This sourcebook provides information for the practical implementation of independent living technology in the everyday rehabilitation process. "Information Services and Resources" lists databases, clearinghouses, networks, research and development programs, toll-free telephone numbers, consumer protection caveats, selected publications, and technology resources related to specific disabilities or age groups. "The Equipment Selection Process" addresses the importance of systematic selection procedures and provides guidelines for the initial client interview and an independent living skills checklist. "Technology at Home" offers advice on use of hospital beds at home, home management, personal care, clothing and shoes, architectural adaptations, and environmental control devices. "Educational and Vocational Technology" describes technical aids which may benefit disabled employees and students at all levels of education. "Recreational and Leisure Technology" focuses on wheelchair sports, water sports, winter sports, leisure activities such as gardening and fitness, and toys and games. "Technology for Personal Mobility" deals with seated wheeled systems, other types of mobility equipment such as walking aids and lifts, seating and positioning technology, and personal vehicles. Other sections include "Control, Communication and Sensory Aids," "Microcomputer Applications," and "Funding, Models, Policy, Statistics." (JDD)
Technology for Independent Living Sourcebook

Alexandra Enders, O.T.R.
Editor

Association for the Advancement of Rehabilitation Technology, Publishers
Suite 700, 1101 Connecticut Avenue, N W . Washington, D C  20036
202/857-1199
A primary mission of the Education and Publication Committees of RESNA is to promote the development of quality educational courses and materials for the membership. Our efforts in the past, as with most new ventures, have been limited mostly to individuals presenting their own research or clinical experiences. Unfortunately, this does little to draw on the experiences of others with the goal toward compiling a more objective knowledge base within a specific clinical area, that then can be used by others as a valuable information source for problem-solving.

This publication represents the second effort by the Education and Publication Committees to compile our current knowledge base and related information sources in the area of technology for independent living. The first was the Technology for Independent Living Resource Guide published last year. The Sourcebook continues and updates these materials, adding sections on control, communication and microcomputer applications. It also extends the scope of the original Guide by adding material to help consumers, practitioners and developers gain a better perspective on the many and individual fields covered, as well as some understanding of the priorities for intervention or action within them.

The original Resource Guide, and now the Sourcebook, reflect a trend in RESNA from simply reporting on technology, toward the development and presentation of materials and information on the practical implementation and application of technology in the everyday rehabilitation process. This increasing orientation in RESNA toward more service delivery and community-based information is a result of the growing number of rehabilitation practitioners within RESNA who both seek and provide us with this information.

We are indebted to Alexandra Enders for setting the pace in this direction -- as well as for the tremendous effort put forth in compiling, revising and extending this Sourcebook.

A special thanks is also given to Maurice LeBlanc who provided the support for the initial Resource Guide, on which this book is based and to Christine Thompson, who, under very tight timelines, typed and proofed the Sourcebook for publication.

Gregg C. Vanderheiden
Chairman, Publications Committee
May, 1984

If you have or know of information which you believe should be in the next edition of the Sourcebook, please forward the information to RESNA’s office, attention Sourcebook Editor. If you are willing to assist the Editor in compiling the information for a section (existing or new) of the next edition, please contact either the RESNA office or the Publication committee chairperson. The quality, accuracy and comprehensiveness of the Sourcebook is dependent upon participation by consumers and professionals from each of the fields covered.
ACKNOWLEDGEMENTS

This sourcebook is based on an earlier Resource Guide, which was compiled in conjunction with a RESNA-sponsored instructional course: Technology for Independent Living, Houston, 1982. Material for the Resource Guide was contributed by the entire faculty: Lars Augustsson, Peter Axelson, Judy Barnett, Kathy Bowman, Will Clark, Alexandra Enders, Lex Frieden, Debbie Gilden, Marian Hall, John Leslie, Bob Kafka, Sam McFarland, Barry Rombach, Jim Tobias, Elaine Trefler, and Margaret Young. The document was compiled and edited at the Rehabilitation Engineering Center at Children's Hospital at Stanford.

The need to expand and update the Resource Guide became obvious, and many members of RESNA helped make this second edition happen. David Jaffee, from the Palo Alto VA Rehabilitation R&D Center, had the original data files translated so they would work on the Trace Center's computers. Chris Thompson, of the Trace Center's staff, did all the typing, retyping, and arrangement -- a mammoth job -- in record time. Without her, this book would not have been produced.

Special thanks also go to Kathy Bowman, Project Threshold, Rancho Los Amigos Hospital; Jim Tobias, Rehabilitation Engineering Volunteer (REV) Network, New York; Rick Holte, Rehabilitation Engineering Center, Children's Hospital at Stanford, and John Brabyn, Smith-Kettlewell Rehabilitation Engineering Center, San Francisco, who all contributed new or greatly revised sections. Marian Hall, ABLEDATA system manager, added new information to the Information Section as well as providing up-to-date lists of manufacturers for several sections.

The staff of the Trace Center, University of Wisconsin-Madison, made this book a reality. Besides physically making it appear on paper, the Trace staff added substantially to the new sections on Microcomputer Applications, and Communication, Control and Sensory Aids. Mary Brady, Dale Bengston, and Francisco Villarruel all provided information. Gregg Vanderheiden not only contributed several articles, but also helped with the overall organization of the book, and the typesetting.
Each section of the Sourcebook was compiled from many sources including:

Information Resources


"Buyer Beware -- Shopping for Assistive Devices." Sensory Aids Technology Update. Sanergy Aids Foundation, 399 Sheridan, Palo Alto, CA

"Warranties Can Save You Time and Money." J. Schmitt, in Accent on Living, Spring 1981. P.O. Box 700, Bloomington, IN

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Kathy Bowman, OTR. Project Threshold, Rancho Los Amigos Hospital, Downey, CA.

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Jim Tobias. Rehabilitation Engineering Volunteer Network, 201 W 85th Street #2E, New York, NY 10024

"Consumer Alert." Judy Berke. The Coordinator Magazine, 11417 Vanowen Street, North Hollywood, CA 91605

Educational and Vocational Technology


1980 National Association of State Directors of Special Education, 1201 16th Street NW #610E, Washington, DC 20036

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Technology for Independent Living II. Virginia Stern & Martha Redden, editors. AAAS, 1776 Massachusetts Avenue NW, Washington, DC

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Paul Brand Editorial in Journal of Rehabilitation R&D Vol 20, #1, July 1983 Office of Technology Transfer, VACP, 752 Seventh Avenue, New York, NY

Choosing the Best Wheelchair Cushion for Your Needs, Your Chair, and Your Lifestyle Peggy Jay Royal Association for Disability and Rehabilitation, 25 Mortimer Street, London, England

“The Effectiveness of Preventive Management in Reducing the Occurrence of Pressure Sores” T Krouskop et al Journal of Rehabilitation R&D Vol 20, #1, July 1983 Office of Technology Transfer, VACP, 752 Seventh Avenue, New York, NY

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“Side by Side Trials An Evaluation Methodology for Comparative Testing of Modular Wheelchair Insert Systems” S Scharlein, R Holte Proceedings of the Sixth Annual Conference On rehabilitation Engineering RESNA, 4405 East-West Highway, Bethesda, MD

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“Hints on Operating a Successful Driver Education Program” Margaret Young, OTR Ontario Crippled Children’s Centre, 350 Rumsey Road, Toronto, Ontario, Canada

Evaluation forms from Colorado Driving School, Englewood, CO

Teaching Driver Education to the Physically Handicapped Human Resources Center Albertson, NY

Hand Controls and Assistive Devices for the Physically Disabled Driver Human Resources Center Albertson NY

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A Guide to Controls Children’s Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA

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G Nave et al
International Council for Computers in Education, University of Oregon, Eugene, OR.

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Discovery '83. Computers for the Disabled
Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menominee, WI

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Additionally, two sources were used throughout the text

Easter Seals, bibliographies, brochures, and the reviews in its bimonthly publication, Rehabilitation Literature

National Rehabilitation Information Center (NARIC) bibliographic sources and annotations
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INTRODUCTION

We all use "technical aids." With the advance of technology, physical strength and ability have declined as the primary measure of worth and the only means to compete for survival. When we need to accomplish a task beyond our physical capabilities, a tool is developed to make that task possible or safer or faster or just easier and more convenient. One of the identifying features of the human species has been its skill at making and using tools. The story of humankind can readily be told as the history of the development of technological innovation.

Compared to the enormous power of machinery, all human beings are physically limited. At each point in history, society defines and redefines the criteria for physical and mental normalcy. Certain members are excluded from being able to independently maintain themselves based on these arbitrary limits. In cases where technology is able to acceptably compensate for the limitation, especially when a significant portion of the population has a similar disability, the limitation is redefined as being within normal limits, and those people are no longer stigmatized as being handicapped. Disability is a matter of degree. Technology can reduce the gap, as in the case of eyeglasses. Not even airline personnel are discriminated against any longer for wearing corrective lenses. Lower back problems seem to be headed into the "normal" range--there is a store in Boston specializing in low back problems, and it is definitely not focusing its marketing strategy toward the "disability" market; its target is the "normal" person with a back problem. Hearing aids also appear to be heading out of the "adaptive aid" category, even the U.S. President now openly wears one, and the advertising campaigns for hearing aids are increasingly emphasizing convenience, happiness, and quality of life.

The last ten years have been exciting times in the field of applied technology for disabled people. From a time when there were very few devices, we now have a situation where there are more devices than anyone can keep track of without the help of a computer. R&D efforts have increased, service delivery is beginning to change from an art to a science, and we can begin to exchange ideas about how and why we have succeeded and failed.

Along with the many new devices that are now on the market or under development, there has come an explosion of information about technical aids for disabled people. If you are an information specialist, you may find yourself inundated with it. If you are a practitioner or a consumer, you may know it's out there, but not know quite where to find it. This Sourcebook was written to help make some sense out of the sometimes bewildering array of information available on technical aids for disabled people.

