Appendix D

Electronic Suppliers

Knowing how to find and purchase electronic parts is a big part of being a resourceful robot builder. This appendix section will help you get started on the right track.

D.1 Introduction

When ordering electronic parts, availability is a key issue. Many times, a firm will list an item in its catalog, but be "out of stock" when you call them to make an order. *Make sure that you ask the sales person to "check stock" when you order anything.* If an item is not in stock—meaning it's not in the company's own warehouses—the company must order it from "the factory". The factory is a huge distribution center over which your electronics dealer has little control. So, it can take anywhere from a couple of weeks to *several months* for the parts you want to come to your dealer.

Some companies will try to deceive you about how long it will take to receive parts from the factory. In general, the rule is: if the company doesn't have it in stock, order it from somewhere else.

The company listing that follows is divided into two categories: retail companies and surplus companies.

D.1.1 Retail Suppliers

Retail companies sell brand-new parts and generally keep a reliable, stable inventory of the products that they sell. Most retail suppliers care a lot about their customers and try to keep them by giving good service: by keeping most parts in stock in their own warehouses. By my definition, "good service" means that the company (1) delivers product quickly, and (2) does not try to deceive the customer about the availability of an item.

In exchange for the reliability of the retailer's line, you pay a price. In general, new retail parts cost anywhere from two to ten times the cost of the same part purchased from a surplus house. But many times, particularly when designing products for manufacture, you need the dependability of parts that the retailer offers. Also, many important parts can't be found in surplus.

D.1.2 Surplus Suppliers

Surplus companies buy bulk lots of discontinued, closed-out, old, used, or otherwise "surplus" merchandise. Many a fascinating, useful, and most importantly, *cheap!* part can be found in the surplus market.

The catalog of a given surplus company changes from issue to issue, as the company sells out of some items and has made purchases of another items. Many surplus companies try to keep some of their product line stable, but the most exciting and cheap products are usually from a one-time bulk purchase. Sometimes, you see the same item hitting the catalogs of several different surplus companies at the same time—a good indication that some manufacturer has just cleared their warehouse of that item!

Because of this flux in product line, it's very important to check that a surplus dealer has a particular item in stock when you order. Many surplus dealers will tell you the approximate quantity of an item that they have in stock—useful if you're going to base a design on the availability of a particular part.

You should be extremely wary if a surplus dealer tries to have an item in your order put on backorder (meaning that they don't have it in stock). Usually, they're just *hoping* to make another bulk purchase of the item you want. Unless they're particularly convincing that the item will indeed be available in a short period of time, cancel the order and find what you need somewhere else.

This said, surplus companies are a great boon to electronics hobbyists of all types. They have fascinating stuff at super-low prices. Generally surplus stock is at least half the cost of retail, but for many items, you will pay as low as *one-tenth* of the retail cost. For funding-strapped educators and hobbyists, the work involved in tracking down parts in surplus is well worth it, and can make a huge difference in the final cost of a project or class. Also in surplus, you can find items that are just too obscure, or must be ordered in huge quantities if you tried the retail market.

D.1.3 Ordering Catalogs

Most companies, both retail and surplus, are glad to send you their catalog.

In the listings, if you see the phrase "orders only" listed in front of an 800 number, then you should not call that company on their 800 number unless you are placing an order. If the phrase "orders and info" is listed, then the company has not requested the 800 number to be used for orders only.

Don't be bashful: go ahead and order catalogs from all of the companies listed here. You will find overlapping stock in both retail and surplus, but you'll be surprised by the variations in the prices of the retailers, and practically every surplus catalog has at least one exciting item you'll find nowhere else. So, happy hunting in the electronics market!

D.2 The Surplus Companies

In the descriptions that follow, the phrase "basic parts" refers to an assortment of common digital, linear, and microprocessor ICs, resistors, capacitors, and LEDs. Some surplus dealers keep a regular stock of these items and others do not.

In most cases, these basic parts are better purchased in retail. With these items, prices in surplus are often no better than retail. Also, surplus ICs are often "pullouts," meaning they've been removed from junk equipment. Chips are tested before being sold to you, but a new part beats a used one at the same price.

