there is a newsletter or trader pub here.

Old Coke machines are also getting popular, with *Memory Lane Sodaware*, *Home Arcade*, and *Richard Alarain* all being typical resources.

Video games, both new and old, are found in either *Playmeter* or *Replay* magazines. I am sure there must be mechanical pinball machine collector newsletters and supply sources, but so far I've been unable to find them. As with the video games, you start off with *Playmeter* or *Replay*.

Windmill collectors even have their *Windmiller's Gazette*. Honest. Or, to really go off the deep end, there are collectors out there who specialize in *Pez* candy dispensers. Their magazine is called the *Optimistic Pezzimist*.

At \$3 per copy.

Detailed reviews of labor-of-love newsletters on collectibles and just about anything else (and I do mean *anything*) appear in *FactSheet Five*.

The best of earlier *FactSheet Five* reviews also appears in the *World of Zines* book.

A Contest

Let's see. What did I miss besides the pinball stuff? For our contest this month, just tell me about any odd technical collectible resource I don't know about. Or else just tell me a repeatable story which involves some electronic or technical collectible in one way or another.

There will be a largish pile of my new *Incredible Secret Money Machine II* books going to the dozen or so better entries, plus an all-expense-paid (FOB Thatcher, AZ) *tinaja quest* for two that will go to the very best of all.

Let's hear from you. ♦

Microcomputer pioneer and guru Don Lancaster is the author of 32 books and countless tech articles. Don maintains his no-charge tech helpline found at (520) 428-4073, besides offering all of his own books, reprints, and all of his consulting services. He also has a free brochure full of his resource secrets waiting for you. Your best calling times are 8-5 on weekdays, Mountain Standard Time.

Don is now the sysop of GENie PSRT, where a special Resource Bin topic has been reserved for Nuts & Volts readers. For fast modem access, use (800) 638-8369 and enter HHH. When prompted, enter XTX99005.SCRIPT.

You can also reach Don at Synergetics, Box 809, Thatcher, AZ 85552.

NEED HELP?

**Phone or write Resource
Bin questions to:**

**Don Lancaster
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Box 809
Thatcher, AZ 85552
(520) 428-4073**

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