The emphasis throughout is on practical applications of technology. Many sources have been quoted, to give you an idea of the resources that you have available to you.

Organizations and people have been listed who may be able to help find answers for your questions. Publications are listed as sources of more information. A few of the publications are out of print, but have been included because they are classics, still useful, and nothing better exists to supersede them. They can generally be found in therapy departments or rehabilitation medicine units.

There is one major resource that has not been specifically referred to in this guide. As a group, this resource is often overlooked, even though their information is usually the most effective, least expensive, and has stood the test of time. Disabled consumers. Find them, ask them questions, listen to them. Trade information! Mrs. B may want to know about shower benches, but she probably has a wealth of information about kitchens. This information has proven its reliability and validity. Take advantage of it whenever possible.

A listing of local community resources was beyond the scope of this book. If you don't know where else to start looking, try the yellow pages of the phone directory. These are some suggested headings: crutches, wheelchairs, wheelchair lifts and ramps, van conversions, hearing aids, handicapped equipment, physical therapy equipment, physician's & surgeon's equipment and supplies, surgical appliances and supplies, rehabilitation services, home health services, handicapped assistance, handicapped transportation services, human services organizations, social service organizations, rental service stores, associations. Your directory may have others.

This resource guide is not intended to convey everything you always needed to know about technology for disabled people. It is, however, a good place to start if you are looking for practical information. Good luck!
A NOTE ON MYSTIFICATION: Avoiding Hardware Inferiority Complexes (HIC)

Often nontechnologists look at the designer-technician as a wizard. It is important to deflate this myth. Everyone has excellent ideas for devices, but these ideas might never see the light of day, due to a hardware inferiority complex (HIC). Designs at the grassroots level, by the way, have HICs with respect to the even more wizard-like R&D programs!

If the idea is to provide functional services, then we must give up this socially enforced tendency to worship equipment and refocus on people. Here are some phrases to repeat before a mirror:

If you are not a technologist: "I don't care if it is 'state-of-the-art!' "No, I'm not dumb, you just have to learn to express yourself so we can understand you." "Microprocessor, shmicroprocessor!"

If you are a technologist: "Sixty seconds of silence." (You may have to work up to this.) "That sounds like a good idea. Can I explain how we might be able to build it?" "Gee, I didn't know that."

Jim Tobias
"Grassroots Rehabilitation Technology and the Delivery System"
AAAS Workshop, Houston, Texas
December 4-5, 1980

A NOTE ON TECHNOPHILIA

The danger exists that technology will be viewed as an end in itself, not as a means to an end. Technology produces two groups of people -- those who love it (technophiles) and those who don't (technophobes). Some people have a low "gadget tolerance," and don't feel comfortable around sophisticated assistive devices. Questions about gadget tolerance must be asked of the provider, the consumer, and the caregiver. Devices obviously shouldn't be pushed on someone who doesn't like them, they'll end up in the closet. But there is another danger here, that of the "technophile," the person with a high gadget tolerance. Sometimes devices are requested because they are new, innovative, "glittery," not because they are best suited to the individual. Please note that when questioning the degree of gadget tolerance, the provider who is asking the question should do some self-examination at that point, and also look at the motivation of other team members who are recommending devices.

Alexandra Enders
"Questionable Devices"
Special Sessions
Second International Conference on Rehabilitation Engineering
Ottawa, Ontario, Canada
June, 1984
INFORMATION SERVICES AND RESOURCES:

DATABASES, CLEARINGHOUSES, NETWORKS

- ABLEDATA / HOW ABLE IS ABLEDATA? / BRS AFTER DARK
- ACCENT ON INFORMATION
- ASSISTIVE DEVICE DATABASE SYSTEM (ADDS)
- ERIC
- NARIC
- OTHER ON-LINE DATABASES
- WHERE HAVE ALL THE DEVICE DATABASES GONE?
- INFORMATION CLEARINGHOUSES
- TECHNOLOGY INFORMATION EXCHANGE NETWORKS
- CONFERENCE
- HEX
- SPECIALNET
- INTERNATIONAL INFORMATION ON TECHNICAL AID INFORMATION SYSTEMS

RESEARCH & DEVELOPMENT PROGRAMS ON TECHNICAL AIDS

TOLL-FREE NUMBERS

CONSUMER PROTECTION

SELECTED PUBLICATIONS AND OTHER RESOURCES

- PUBLICATIONS WHICH PROVIDE DISABILITY & TECHNOLOGY OVERVIEW
- DISABILITY BOOKS WHICH HAVE USEFUL INFORMATION ON DEVICES
- PRODUCT DIRECTORIES
- A DIFFERENT APPROACH TO ASSISTIVE DEVICES
- SOURCES OF CURRENT INFORMATION
- AUDIOVISUALS
- NATIONAL ORGANIZATIONS

TECHNOLOGY RESOURCES RELATED TO SPECIFIC DISABILITIES OR AGE GROUPS

- ARTHRITIS
- CEREBRAL PALSY
- DISABLED CHILDREN
- DISABLED ELDERLY
- LARYNGECTOMY
- MULTIPLE SCLEROSIS
- ONE-HANDED
- OSTOMY
- PARKINSON'S DISEASE
- STROKE

FOR INFORMATION SPECIALISTS
WHAT IS A COMPUTERIZED DATABASE?

A computerized database is a body of information stored in a computer. The information gets into the computer via devices such as word processors or computerized typesetting machines which translate the words and sentences into the numbers which the computer can manipulate. Modern computers are large enough and fast enough to hold billions of words and read them all in seconds. A data search is what happens when the computer scans a database for the occurrence of specified words, resulting in the recovery of the desired information.

THE ABLEDATA SYSTEM

The ABLEDATA System is a computerized data retrieval system for information on rehabilitation products, funded by the National Institute for Handicapped Research of the U.S. Department of Education and operated by the National Rehabilitation Information Center (NARIC). The ABLEDATA product database lists commercially available rehabilitation products. The national database lists only manufacturers, sole distributors or national distributors with unique mail-order product catalogs. Bibliographic materials and organization information are available through BRS on REHABDATA (NRIC), also maintained by NARIC. Using ABLEDATA can help people make more informed decisions about purchasing the appropriate aids or devices they require.

ABLEDATA can provide answers to questions like:

- My uncle has impaired vision. What kinds of reading aids are available to help him?
- My company is developing an Employee Assistance Plan. Is there a resource for equipment which could help those people injured on-the-job to return to work quickly?
- Kelly had always enjoyed carpentry and I think it would be therapeutic to continue, but maneuvering standard tools is impossible. How can I find out what adaptive devices are available?
- I manufacture fishing gear and have developed a fishing pole mount for wheelchairs. Is there a centralized place to list its availability?
- My patient wants to stay out of a nursing home, but wonders about maintaining a daily routine alone. Are there devices which would help?
- Pat will be going back to work shortly. I think a van would be a wise purchase at this point, but how can I get comparative information about van modifications to help Pat make an informed decision?

ABLEDATA lists over 10,000 products which are commercially available. Further, ABLEDATA is updated monthly, which means that the product listings are continually being expanded and refined to assure you of the most current product information.

Products listed in ABLEDATA extend from the simple to the sophisticated and reflect a broad range of equipment needs. Products are identified by the following categories:

- Personal Care
- Vocational/Educational
- Seating
- Communication
- Ambulation
- Orthotics/Prosthetics
- Home Management
- Mobility
- Transportation
- Recreation
- Therapeutic Aids
- Sensory Aids

WHAT DOES AN ABLEDATA PRODUCT LISTING INCLUDE?

Each ABLEDATA product listing includes the following descriptive information:

- Common product name
- Brand name
- Manufacturer
- Cost
- Description of the product
- Informal user comments (if available)
- Abstracts of formal evaluations (if available)

HOW CAN A PRODUCT BE LISTED ON ABLEDATA?

ABLEDATA welcomes recommendations from product users, researchers, health professionals and manufacturers regarding equipment and devices to add to the database. In addition, the staff reviews journals and manufacturer catalogs as well as contacting individuals in the field of rehabilitation for new product ideas.

As an integral component with the actual database, the ABLEDATA System includes a network of Information Brokers. The Network of Information Brokers consists of Regional Information Brokers trained by NARIC to successfully access ABLEDATA's product listings. Regional Information Brokers are employed by a variety of rehabilitation related facilities and organizations. They serve as a local access point for product information. The Information Broker provides interpretation of the clients' requests or needs for obtaining information from the database and provides additional...
information on local or regional vendor resources and other related services for the products.

Requests for information about equipment may be directed to the Brokers by anyone, including disabled individuals or family members, rehabilitation professionals, manufacturers or vendors, educators, public or private agencies, or researchers. In addition to computer printout information, the Information Broker can provide photocopies of the manufacturer’s literature for further detailed information, and for local requests the Broker can provide supplier information, sources for repair and maintenance or other related resources and referrals.

DATA ENTRY FORMAT

The content of each data entry in the files includes the following fields:

- **AN**: Accession number (Computer record ID number, includes code for year/month data entered)
- **NM**: Generic name of item
- **BN**: Brand name (Trade name and/or model number)
- **MN**: Manufacturer’s name
- **CD**: Manufacturer’s and distributor’s code numbers to locate address
- **AV**: Availability (Major distributors or developer if not commercially available)
- **CT**: Cost/date
- **DE**: Description—brief statement describing item
- **CM**: Comments—includes information on cumulative data, contraindications, limitations, etc (from disabled individuals, rehabilitation professionals, etc)
- **EV**: Evaluation—formally documented test results
- **ID**: Identifiers—index terms from controlled vocabulary listed in thesaurus

Generic Name, Brand Name, Manufacturer, Distributors, Cost and Description are self-explanatory and must be completed for each data entry. The Accession Number is not used for searching the database. The first four digits identify the month and year the data was entered into the system, and the last six digits are a document identification number for internal editing purposes. A Code Number is assigned to each manufacturer and distributor and is used to access a separate file to obtain the address of desired companies. Presently the fields, or paragraphs, for Comments and Evaluation are not completed for all data entries, these are completed as the information is submitted or otherwise available. Comments include informal use evaluation or general comments from disabled individuals, health professionals or anyone desiring to share information regarding products. All data submitted is reviewed before input to the system, and verified if necessary. The Evaluation field is for formally documented evaluation results, primarily from research programs. Evaluation results may be reproduced in total or summarized if lengthy, with references for obtaining the complete results.