There are some exceptions when surplus is still better on ICs and other basic parts items. Occasionally, surplus can still undercut retail price by a significant margin, particularly on products such as optoelectronics, or RAM chips, for example.

Also, there may arise situations when *all* retail dealers may be out of stock of a particular IC, due to fluctuations in the factory supply. In this sitation, go straight to your basic parts surplus dealer—they will have chips that have been lying around for years. Sure, they're not brand new, but most old chips work just as well as new ones.

D.2.1 Surplus Company Listing

All Electronics Corp

P.O. Box 567 • Van Nuys, CA 91408
orders only: (800) 826-5432
information: (818) 904-0524
fax: (818) 781-2653

Good basic parts assortment. Many interesting surplus boards and assemblies, excellent motor selection, rechargeable batteries, switches, optoelectronics, etc. Prices very good.

Terms: $10 minimum order; MC/VISA/Discover accepted; flat shipping/handing charge of $3.50.

American Design Components

815 Fairview Avenue • POB 220 • Fairview, NJ 07022
orders and info: (800) 776-3700
local: (201) 941-5000
fax: (201) 941-7480

Surplus computer equipment, power supplies, lots of motors and batteries, switches, MOVIT robot kits. Overpriced basic parts assortment. Some other stuff very well priced.

Terms: $15 minimum order; MC/VISA/AMEX/ accepted; annoying shipping/handing charges of $3.00 plus 10% of cost of merchandise. Mentally add 10% to their catalog prices as you're going through their catalog and you won't be as annoyed by this excess "handling" charge.

American Science & Surplus

601 Linden Place • Evanston, Illinois 60202
orders and info: (708) 475-8440
fax: (708) 864-1589

Formerly known as **JerryCo Inc.**, this company produces the most entertaining, humorous, and informative catalog in the surplus industry. A diverse assortment of stuff: tools, toys, stationery, electronics, motors, batteries, gears and bearings, etc., etc. You never knew you needed it until you saw it in this catalog. The catalog is fun to read even if you don't buy anything. Prices are generally good but not great.

Terms: $12.50 minimum order (including handling charge); MC/VISA accepted; flat shipping/handing charge of $4 for most orders.

Edlie Electronics

2700 Hempstead Turnpike • Levittown, NY 11756-1443
orders and info: (800) 645-4722
local: (516) 735-3330
fax: (516) 731-5125

Strange and interesting surplus assortment. Tools, cables, test equipment, electronic kits, car audio, PCB materials. Catalog is disorganized, but some stuff is *very* cheap. Minimal basic parts.

Terms: minimum cash order $25.00; minimum credit card order $50.00; MC/-VISA accepted; shipping/handing charges starting at $4.75 and increasing with size of order. Service is sometimes slow; inquire about availability and delivery when placing order.

The Electronic Goldmine
POB 5408 • Scottsdale, AZ 85261
orders and info: (602) 451-7454
fax: (602) 451-9495

Excellent catalog comprised mostly of packaged electronic kits, with a small amount of very good surplus stock mixed in.

Terms: $10 minimum order; MC/VISA accepted; minimum $3.50 for UPS shipping.

Electronic Supermarket
P.O. Box 988 • Lynnfield, MA 01940
orders: (508) 532-2323

Odd surplus assortment composed mostly of close out junk. Retail serious car audio stuff.

Herbach and Rademan Company
18 Canal Street • P.O. Box 122 • Bristol, PA 19007-0122
orders only: (800) 848-8001
info: (215) 788-5583
fax: (215) 788-9577

Mixture of surplus and retail with an emphasis on industrial equipment: large motors, pumps, tools, batteries, powers supplies, optics. Retail closed-circuit TV/security equipment.

Terms: $5 handling charge for orders under $25; MC/VISA accepted; shipping charges are UPS rates.

Hosfelt Electronics, Inc.
2700 Sunset Boulevard • Steubenville, OH 43952-1158
orders and info: (800) 524-6464
local: (614) 264-6464
fax: (614) 264-5414

Wide surplus selection. Big relay assortment, transistors, inductors, motors, fans, enclosures, xformers, opto's, caps, pots, speakers, connectors, electronic kits, books, tools. Good random stuff too. Prices range from so-so to excellent depending on the item.