The identifier field is the only paragraph required to use a controlled vocabulary. These terms are assigned from the list of categories and subcategories listed in the ABLEDATA thesaurus, and all generic or common product names listed by category. In addition, a separate and more detailed index is available with all terms indexed alphabetically with alternative terms (or synonyms) and cross-references for appropriate searching terms. The ABLEDATA Thesaurus (2nd edition) is available for $250, including postage and all supplements. Searching the database is accomplished by free text searching. This method of searching may use either words designated in the controlled vocabulary or may be searched using any word or phrase in conjunction with applied limitations or operators. Any of the fields or paragraphs may be searched but consistency of terminology within the data entries is particularly critical with free text searching.

NARIC provides training workshops specifically for learning to search ABLEDATA.

**SAMPLE DATA ENTRY**

AN 83-07-006900
NM INSULIN SYRINGE INFUSER
BN ACCU RINGE MODEL SP250, INSULIN PUMP
MN DELTA MEDICAL INDUSTRIES
CD 1372
AV MANUFACTURER
CT $1,500.00, 0583
DE INSULIN PUMP FOR CONTROLLING BLOOD GLUCOSE LEVELS. UNIT IS SIZE OF A PACK OF CIGARETTES CLIPPED TO BELT OR WORN IN POCKET. CONNECTING SYRINGE IS INJECTED INTO SKIN AND TAPPED HOLDS FOUR DAY SUPPLY OF INSULIN USES U-100 UNDILUTED INSULIN (OTHER CONCENTRATIONS CAN BE USED.) UNIT IS PROGRAMMED TO DELIVER INSULIN AT MULTIPLE TIMES ACCORDING TO THE USERS SELF MONITORED BLOOD GLUCOSE LEVELS 1 1/16 BY 2 5/8 BY 4 3/8 INCHES 5 1/2 OUNCES SYRINGE 3 CC P3-0-L BATTERY NICKLE CADMIUM RECHARGEABLE BATTERY OR NON RECHARGEABLE BATTERY DELIVERY TUBE 2 FEET LONG INTERNAL VOLUME 12 UNITS NEEDLE STANDARD LER HUB, NUMBER 25 TO 27, 1/2 TO 3/4 INCHES LONG ON/OFF REVERSE CONTROLS. BASE RATE FROM 028 UNITS OF INSULIN PER HOUR TO 28 INSULIN UNITS PER HOUR (99 OPTIONS) ID PERSONAL CARE PERSONAL HEALTH
CM MUST HAVE A DOCTOR’S PRESCRIPTION TO RECEIVE PRODUCT

The ABLEDATA System is designed as a central database, and is stored at Bibliographic Retrieval Services (BRS) in Latham, New York. It may be accessed anywhere in the country, or internationally, by persons with subscriptions to BRS through special telecommunications lines (e.g., Telenet, Tymnet) or BRS subscriptions range from $16.00 to $35.00 per connect hour, and telecommunication charges range from $6.00 to $11.00 per connect hour. There is a $15.00 per hour/$15.0 per citation royalty for public access to ABLEDATA. Each program generates its own policy regarding charging fees for providing searches of ABLEDATA or other databases. Some provide searches free of cost; others have minimal fees. As of 2/1/84, NARIC charges $10.00 per search providing up to 100 citations, and $5.00 for every additional 100 citations (or portion thereof).
HOW CAN I ACCESS ABLEDATA'S INFORMATION?

If you would like personal assistance to effectively retrieve ABLEDATA’s product information, contact a trained ABLEDATA broker.

ABLEDATA INFORMATION BROKERS

Megan Ranaall or Barbara Lerner
National Rehabilitation Information Center
4407 8th Street, N.E.
Washington, D.C. 20017-2299
(202) 635-6090

Sue Gaskin
Division of Rehabilitation Services
Department of Human Services
1401 Brookwood Drive
PO Box 3781
Little Rock, AR 72203
(501) 371-5897

Barbara J Warren, Information Specialist
PAM Assistance Centre
110 Marshall Street
Lansing, MI 48912
(517) 371-5897

Lynda Harbert
Rancho Los Amigos Hospital, REC
7601 E Imperial Highway. 500 Hut
Downey, CA 90242
(213)922-8116

Resource Library
Moss Rehabilitation Hospital
12th Street & Tabor Road
Philadelphia, PA 19141
(215) 329-5715

Bill Steenbeke
Independent Living
Memorial Hospital
615 N Michigan
So Bend, IN 46601
(212) 284-7450

Jerry Assay
Utah State Div. of Rehabilitation Services
Rehabilitation Service Center
250 East 500 South
Salt Lake City, UT 84111
(801)533-5991

Lois Byrum
Minnesota Division of Vocational Rehabilitation
501 Capitol Square Building
St Paul, MN 55101
(612)296-6684

Alice B Kuller
Hermansville Rehabilitation Center
Guys Run Road
PO Box 11460
Pittsburgh, PA 15238
(412)781-5700 x 508

Ricardo G Cerna
Division of Vocational Rehabilitation
131 W Wilson St 7th Floor
P O Box 7852
Madison, WI 53707
(608)266-1998

Elizabeth Levy
Adaptive Equipment Resource Specialist
Vermont Center for Independent Living
174 River Street
Montpelier, VT 05602
(802)229-0501
(800)622-4556 (Vermont only)

Wendell Finger
Rehab Eng Section
California Department of Rehabilitation
830 K Street Mall
Sacramento, CA 94614
(916)323-2959

June Holt
Massachusetts Rehabilitation Commission
20 Park Plaza, Room 331
Boston, MA 02116
(617)727-1140

Ruth Lampert
Veterans’ Administration
252 7th Avenue
New York, NY 10001
(212)620-6702

Roger Levy
Texas Rehabilitation Commission
118 E Riverside Drive
Austin, TX 78704
(512)445-8000

Carolyn Ramey
Access Alaska
841 E Dowling Road
Anchorage, AK 99502
(907)563-4060

Anne Holmes
National Deaf-Blind Information & Resource Center
2930 Turtle Creek Plaza
Suite 102
Dallas, TX 75219
(214)522-4540

Helen Stonehill
International Center for Disabled
340 E 24th Street
New York, NY 10010
(212)679-0100 x 307

Dave Shaffer
Human Resources Center
1 W Willets Road
Albertson, NY 11507
(516)747-5400
Bibliographic Retrieval Services

If you would prefer to access ABLEDATA directly, it is available to anyone with a subscription to Bibliographic Retrieval Services (BRS) For information regarding the equipment and resources necessary to publicly access ABLEDATA, call or write BRS, 1200 Route 7, Latham, NY 12110. 800/833-4707. New York residents call 518/783-1161

BRS AFTER DARK

To directly access the ABLEDATA or REHABDATA, you must have a subscription to BRS (Bibliographic Retrieval System) The BRS Search Service, which is used by major research centers, corporations and university libraries around the world, is now available to the home computer user Called BRS/AFTER DARK, this comprehensive new service provides access to information from millions of journals, reports, books and articles via a transparent, user-friendly interface to the sophisticated BRS Search software Available from 6 p.m. until midnight, local time, the service offers dramatically reduced searching costs during convenient, after-work hours BRS/AFTER DARK is available for a one-time subscription fee of $75 which covers the search service, the BRS/AFTER DARK Newsletter, electronic mail, and other services Access to BRS/AFTER DARK costs as little as $6.00 per connect hour, including INSET telecommunications charges Further information is available from Cathy Anderson, BRS/AFTER DARK, 1200 Route 7, Latham, NY 12110. 518/783-1161

HOW ABLE IS ABLEDATA?

In the November 1983 issue of Changing Times Magazine, an article, "Things that help the handi-capped help themselves," reported the following information

"To get a first-hand idea of just how well the computerized product identification system works, Changing Times sought information on a variety of products selected at random. We requested information on

- a hammer that a one-armed person could use.
- a device to help a paralyzed person get into a bathtub.
- an immersible bench that a disabled person can use in a bathtub or sink.
- a powered mode of transportation other than expensive electric wheelchairs.
- a means by which a disabled person could summon help in an emergency.
- clothing designed especially for people with disabilities.

A few days later we received a package of printouts from Abledata, which informed us that

"United Pacific Corp., 245 Roosevelt Rd., West Chicago, Ill. 60185, manufactures a hammer with nail slots in a magnetized head that allows one-hand use. It retails for about $20.

"Twenty-five companies make devices that help people with disabilities get into the bathtub. Items range from a heavy-duty polyvinyl cushion that inflates with water and costs less than $300 to an electric, stainless steel, floor-mounted lift priced at more than $2,300.

"Some 47 different bathtub benches and shower stools are distributed by 32 companies. A molded plastic seat with no back support costs $11, a vinyl upholstered chair and backrest with removable arms sells for $265.

"Nineteen manufacturers offer 23 different powered mobility products, starting with a battery-operated metal frame with small wheels and footrests that converts standard four-legged chairs into motorized vehicles for indoor use. It costs about $850. At the top of the line is a four-wheeled, eight-speed electric cart for either indoor or outdoor travel. It can reach speeds of up to 22 mph and retails for around $3,000.

"Fourteen different models of emergency alert systems are available from manufacturers. A $60 unit consisting of a wireless remote control signal that can be clipped to a pocket, bed or wheelchair activates an alarm receiver plugged into a standard outlet up to 100 feet away. At the other end of the spectrum is an exotic $2,300 microprocessor-based system that periodically requests a simple response from the person it is monitoring.

"A variety of 60 lines of men's and women's clothing with special off-and-on features are available from 16 listed manufacturers. Items range from easy slip-on blouses priced at about $5 up to an $85 jacket with Velcro fasteners in the front.

The article goes on to say that

"With the printouts from Abledata you can get a good idea of the variety of products available, who makes them and how much you can expect to pay. Printouts may also include names of local resources and distributors"

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THE ABLEDATA USERS' GROUP

The ABLEDATA Users' Group is an association of individuals and organizations who access ABLEDATA regularly. The annual fee is $35. The Users' Group was created in response to the diversity of ABLEDATA's users. The Users' Group accommodates a wide variety of participants by allowing the ABLEDATA staff to target their technical assistance toward specific needs.

For more information, contact ABLEDATA, 4407 Eighth Street NE, Washington, DC 20017, 202/635-6090, TDD 202/635-5884
Sources for More Information on Devices: Other Product-Related Data Systems

Accent on Information, P.O. Box 700, Bloomington, IL 61701

A commercial computerized product database with data entries organized by categories of equipment and by disability function. Data entries include ideas for how to make or adapt equipment, and organizations of interest to disabled persons. Total database includes 5,400 entries, representing approximately 1,000 companies, developers and organizations. Product printouts are available by mail for a cost of $12.00 for the first 50 entries and $0.80 for every additional citation. Photocopies of the literature can be provided for some products. Each data entry lists the product name, cost, and a brief description.

Accent Buyer's Guild grew out of the information system and lists manufacturers, distributors, and organizations, classified by product type or function. It is an abbreviated version of the database holdings. Information listed includes names and addresses only. Cost is $10.00.

Assistive Device Database System (ADDS)

The Assistive Device Database System (ADDS) is a source of information on adaptive equipment, programs and other resources available to handicapped or disabled persons. ADDS contains information not only on commercially available devices, but also on those which are custom made.

ADDS was originally developed by the Assistive Device Center at California State University, Sacramento for use by college and university counselors who advise disabled students needing assistance to accomplish tasks essential to getting a complete education, especially those students in the fields of sciences and engineering.

ADDS provides information on communication, manipulation, mobility and sensory handicaps. ADDS provides four basic types of information:

- Devices, including purpose, manufacturer, vendor, cost and skill needed for use
- Bibliographic citations, including author, title, source, and abstract
- Resource persons, including name, address, phone, organizational affiliation, specialty, and service offered
- Service agencies, including name, organization, address, phone, publications, and types of disabilities served

ADDS is being made available by American International Data Search (AIDS), Inc. AIDS will be available for direct on-line searching through commercial services and computer networks. Initially searches will be performed by the AIDS staff; but can be delivered electronically to your computer or terminal.

If you do not have a computer or terminal or if you prefer AIDS to do the search you may make an information request via a toll-free number or mail in an information request form. American International Data Search can also access on-line data-bases of information for the disabled. In most cases, the information will be available within 24 hours.

To initiate a search or to request a search form call 800/275-8700 (in California, 800/223-2437), or write American International Data Search, Inc., 2326 Fair Oaks Blvd., Suite C, Sacramento, CA 95825.

ERIC Clearinghouse on Handicapped and Gifted Children, 1920 Association Drive, Reston, VA 22091, 703/620-3660

Information on curricula, teaching methods, research, program descriptions, assessment and other topics related to the education of handicapped and gifted children can be found in the Council on Exceptional Children (CEC) quarterly abstract journal Exceptional Child Education Resources (ECER) and in the ERIC monthly abstract journals Resources in Education (RIE) and Current Index to Journals in Education (CIJE). These three publications provide you with abstracts of journal articles, books, research reports, conference proceedings, curriculum guides, project reports, and other types of education literature, both published and unpublished.

You can search the information in these publications manually or by computer. Hundreds of university, professional and public libraries subscribe to ECER, RIE, and CIJE. You can search the subject indexes by hand to find abstracts of articles and documents on your topic. Many of these libraries also offer computer searching of ECER and ERIC (RIE and CIJE). Some libraries are funded to offer free or inexpensive searches to certain groups. If your topic is fairly complex, or you need to have a comprehensive review of the literature, a computer search can save you many hours in the library.

Computer searches of ECER and ERIC are available from CEC Information Services at the following rates:

Regular and Institution Rates

One database (ECER or ERIC) $35.00 (up to 50 abstracts), two databases (ECER and ERIC) $50.00 (up to 100 abstracts)

Special CEC member rates

One database (ECER or ERIC) $25.00 (up to 50 abstracts), two databases (ECER and ERIC) $40.00 (up to 100 abstracts)

Additional abstracts at $5 per 25, add 10% for postage and handling.

If you need help locating a library near you, call CEC Information Services at 703/620-3660.

The Council for Exceptional Children operates the ERIC Clearinghouse on Handicapped and Gifted Children under a contract with the National Institute of Education.
The following is a list of the 1982-83 Rehabilitation Research Review titles and authors.

The following is a list of the 1982-83 Rehabilitation Research Review titles and authors.

1. Rehabilitation Education and Training
   Michael Scofield, Ph.D.
2. Client Vocational Assessment
   Norman Berven, Ph.D.
3. Private Sector Role of Rehabilitation Professionals
   George Wright, Ph.D.
4. Process, Issues and Needs in Private-for-Profit Rehabilitation
   Mary Ellen Mitchell, Ph.D. Jack M. Sink, Ph.D.
5. Benefit Cost Analysis
   Monroe Berkowitz, Ph.D.; Edward Berkowitz, Ph.D.
6. Consumerism and Advocacy in Vocational Rehabilitation
   Lex Frieden
7. Applications of Telecommunications Technology to Services for Individuals with Disabilities
   Susanne Bruyere, Ph.D.
8. The Role of the Family in Rehabilitation
   William English, Ph.D.
9. Incentives and Disincentives in the Vocational Rehabilitation Process
   Kurt L. Johnson
10. Rehabilitation and Adult with Learning Disabilities
    Joseph A. Szuhay, Ph.D.; John M. Williams, Ed.D.
11. Sheltered Employment Services and Programs
    Luca E. Conte, Ph.D.
12. Delivery of Vocational Rehabilitation to Rural Populations
    Laurel Richards
13. Case Management Techniques
    Deborah A. Pape, Ph.D.
14. Contemporary Research on the Vocational Rehabilitation of Persons with Mental Retardation
    Harry A. Allen, Ed.D.; Donna R. Falvo, Ph.D.
15. Computers in Vocational Rehabilitation
    Current Trends and Future Applications
    Bruce Growick, Ph.D.
16. Performance Appraisal of Rehabilitation Professionals
    William Sather, Ph.D.
17. Low Cost Technical Aids and Self-Help Approaches to Technology
    The Benefit for Disabled People
    Gregory Dixon, Sandi Enders
18. Measuring Vocational Rehabilitation Success
    Kenneth Reagles, Ph.D.

The 1984 Rehabilitation Research Reviews include:

1. Supported Work/Transitional Employment
   Steve Ostby, Ph.D. and Anne Chandler, Ph.D.
2. Importance of Physical Conditioning for Disabled Persons
   Peg Nosek and Ray Nofi
3. Parent Training for Early Intervention
   Diane Briker, Ph.D. (Kristine Slentz, Barbara Walker)
4. The Use of Computers to Expand Employment Opportunities for Disabled Persons
   William Crimando, Ph.D. and Susan Harrington Godley, Ph.D.
5. The Rehabilitation of Persons with Head Injuries
   Ruth Torkelson-Lynch, Ph.D.
6. The Rehabilitation of Autistic Persons
   Anne Donnellan, Ph.D.
7. Wheelchairs
   Colin McLaurin, Ph.D.
8. Medical Rehabilitation of Persons with Muscular Dystrophy and Other Neuromuscular Diseases
   Dr. William Fowler, Jr.
9. Disability and Older Adults
   Pamela Finney-Fried, Ph.D.
10. The Community Integration of Disabled Persons
    Carol Sigelman, Ph.D.
11. The Efficacy of the Independent Living Program Model Based on Descriptive and Explanatory Studies
    Lex Frieden
12. The Use of Computer Technology in Service Delivery to Disabled Persons
    Brian McMahon, Ph.D.; James Sampson, Ph.D., and Jane Burkhead, Ph.D.

Individual Reviews are $750 each, the complete set is $1000. All prices include postage and shipping in the USA.

While NARIC provides free fact and referral services, other products and services are available for nominal fees. However, no one will be denied access to NARIC's sources because of an inability to pay. For more information please write, call, or visit:

National Rehabilitation Information Center
The Catholic University of America
4407 Eighth Street, NE
Washington, DC 20017
Phone 202/635-5826
TDD 202/635-5884
ABLEDATA 202/635-6060
REHABDATA 202/635-5822

NARIC operates under contract with the National Institute of Handicapped Research, U.S. Department of Education (Contract #300-84-0007).
WHERE HAVE ALL THE ASSISTIVE DEVICE DATABASES GONE?

Several product-related databases that were listed in the first edition of the Resource Guide no longer appear to be in operation. These include

APIAD: Automatic Retrieval of Information on Assistive Devices
Louisiana Tech University
Rehabilitation Engineering Research Center
P.O. Box 10348
Ruston, LA 71272

Assistive Devices for People with Disabilities
Clinical Convenience Products
2066 Helena Street
Madison, WI 53704

Project Fund
Information Center of Greater Birmingham, Inc
3600 8th Avenue South, Suite 504
Birmingham, AL 35222

STORPROD
University of Washington
Department of Rehabilitation Medicine
BU - 805 HSB Room 30
Seattle, WA 98195

This database doesn't appear to readily serve the general public

VAREC Information Storage and Retrieval System
Veterans Administration REC
Information & Education Service
252 7th Avenue
New York, NY 10001

INFORMATION SERVICES AND RESOURCES

SPECIALIZED DATABASES UNDER DEVELOPMENT

Job Accommodation Network (JAN)
P.O. Box 468
Morgantown, WV 26506
1-800-JAN-PCEH

Sponsored by the President's Committee on Employment of the Handicapped, this database will provide information about workplace accommodations for disabled individuals. Accommodations will be listed according to tasks and an individual's functional limitations. It is primarily for employers seeking ways to accommodate disabled employees.