Terms: no minimum order for credit card, check or COD payment; MC/VISA/-AMEX/Discover accepted; shipping charges are UPS rates + $1.00.

Jameco Electronics
1355 Shoreway Road • Belmont, CA 94002
orders: (415) 592-8097

Used to be a surplus dealer; now deals PC kits, power supplies, cases, motherboards. Listed because remaining surplus stock and chip assortment is useful. Get their catalog in any event for the comprehensive semiconductor manufacturer directory.

Terms: $50 minimum order to discourage hobbyists. The blatant commercialism of this company is upsetting, especially considering their past as a valued member of the surplus industry.

Kelvin Electronics
7 Fairchild Avenue • Plainview, NY 11803
orders and info: (800) 645-9212
local: (516) 349-7620
fax: (516) 349-7830

Huge selection of inexpensive and interesting educational/science kits—robotics, radio, audio, etc. Hobbyist electronic kit assortment. Excellent inexpensive tool and test equipment selection. Small surplus selection; excellent prices on LEDs. Very good basic parts.

Terms: $20 minimum order; MC/VISA accepted; shipping/handling charges of 5% of total order or $5, whichever is greater, with exceptions for heavy items, etc.

Marlin P. Jones & Associates
P.O. Box 12685 • Lake Park, FL 33403-0685
orders and info: (407) 848-8236
fax: (407) 844-8764

Good robotic surplus: motors, transformers, lots of relays, switches, optical stuff, power supplies, batteries. No chips. Good capacitor selection.

Terms: $1 handling charge for orders under $10; MC/VISA accepted; shipping charges are UPS rates.

Mendelson Electronics
340 East First Street
Dayton, OH 45402-1257
orders and info: (800) 422-3525
local: (513) 461-3525
fax: (513) 461-3391

Huge family owned surplus supplier. Would rather sell you 100 or 1000 of an item than 10 of them. Lowest prices to be found on many computer items, motors, switches, connectors, displays, fans, transformers, capacitors. Catalog often lists manufacturers' part numbers only: it's helpful if you have a data book from the manufacturer.

Terms: $50 minimum order; MC/VISA/Discover accepted; shipping charges are UPS rates.

R&D Electronics

5363 Broadway • Cleveland, OH 44127
orders only: (800) 642-1123
info: (216) 441-5577
fax: (216) 621-8628

A small but very useful surplus assortment, good service, very good prices. Lots of switches, motors, transformers, LCD displays, wire, good other random stuff.

Terms: $10 minimum order; MC/VISA/Discover accepted; shipping charges are UPS rates.

Surplus Traders

P.O. Box 276 • Winters Lane
Alburg, Vermont 05440
voice: (514) 739-9328
fax: (514) 345-8303

Small but extremely cheap surplus assortment; minimum purchases per item of 50 to 100 quantities. Lots of AC/DC adapters, some switches, telephone equipment, CATV stuff.

Unicorn Electronics

10010 Canoga Ave. • Chatsworth, CA 91311
orders and info: (800) 824-3432
local (818) 341-8833
fax: (818) 998-7975

Extensive basic parts assortment. Very good prices on chips; price break at 25 pcs. on most parts. Laser diodes.

Terms: $15 minimum order; MC/VISA accepted; no shipping charges on prepaid orders.

D.3 The Retail Companies

Active Electronics

several regional centers across the USA; call Telemarking Department at (800) 677-8899

Leading retail dealer, oriented toward both small orders and large. Very good assortment of all necessities. Prices are sometimes high and sometimes very good. 33% discount on most items if $300 or more of any individual item is ordered.

Arrow Electronics

Catalog Division • 1860 Smithtown Avenue
Ronkonkoma, NY 11779
orders and info: (800) 93-ARROW

Huge retail dealer. Prices are high unless large quantities are involved. Excellent selection.

C-Gate International

3529 Ryder Street • Santa Clara, CA 95051
orders and info: (408) 730-0673
fax: (408) 730-0735

Computer accessories dealer. Unbelievably low prices on many items. How about a 6-outlet metal power strip for under $5 in single quantities? Or null modem adapters for $1.70? This is *the* ultra-cheap accessories warehouse. Look for their ad in *Computer Shopper* magazine.