Tech-Knowledge
Center for Rehabilitation Technology, Inc
Georgia Institute of Technology
Atlanta, GA 30332
404/894-4980

Tech-Knowledge is an information service of the Center for Rehabilitation Technology, Inc. in Atlanta. This computerized data and information clearinghouse covers such areas as specifications, standards, legal requirements, product research and design, engineering and architecture, and marketing opportunities and business development. This service is available to all organizations by subscription. The search rate for consumers is $3 per hour, while the charge to researchers, organizations and business is $35 for the first search hour and $25 for each following hour. There is a 25% discount to all users after ten hours of search in one year.

ONLINE DATABASES THAT INCLUDE REHABILITATION INFORMATION: A Guide for the Researcher
Sharon McFarland, NARIC, The Catholic University of America, 4407 Eight Street NE, Washington, DC 20017 202/635-5822 (Information Specialist), 202/635-5884 (TDD) February, 1982

This guide, prepared by the National Rehabilitation Information Center, lists databases available from the Bibliographic Retrieval Service (BRS) and DIALOG which have rehabilitation information.

Each entry lists the name of the database, which vendor or vendors have the database available, and the file label or number. In addition, a brief description of the database coverage and general subject areas are given, drawn from the database guides written by BRS and DIALOG and search experience at NARIC.
The purpose of the ARC Bioengineering Program is to improve the quality of life for mentally retarded persons, especially severely/profoundly retarded persons, through technology. Program activities consist of adapting currently available assistive devices for use by retarded persons, developing new assistive devices when needed, and consolidating information on the use of technological aids into a technology resource library.

The Center links people with others who share common concerns, sponsors workshops and them physical handicap: and to the people who work with associates of Rosalyn, Virginia, to establish the National Information Center for Handicapped Youth.

The Center provides publications about specific areas of interest, addresses of parent organizations, information about other resources, ideas on how to work with schools and other agencies to create best programs possible, and newsletters which address timely subjects of interest.

Those who may use the services of the Center include parents of children experiencing handicaps, adults who experience handicaps and wish further information about rights and services, and professionals, students and advocates concerned about the needs and rights of persons experiencing handicaps.

For further information, contact National Information Center for Handicapped Children and Youth, P.O. Box 1492, Washington, DC 20013.

The Center provides a computerized database, NISH (National Information Sources on the Handicapped), available through Bibliographic Retrieval Services (BRS). The database contains records of organizations which disseminate information nationally on disability. It is no longer available on the BRS system, but the data is still available in book form.

The Clearinghouse on the Handicapped had developed a computerized database, NISH (National Information Sources on the Handicapped), available through Bibliographic Retrieval Services (BRS). The database contains records of organizations which disseminate information nationally on disability. It is no longer available on the BRS system, but the data is still available in book form.

The Directory of National Information Sources on Handicapping Conditions and Related Services was recently published by the National Information Center for Handicapped Youth and Children.

The U.S. Department of Education has awarded a three-year contract to InterAmerica Research Associates of Rosslyn, Virginia, to establish the National Information Center for Handicapped Youth and Children. The Center sponsors workshops and seminars on collecting and sharing information and ideas which may be helpful to children and youths who experience physical handicaps and to the people who work with them. The Center links people with others who share common concerns, sponsors workshops and publishes newsletters. The Center also disseminates information to rural areas and culturally diverse populations.
SOME LOCAL RESOURCE CENTERS

Also see the list of ABLEDATA System Information Brochures on page 7, as well as the communication service centers on page 208, and seating service centers, page 164.

California

Comprehensive Rehabilitation Center (CRC)
323 North Prairie Avenue
Inglewood, CA 90301
213/673-9090

The CRC is providing a telephone information service for people with disabilities, health professionals and the general community. Access Info is a system providing taped messages on a variety of topics related to disability and rehabilitation. A brochure listing the tapes available on Access Info is available from the Center.

Massachusetts

Independence Associates
693 Bedford Street
Elmwood, MA 02337
617/378-3997

Independence Associates is a good resource for helping solve equipment problems, assisting you with what type of equipment you need and perhaps most importantly advocacy services to deal with funding sources, equipment suppliers, hospital staff, etc. They also have a resource guide, A Survival Handbook for Independent Living Enthusiasts, which includes information on assistive devices.

Michigan

PAM Assistance Centre
601 W Maple
Lansing, MI 48906
517/371-5897

The PAM Assistance Centre is an information clearinghouse and referral service on assistive devices: what products exist, what they do, how much they cost, and where to get them. They also publish a practical newsletter, the PAM Repeater. Individual subscriptions are $5.00/year, organizational subscriptions are $25.00/year.

Missouri

Assistive Device Resource Service
609 Maryland
University of Missouri-Columbia
Columbia, MO 65211
600/392-0533

A primary resource center, serving the State of Missouri, this service provides technical assistance to vocational programs serving handicapped students.

Texas

REHAB TECH (formerly IMPART)
Texas Rehabilitation Commission
Roger Levy, program specialist
118 E Riverside Drive
Austin, TX 78704
512/445-8338

REHAB TECH is an information and referral service. It provides solutions to individual problems in home, education, or vocational settings.

Vermont

Resource Guide for Augmentative Communication and Adaptive Equipment, Ruth Dennis, OTR, and Susan Edelman, RPT. A compilation of resource and service information to facilitate the processes in volved in assessment, purchase, fabrication, training, and repair of equipment, and provide documentation of those resources which are sparse or non-existent in Vermont.

Canada

Disabled Living Resource Centre
Kinsman Rehabilitation Foundation
2256 West 12th Avenue
Vancouver, British Columbia
CANADA
604/736-8841

For information centers with toll free numbers, see the section on TOLL-FREE NUMBERS.
TECHNOLOGY INFORMATION EXCHANGE NETWORKS

Confer

Confer is a new computer telecommunications tool that provides a highly effective medium for people to exchange ideas, resolve problems and discuss plans with others within a social network. Confer users connect their computer terminals by telephone with a central computer at Wayne State University to exchange messages and participate in discussions.

During the last half of 1983, the Blissymbolics Communication Institute has been administering the use of Confer as a trial project to identify some of the uses of computer conferencing as they relate to the international field of augmentative communication. During this trial period, attention has been focused on administrative procedures and the new skills and routines required of users, in order that this new medium's capabilities can be appropriately utilized. The particular conference being administered by BCI is called IPC AC (International Project on Communication Augmentative Communication).

The fee structure and information regarding IPC AC can be obtained by writing to Katherine Seybold, Blissymbolics Communication Institute, 350 Rumsey Road, Toronto, Ontario M4G 1R8. 406/424-3806

HEX (Handicapped Education Exchange)

The Handicapped Education Exchange (HEX) is a computerized bulletin board which is available through the public telephone network. HEX can be reached by dialing 301/593-7033, 24 hours a day. 7 days a week. It is intended as a free service to those involved in the education of, or communications with, the handicapped. For more information, contact Richard Barth, 11523 Charlton Dr., Silver Spring, MD 20902 301/681-7372 (voice)

HEX can be useful to you as:

- A way for the handicapped, and those assisting the handicapped, to make known what sorts of devices they need
- A way for those qualified to provide technical assistance to disabled individuals to find out what they might be doing to help
- A way for those actively involved in designing aids for the disabled to offer suggestions to, and get help from, others who are similarly engaged
- A way for those having products, services, or information of potential use to the handicapped to make known their availability
- A way of disseminating information about organizations and programs useful to the handicapped
- A way of demonstrating the usefulness of computerized bulletin boards to the handicapped

To "talk" to HEX, you will need either an ASCII or Baudot terminal. The ASCII terminal may be either a simple terminal or a computer which is capable of running at a speed of 300 baud, using 8 data bits, no parity and 1 stop bit. It should be equipped with a Bell 103-type modem. Baudot caller should use a standard Telecommunication Device for the Deaf (TDD), also known as a TTY (teletypewriter). HEX is set up so that it can handle an ASCII or Baudot caller; automatically, on the same line

HEX serves as a means of exchanging ideas and information concerning application of technology to aid disabled people. If you have an ASCII or Baudot terminal, dial HEX and take a look at the information already on it. If you have something that you would like to pass along to others in the field, you can easily enter it as a new message.

HEX is operated by AMRAD, the Amateur Radio and Development Corporation. It is funded by a grant from the Office of Special Education, U.S. Department of Education.

SpecialNet

The special education communication information network SpecialNet is part of a large computer network that provides telephone access in over 250 U.S. cities. SpecialNet features electronic mail, topical bulletin boards, and data collection/information management systems. Organizations and individuals subscribing to SpecialNet can communicate via electronic mail. Information transmitted concerns conferences, computers, litigation, RFP, consultants, employment, EDUtech, Congress, opinions and other related topics. A subscription to SpecialNet costs $200 per year plus a charge for actual time connected to the system. To subscribe to SpecialNet, contact National Association of State Directors of Special Education, 1201 Fifteenth Street NW, Suite 404E, Washington, DC 20036

The Prentke Romich Company (PRC) is managing one bulletin board on SpecialNet, ASSISTIVEDEVICE. If you have assistive device announcements in the following areas that you would like posted on the board, please contact PRC by calling, or writing through the electronic mailbox address (user name = PRC). PRC is looking for information on

1. Seminars/workshops regarding the use of assistive devices
2. New product announcements
3. Used assistive devices for sale or purchase
4. New resources/texts/materials regarding assistive devices

A separate item to be developed and posted on the bulletin board will be FUNDING. PRC will post source (i.e., insurance company), address, type of device funded (i.e., communication aid, environmental control system). If you have specific information you would like to share, please contact Prentke Romich Company, 8769 Township Road 513, Shreve, OH 44676, 216/567-2906

For more information on electronic bulletin boards and information exchange networks, see the section on MICROCOMPUTER APPLICATIONS, page 241-242
INFORMATION SERVICES AND RESOURCES

INTERNATIONAL INFORMATION ON TECHNICAL AND INFORMATION SYSTEMS

European Technical Aids Information System

The European Economic Community (EEC) is developing a new technical aids system for disabled persons. Called "Handynet", the system consists of two parts: Handyaids, which lists information on technical aids available in EEC countries and Scandinavia, and Handywho, which carries information on professionals and organizations that develop or provide technical aids in these countries.

Long-range plans include Handysearch, an inventory of research in the field of technical aids, Handycat, information on EEC documents and legislation concerning disabled persons, and Handynews, a service that reports new developments, meetings and conferences on technical aids.

For more information, contact Patrick Daunt, Head, Bureau for Action in Favor of Disabled People, Al 613 200, rue de la Loi, B-1049, Brussels, Belgium.

International Commission on Technical Aids, Housing, and Transportation (ICTA)


Four papers from the 1981 conference in Bellagio, Italy, sponsored by the Rockefeller Foundation.


This book is the proceedings of the First International Conference on Information Systems on Technical Aids for People with Disabilities, held October 4-8 in Bellagio, Italy. An exploration of the best ways to promote international exchange of information on technical aids. There is an international overview of technical aid information systems in Sweden, England, Australia, Germany, Italy, Japan and the U.S. The proceedings also include a resource section listing information, publications and journals on technical aids and services available for individuals who experience handicaps.
THE FEDERAL GOVERNMENT'S INVOLVEMENT IN DISABILITY-RELATED TECHNOLOGY R&D

“The official role of the Federal Government in vocational rehabilitation, prosthetics research, and other disability-related research dates back to the 1930's and 1940's. The presence of the Federal Government as a purchaser of devices and disabled people reaches back even further to the years following the Civil War. Much of the groundwork for the current system of rehabilitation research was laid in the 1940's by the National Academy of Sciences and the armed services in response to the postwar needs of veterans. A large share of the initial research was conducted by the Department of Defense (DOD) and the Veterans Administration (VA) on prosthetic devices, Prosthetics research, along with an expanded focus on other areas of disability-related research, still continues in the VA system. The present-day Rehabilitation Services Administration (RSA) had its beginning as the Office of Vocational Rehabilitation within the then Department of Health, Education, and Welfare (DHEW) in the early 1950's. Since these early efforts, the range and depth of the Federal initiative have expanded markedly. In addition, this area of R&D has steadily gained increased attention and recognition by the Federal Government over the years, though it remains small in comparison to the immensity of the problems involved. The private and nonprofit sectors of our society have also become increasingly involved in disability-related products and services.”

from Technology and the Handicapped, Office of Technology Assessment (OTA), U.S. Congress, Washington, DC, 1982

National Institute of Handicapped Research, Department of Education, 400 Maryland Avenue, SW, Washington, DC

The National Institute of Handicapped Research (NIHR) provides leadership and support for a national and international program of comprehensive and coordinated research regarding the rehabilitation of handicapped persons, and sees that this knowledge is made available to those who can best use it. Developing and applying new technologies to the effort is the main focus of the Institute's Rehabilitation Engineering Centers.

Each center is encouraged to establish official working relationships with institutions of higher learning in medicine, engineering, and related sciences, and to assist in the development of manpower and training programs through which the technique, hardware, and systems development can be introduced safely into the service delivery systems. Duplication of effort is avoided through intercenter coordination. Each center has an approved core of research emphasis and each reflects the needs of major patient populations of the center. In the following list, the respective core area of research, and a brief description of specific focus, is listed beneath each REC.

Current NIHR-Supported Rehabilitation Engineering Programs

CASE WESTERN RESERVE UNIVERSITY SCHOOL OF MEDICINE, Cleveland, OH 44105, 216/444-4500  P Hunter Peckham, Ph D

Functional Electrical Stimulation Research on restoration of neuromusculoskeletal impairment by functional electrical stimulation, closed loop control of electrically stimulated muscles to improve FES orthoses for restoration of hand function, therapeutic applications of FES for management of abnormal muscle contractions in cerebral palsy, biofeedback system for replacement of tactile information in quadriplegic, development of external control logic and percutaneous stimulation systems.

CEREBRAL PALSY RESEARCH FOUNDATION OF KANSAS, INC, PD Box 8217, 2021 N Old Manor, Wichita, KS 67208, 316/688-1881  John F Jonas, Jr., John H Leslie

Work Site Modification Research on worksite modification using technology systems approaches - - to determine whether generalizable principles of design are feasible for neurologically impaired persons, develop taxonomy of performance characteristics, investigate the occupation, significantly physical skills of pre-vocational disabled, develop an Available Motions Inventory, develop determined time standards, investigate use of robotic arm, design interfaces with computer, communication devices, and word processors, develop head wand, make and install toolsing or adaptive devices for production lines in at least three sheltered workshops

DALLAS REHABILITATION FOUNDATION, 7850 Brookhollow Road, Dallas, TX 75235, 817/273-2249, 214/637-0740  Raymond Dabney, Alfred R Potvin

Quantification of Human Performance Research on an improved method of quantification of human performance, refinement expansion, clinical evaluation, and commercialization of the sensory and motor function


Evaluation of Technology & Stimulation of Industry foster a commercialization process to lead to increased availability of assistive devices for handicapped, stimulation of industry to participate in production, marketing and distribution of devices, developing criteria for selection of devices for testing, development of evaluation protocol

GALLAUDET COLLEGE Division of Research, 400 Florida Avenue NE, Washington, DC 20002, 202/551-5440  Raymond J Trybus, Ph D

Sensory Aids for Deaf and Hearing Impaired research into the various technologies for the deaf
Transportation of the Handicapped -- Personal

415/563-2323. Arthur Jampolsky, MD, John Br3byn

Rehabilitation in lower back pain

802/858-4831. John W. Frymoyer, M D

UNIVERSITY OF VERMONT, Burlington, VT 05405

Licensed Vehicles

LA 71272. 318/257-4582 Duane F Bruley, Ph D.

LOUISIANA TECH UNIVERSITY, PO Box 10348, Ruston, 17

TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK

evaluation of sensory aids for blind and deaf

Sensory Aids -- Blind and Deaf Development ani

2232 Webster Street, San Francisco, CA 94115

SMITH-KETTLEWELL INSTITUTE OF VISUAL SCIENCES,

FES, acute and extremities, corre'tion of spinal deformities by

implanted into body to activate muscles in lower

stimulation and biofeedback, multichannel FES

improved methods of gait training and upper ex-

niques of functional electrical stimulation,

Functional Electrical Stimulation: In proved tech

niques of functional electrical stimulation, improved methods of gait training and upper ex

tem red rehab through application of electrical

stimulation and biofeedback, multichannel FES

implanted into body to activate muscles in lower extremes, correction of spinal deformities by

FES, acute and chronic FES for incontinence con

control, effects of stimulus wave form and electrodes on comfort during controlled motor contraction

Louisiana tech university, P O Box 10348, Ruston, LA 71272. 318/257-4582 Duane F Bruley, Ph D.

Transportation of the Handicapped -- Personal

Licensed Vehicles

university of vermont, Burlington, VT 05405

802/856-4831. John W. Frymoyer, M D

Rehabilitation in lower back pain

Smith-Kettlewell Institute of Visual Sciences,

2232 Webster Street, San Francisco, CA 94115

415/563-2323. Arthur Jampolsky, MD, John Br3byn

Sensory Aids -- Blind and Deaf Development and evaluation of sensory aids for blind and deaf

HARVARD-MIT, Children's Hospital Medical Center,

300 Longwood Avenue, Boston, MA 02115. 617/735-6594. William Berenberg, M.D.

Quantification of Human Performance: Research on improved method of quantification of human perfor

mance; improved methods of quantification of performance by assessing changes in range of mo

tion; strength and segmental mobility of the spine; quantitative measures for monitoring ef

fects of intervention strategies for treatment of arthritic condition

THE LEXINGTON CENTER, INC. Rehabilitation Engineering Center, 30th Avenue and 75th Street,

Jackson Heights, NY 11370 Alan Lerman, Ph D

New Generation Hearing Aids

NORTHWESTERN UNIVERSITY, 345 E Superior St.

Chicago, IL 60611, 312/649-8560 Dudley Childress

Prosthetics & Orthotics development of durable, modular and inexpensive myoelectric prehension devices for amputees, artificial arms, limb extens

ion mechanisms; rigid knee amputation; design and development of knee orthoses, prehensile terminal handpointers, microprocessor-based powered wheelchairs and environmental control units, joint replacement-hip prostheses, knee replacements

RANCHO LOS AMIGOS HOSPITAL, 7601 East Imperial Highway, Downey, CA 90242, 213/922-7167 Robert "Waters, Donald McNeal

Communication Systems: development of system to apply current and emerging technologies for the alleviation and solution of prob

lems caused by deafness, ranging from mild to profound hearing loss. The major focus is on the difficulties in speech communication between deafened and hearing persons.

HARVARD-MIT, Children's Hospital Medical Center,

300 Longwood Avenue, Boston, MA 02115. 617/735-6594. William Berenberg, M.D.

Evaluation of Technology & Stimulation of industry evaluation of product performance through development of standards, user tests of suitab

ility, and clinical evaluation of effectiveness, dissemination of information through publication, computer data files, and educational curricula

TRACE CENTER, University of Wisconsin, 314 Weismann Center, 1500 Highland Avenue, Madison, WI 53706, 608/262-6966 Gregg C Vanderheiden.