Terms: no minimum order; MC/VISA accepted; you pay exact UPS shipping charge plus $2.95 handling charge per order.

Digikey Corporation

701 Brooks Ave. South • P.O. Box 677
Thief River Falls, MN 56701-0677
orders and info: (800) DIGI-KEY
fax: (218) 681-3380

Large parts and accessories assortment. Chips, displays, power supplies, cases, connectors. Extensive. Prices okay, better in quantity.

Terms: $5 handling charge for orders under $25; MC/VISA, check, money order or COD; customer pays shipping on credit card and PO orders. Increasing volume discounts for orders over $100.

Electronic Buyers' Club
1803 Northwest Lincoln Way
Toledo, OR 97391-1014
orders and info: (800) 325-0101

Organization with a \$35 yearly membership fee. Unusual, but once you join you get incredibly low prices on basic electronics: semiconductors, ICs, resistors, caps, diodes, ceramic resonators, LEDs, more. Prices start low at single quantities and go down if you buy tens or hundreds. Beats any of the other retailers hands down for most of the parts that they stock.

Catalog includes many manufacturers' data sheets and is a reference work in and of itself. Quick delivery on stocked parts. If you will spend \$100 or more on electronic supplies in the next year, the \$35 fee will earn its price. Many parts sold are available at literally one-fourth the prices that Digikey (for example) advertises.

See also *International Components Corporation*, the twin of EBC with slightly higher prices but no membership fee.

Terms: No minimum order but \$2 fee on orders less than \$25; shipping charges are exact UPS rates.

International Components Corporation
1803 Northwest Lincoln Way
Toledo, OR 97391-1014
orders and info: (800) 325-0101

The non-membership version of *Electronic Buyers' Club*, above. This catalog offers slightly higher prices and smaller selection than members have; still, the prices are extremely good.

Terms: No minimum order but \$2 fee on orders less than \$25; shipping charges are exact UPS rates.

LEGO Dacta
555 Taylor Road • Enfield, CT 06082
orders and info: (800) 527–8339 or (800) 243–4870

LEGO Dacta is the educational branch of the LEGO company (which has its U.S. headquarters in Enfield, CT). Dacta sells the *LEGO Technics* product line—the geared and motorized version of the LEGO system.

Call Dacta and get their "Gear Up for Learning" catalog, which has many LEGO Technics kits. Recommended starting kits are the *Technic Universal Buggy* (item number 1038, about \$57), which is a small, turtle-like vehicle with dual motor drive, and the *Technic Supplemental Set* (item number 9605, about \$185), a general-purpose Technic kit with two motors, battery packs, and a large gear and beam assortment.

MCM Electronics

650 Congress Park Drive • Centerville, Ohio 45459-4072
orders and info: (800) 543-4330
fax: (513) 434-6959

Tools, connectors, replacement VCR parts. Car audio and alarms. Phone and cable accessories. Large transistor assortment. Extremely good prices especially on tools: most stock is of acceptable Taiwanese manufacture. A must-have catalog. Quick and efficient delivery.

Terms: \$25 minimum for credit card orders; MC/VISA accepted; shipping charges are UPS rates plus \$2.10 handling charge.

Mouser Electronics

P.O. Box 699 • Mansfield, TX 76063
orders and info: (800) 34-MOUSER
fax: call for nearest number

Wide selection of parts, connectors, and accessories. Excellent customer service will fax you detailed specs on any part they carry. Regional distribution centers across US. Good prices for a top-of-the-line retail dealer.

Terms: \$5 handling charge for orders less than \$20; MC/VISA/AMEX/Discover/-Diners Club/Carte Blanche accepted; shipping charges are actual UPS rates.

Ocean State Electronics

P.O. Box 1458 • Westerly, RI 02891
orders only: (800) 866-6626
fax: (401) 596-3590
info: (401) 596-3080

Small retail dealer: chips, resistors, pots, semi's, LEDs, caps, relays, fans, enclosures, plugs. Generally overpriced across the board. Useful for extensive inductor assortment and amateur radio parts.

Terms: \$5.00 minimum order; MC/VISA, COD accepted; flat \$4 S/H most orders shipped UPS ground.