Communication Systems: Research on access to communication, control, and information processing systems; develop quantitative measures of pro

gress, determine state-of-the-art devices for non-vocal persons, study characteristics of target population and process of augmentative communication, quantitative measures of minimum functional levels, determine whether technology can facilitate language therapy or processing; increase rate of control with aios, develop interfaces for extremely motor-impaired individuals

TUFTS UNIVERSITY, Tufts New England Medical Center, Department of Rehabilitation Medicine, Box 1014, 171 Harrison Avenue, Boston, MA 02111. 617/956-5036 Richard Foulds

Communication Systems -- develop visual line of gaze communication system, develop second generation oculometer, system with videocamera, process

ing electronic and microcomputers using corneal reflection-pupil center method, ocular interface for commercial microcomputers, test use of propor

tional control, examine single fingergend typing, technique for generating unit sets for single-switch aids

UNIVERSITY OF MINNESOTA, Department of Physical Medicine and Rehabilitation, c/o ORA, 1919 University Avenue, St Paul, MN 55455, 612/373-8990 G Gullickson, M D, R Patterson, Ph D

Quantification of Human Performance improved methods of quantification of performance by assessing changes in range of motion, strength and segmen

tal mobility of the spine, quantitative measures for monitoring effects of intervention strategies for treatment of arthritic condition

UNIVERSITY OF VIRGINIA MEDICAL CENTER, Department of Orthopedics & Rehabilitation, P 0 Box 209/UVA, Charlottesville, VA 22908, 804/977-6730 Col

McLaurin

Wheelchairs Improved wheelchair systems and specialized seating, research on human factors in propulsion; seating and body support, analysis and design of structural components and systems for wheelchairs, power system

INFORMATION SERVICES AND RESOURCES

SOUTHWEST RESEARCH INSTITUTE, Electronic Systems Division, P O Drawer 28510, 6220 Culebra Rd, San Antonio, TX 78284, 512/854-5111 Sam McFarland
INFORMATION SERVICES AND RESOURCES

International

REHABILITATION INSTITUTE, Linhartova 51, Ljubljana, Yugoslavia Aloz Kraj

Functional Electrical Stimulation: enhancement of applicability of FES devices and therapies of paralytic patients, FES of spinal cord injured patients, restoration of locomotion, quantification of effects of electrical stimulation in patients with urinary disorders.

NIHR also funds a number of other rehabilitation research and training centers which can provide information on disability-related technology

CARROLL CENTER FOR THE BLIND, 770 Centre St., Newton, MA 02155, 617/969-6200 Rachel E. Rosenbaum.

Aids and Appliances Review a journal concerned with blindness and low-vision rehabilitation

HUMAN RESOURCES CENTER, 1 U. Willets Road, Albertson, NY 11507, 516/747-5400 Jack Victor, Ph.D.

Research on Employability of Handicapped Individuals

INSTITUTE FOR INFORMATION STUDIES, 200 Little Falls Street, Suite 404, Falls Church, VA 22046, 703/523-0383. Elizabeth Pan, Ph.D.

REHAB BRIEF publication issued monthly summarizes findings of NIHR research and disseminates it to 30,000 users.

MISSISSIPPI STATE UNIVERSITY, P.O Drawer LQ, Mississippi State, MS 39762, 601/325-2001 William H. Graves, Ph.D.

Rural Independent Living Skills and Services


Interagency Agreement with USIA PATH Americas Program, focuses on needs of handicapped children and adults in the Americas

NATIONAL REHABILITATION INFORMATION CENTER (NARIC), Catholic University of America, 4407 Eighth Street NE, Washington, DC 20017, 202/635-5822. Susan Flowers. See page 10.

PENNSYLVANIA COLLEGE OF OPTOMETRY, Office of Academic Development, 1200 W. Godfrey Avenue, Philadelphia, PA 19141, 215/424-5900 Laura Edwards

Orientation of Mobility Research for Persons with Low Vision

REHABILITATION INTERNATIONAL -- USA, 1123 Broadway, New York, NY 10C10, 212/620-4040 Philip Pulseo, Ph.D.

RIUSHARE Program to upgrade utilization of innovations and information from international rehabilitation

STOUT VOCATIONAL REHABILITATION INSTITUTE, University of Wisconsin/Stout, Menomonie, WI 54751, 715/232-1464 Daniel C. McAlees

Research on Sheltered Transitional Employment

UNIVERSITY CENTER FOR INTERNATIONAL REHABILITATION, 513 Erickson Hall, Michigan State University, East Lansing, MI 48824, 517/355-1824 William Frey, Ph.D.

International Research Information and Training Center

UNIVERSITY OF ARKANSAS, Board of Trustees, Fayetteville Campus, Fayetteville, AR 72701, 501/371-1654 Douglas Watson, Ph.D.

Improving Vocational Rehabilitation in Post-secondary Education Programs for Deaf Individuals

WORLD REHABILITATION FUND, INC., 400 E. 34th Street, New York, NY 10016, 212/679-2934 Diane Woods

International Exchange of Experts and Information in Rehabilitation

Other Rehabilitation Engineering Programs

These programs have in the past received support from NIHR, most have continued R&D work in their specialty areas

CHILDREN'S HOSPITAL AT STANFORD, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA 94304, 415/327-4800 Maurice A. LeBlanc

Controls and interfaces

INSTITUTE OF REHABILITATION MEDICINE, New York University, 400 E. 34th Street, New York, NY 10016, 212/340-6015 Joseph Goodgold

Evaluation of Functional Performance of Devices for Severely Disabled Individuals

TEXAS INSTITUTE FOR REHABILITATION AND RESEARCH, 1333 Moursund Avenue, Houston, TX 77030, 713/797-1440 Thomas A. Krouskop

Effects of pressure on tissue

THE UNIVERSITY OF IOWA, Carver Pavilion, Iowa City, IA 52242, 319/356-3470 R. R. Cooper, Richard A. Brand, Y. King Liu

Low Back Pain

THE UNIVERSITY OF MICHIGAN, 532 S Stadium Hall, Ann Arbor, MI 48109, 313/763-6632 J. Raymond Pearson

Automotive Transportation for the Handicapped

UNIVERSITY OF TENNESSEE, 532 S. Stadium Hall, Knoxville, TN 37916, Carl Asp, Ph.D.

Hearing aids

UNIVERSITY OF TENNESSEE, Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163, 901/528-6445 Douglas Hobson

Aids for Handicapped Children

INSTITUTE OF ORTHOPEDIC SURGERY AND REHABILITATION, Academy of Medicine, Dzierzynskiego 135, 61 545 Poznan, Poland A. Senger

Upper extremity disabilities

39
Veterans Administration

VA has been involved in disability-related technology research since the late 1940's. For many years, VA was the primary supporter of federally sponsored research in this area, especially in the field of prosthetics research. In the last few years, VA has expanded its disability-related research focus to include a broader range of areas. The establishment of the Rehabilitation Engineering Research and Development (RER&D) program is the VA's response to the increased research and service needs of the veteran population and of disabled people in general.

REHABILITATION RESEARCH & DEVELOPMENT, Central Office, Veterans Administration Central Office, 810 Vermont Avenue, Washington, DC 20420, 202/389-5147

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Decatur Veterans Administration Hospital, 1670 Claremont Road, Decatur, GA 30033, 404/321-6111

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Hines Veterans Administration Hospital, Rox 20, Hines, IL 60141, 312/343-7200

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Palo Alto Veterans Administration Hospital, Mail Stop 153, Palo Alto, CA 415/493-5000, x 5464

Office of Special Education (OSE), Department of Education, 400 Maryland Avenue, SW, Washington, DC

OSE is the third largest Federal supporter of disability-related research, and the largest in the area of educationally related efforts.

Other Federal Agencies

NASA and NSF are also involved in hardware-oriented research in this area.

National Science Foundation (NSF), 1800 G Street, Washington, DC 20202

NASA Technology Utilization Office, Rehabilitation Programs, 400 Maryland Avenue SW, Washington, DC 20546, 202/755-3720

NASA has been involved in transferring technology and information gained from its bioengineering efforts, as well as its general research efforts, to the health care sector since the late 1960's. Biomedical applications teams attempt to identify and interpret national trends in medicine as well as technology-related problems in health-care delivery, and develop potential solutions to these problems through the use of aerospace technology.

REHABILITATION RESEARCH & DEVELOPMENT, Central Office, Veterans Administration Central Office, 810 Vermont Avenue, Washington, DC 20420, 202/389-5147

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Decatur Veterans Administration Hospital, 1670 Claremont Road, Decatur, GA 30033, 404/321-6111

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Hines Veterans Administration Hospital, Rox 20, Hines, IL 60141, 312/343-7200

REHABILITATION RESEARCH & DEVELOPMENT CENTER, Palo Alto Veterans Administration Hospital, Mail Stop 153, Palo Alto, CA 415/493-5000, x 5464

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INFORMATION SERVICES AND RESOURCES

Another mechanism that NHR and other Federal agencies involved in this area use is the Interagency Committee on Rehabilitation Engineering.

This working group is composed of representatives from the National Science Foundation, the National Council on the Handicapped, the National Bureau of Standards, the National Aeronautics & Space Administration, the Veterans Administration, the National Institute of Handicapped Research, the Department of Health and Human Services, the Department of Transportation, the National Institute of Neurological and Communicative Disorders and Stroke, and the Senate Committee on Labor and Human Relations. This Interagency Committee was instrumental in the development of NHR's Long-Range plan.

The Private Sector Role in Disability-Related Research

"It is difficult to characterize the 'private sector' involvement in disability-related research. The private sector may mean a large, multi-national, multi-product, billion-dollar-a year company like the Johnson & Johnson Corp, or it may mean a small, single-product firm like Amigo Sales Co, or possibly a private nonprofit organization such as the Cystic Fibrosis Foundation or Muscular Dystrophy Association. These diverse organizations provide a wide variety of products and services to disabled people. However, each is quite different from the others in terms of priorities, resources, and function. Manufacturers of health-related devices that specifically serve disabled people are frequently referred to as part of the medical device industry. In addition, there are thousands of agencies that derive their funds from charity or provide philanthropic services, these may be foundations, service organizations, funds, or associations. The medical device industry and charitable foundations and related organizations are both extremely diverse groups that exist to serve an equally diverse 'market'."

Technology and the Handicapped, OTA, 1982

More information on federally funded R&D efforts can be found in the publications listed in the Public Policy section of FUNDING, MODELS, POLICY, STATISTICS, page 261, in this Sourcebook. "Research and Development," Chapter 6 of Technology and Handicapped People, Office of Technology Assessment (OTA), US Congress, 1982, provides a good overview of the process and players.
LOCATING R&D PROJECTS

AAAS Project on the Handicapped in Science. 1776 Massachusetts Avenue NW, Washington, DC 20036; 202/487-4496 (voice or TTY). The American Association for the Advancement of Science (AAAS) Project on the Handicapped in Science is beginning a new program, funded by the National Science Foundation, to bridge the gap between the researchers and developers of technologies and the disabled people who are potential users of the technologies. As a first step, the project will review completed and ongoing research and development work to aid handicapped persons. This will include identifying research projects funded by NSF and other federal agencies, searching scientific literature to locate other disability-related R&D projects, and organizing information from disabled user groups and individuals. The Project on the Handicapped in Science hopes to call attention to the field of disability research and to expand the benefits it offers to disabled individuals by more widely involving the scientific and engineering community in disability research, including disabled individuals in the R&D process, and increasing the public's awareness of these issues. The project will be directed by Martha Ross Redden and Virginia Stern.

Technology R&D Publications

Journal of Rehabilitation R&D, formerly the Bulletin of Prosthetics Research. Sheldon Todd, Ed. Address correspondence to Office of Technology Transfer (153D), 252 Seventh Avenue, New York, NY 10001. Quarterly journal on rehabilitation engineering research & development. One issue each year will be devoted to progress reports for all VA Rehab R&D projects, as well as reports from other Federal Agencies such as the National Institute on Handicapped Research, the National Institutes of Health, and from other domestic and foreign research scientists.

Rehabilitation Engineering Society of North America, Proceedings from the Annual Conferences on Rehabilitation Engineering. Available from RESNA, Suite 402, 4405 West Highway, Bethesda, MD 20814. The annual compilation of the scientific papers presented at the yearly rehabilitation technology conference.

Reports from the federally-funded projects listed in this section can be obtained from the individual centers, or from the National Rehabilitation Information Center (NARIC). See Information Resources, page 10.

Reports on international R&D projects can be obtained through projects such as UCIR, RIUSA, World Rehabilitation Fund, all listed under NIH-supported projects.
TOLL-FREE NUMBERS RELATED TO PRODUCTS FOR DISABLED PEOPLE

800 telephone numbers are nothing new, but you might be surprised by how many companies have them. Expert advice on choosing or using a device may be only a call away. And because it's free, it's worth a try.

By dialing (800) 555-1212, you can find out if a manufacturer has a toll-free number. Or if you want more than 35,000 toll-free numbers listed both by company and category, write to Toll-Free Digest, Box 800, Claverack, NY 12513 or call (800) 447-4700 to order the 480-page book. It costs $10.95 plus $2 shipping.

Except where noted, use 800 number only outside the respective state.

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<tr>
<th>Company Name</th>
<th>City, State</th>
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<tr>
<td>A-BEC</td>
<td>Torrance, CA</td>
<td>800/421-2269</td>
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<td></td>
<td></td>
<td>800/262-1331 in California</td>
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<td>Abest</td>
<td>Newton, USA</td>
<td>800/831-Newton</td>
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<tr>
<td>Abbey Medical, Inc</td>
<td>Hawthorne, CA</td>
<td>800/421-5186</td>
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<td>Subsidiary American Hospital Supply Corp</td>
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<td>800/942-9255</td>
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<td></td>
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<td>800/323-9067 in Illinois</td>
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<td>Active Aid</td>
<td>Redwood Falls, MN</td>
<td>800/533-5330</td>
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<td>Aerocuticals Health Care Products</td>
<td>Southport, CT</td>
<td>800/243-9876</td>
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<td>Ajay</td>
<td>Delavan, WI</td>
<td>800/555-3276</td>
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<tr>
<td>Alimed, Inc</td>
<td>Boston, MA</td>
<td>800/225-0211</td>
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<td>Allied Healthcare Products, Inc</td>
<td>St Louis, MO</td>
<td>800/325-3890</td>
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<td>Chemetron Medical Division</td>
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<td>Alpha Unlimited</td>
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<td>800/237-6836</td>
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<tr>
<td>AMEREC Corporation</td>
<td>Bellevue, WA</td>
<td>800/426-0858</td>
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<tr>
<td>American Health Sciences</td>
<td>Phoenix, AZ</td>
<td>800/528-0181</td>
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<tr>
<td>Amigo Sales, Inc.</td>
<td>Bridgeport, MI</td>
<td>800/248-9130</td>
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<td>Aquatherm Products Corp</td>
<td>Rahway, NJ</td>
<td>800/526-4296</td>
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<tr>
<td>Ascher Surgical Supplies, Inc</td>
<td>Philadelphia, PA</td>
<td>800/523-1300</td>
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<tr>
<td>B&amp;D Drake Willock</td>
<td>Portland, OR</td>
<td>800/547-5534</td>
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<td>B&amp;F Medical Products, Inc</td>
<td>Toledo, OH</td>
<td>800/537-3419</td>
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<tr>
<td>Ballert Orthopedic Corp</td>
<td>Chicago, IL</td>
<td>800/345-3456</td>
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<tr>
<td>Banyan International Corp</td>
<td>Abilene, TX</td>
<td>800/351-4530</td>
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<tr>
<td>Battle Creek Equipment Co</td>
<td>Battle Creek, MI</td>
<td>800/253-0854</td>
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<td>Be Mar Surgical Supply Co</td>
<td>Centerport, NY</td>
<td>800/645-5322</td>
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<td>Bell-Horn</td>
<td>Philadelphia, PA</td>
<td>800/523-4510</td>
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<td>Bio Clinic Co.</td>
<td>San Bernardino, CA</td>
<td>800/854-2369</td>
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<td>Biosearch Medical Products, Inc</td>
<td>Somerville, NJ</td>
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<td>Biomega Corp</td>
<td>Gainesville, FL</td>
<td>800/874-7878</td>
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<td>Biostim, Inc</td>
<td>Princeton, NJ</td>
<td>800/257-5184</td>
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<tr>
<td>Otsuka America</td>
<td>Minneapolis, MN</td>
<td>800/328-4058</td>
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<tr>
<td>Borg Textile Corp</td>
<td>Chicago, IL</td>
<td>800/241-8992</td>
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<td>EF Brewer Co</td>
<td>Menomonee Falls, WI</td>
<td>800/558-8777</td>
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<td>Brix Technologies, Inc</td>
<td>Worcester, MA</td>
<td>800/225-7496</td>
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<td>John Bunn Co.</td>
<td>Tonawanda, NY</td>
<td>800/828-7331</td>
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<td>The Burdick Corporation</td>
<td>Milton, WI</td>
<td>800/356-0711</td>
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<tr>
<td>Canyon Products</td>
<td>Simi Valley, CA</td>
<td>800/221-5499</td>
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<td>Carrom Health Care Products</td>
<td>Mary Hvts, MO</td>
<td>800/325-4004</td>
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<td>Cheesebrough Pond's Inc</td>
<td>Greenwich, CT</td>
<td>800/245-5320</td>
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<tr>
<td>Cleo Living Aids</td>
<td>Cleveland, OH</td>
<td>800/321-0595</td>
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<td>Brookline, MA</td>
<td>800/225-9180</td>
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<td>Guilford, CT</td>
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<td>Colson Equipment, Inc</td>
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<td>Conco Medical Co</td>
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<td>Stockton, CA</td>
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<td>800/892-3453 CA only</td>
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<td>Convacare, Inc.</td>
<td>Raleigh, NC</td>
<td>800/882-8735</td>
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<td>Creative Rehabilitation</td>
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<td></td>
<td>Portland, OR</td>
<td>800/547-4811</td>
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<td>Crow River</td>
<td>Wayzata, MN</td>
<td>800/328-3632</td>
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<td>Cryo-2</td>
<td>Fort Pierce, FL</td>
<td>800/327-0313</td>
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<td>Cyborg Corp.</td>
<td>Newton, MA</td>
<td>800/343-4494</td>
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<td>DMic Systems, Inc.</td>
<td>Temple Terrace, FL</td>
<td>800/237-9023</td>
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<td>800/343-3980</td>
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<td>Mason, MI</td>
<td>800/248-9618</td>
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<td>Desemo</td>
<td>Savannah, GA</td>
<td>800/342-7661</td>
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<tr>
<td>Detecto Scale Co</td>
<td>Great Neck, NY</td>
<td>800/845-6524</td>
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<td>Dillon Manufacturing Co</td>
<td>Norcross, GA</td>
<td>800/241-7492</td>
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<td>Dixie USA, Inc.</td>
<td>Houston, TX</td>
<td>600/231-6230</td>
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<td>Don Joy Orthopedic</td>
<td>Carlsbad, CA</td>
<td>800/338-6569</td>
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<td>Donley Battery Co</td>
<td>Los Angeles, CA</td>
<td>800/423-3934</td>
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<td>DRILpride</td>
<td>Div. of Weyerhauser Co</td>
<td>Fremont, MI</td>
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<td>800/253-3078</td>
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<td>Duro-Med Industries, Inc</td>
<td>Hackensack, NJ</td>
<td>800/526-4753</td>
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<tr>
<td>Elmer's Weights, Inc</td>
<td>Lubbock, TX</td>
<td>800/858-4568</td>
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<td>EMPI, Inc.</td>
<td>Fridley, MN</td>
<td>800/328-2536</td>
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<td>Lake Forest, IL</td>
<td>800/323-9790</td>
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<td>Cyborg Corp.</td>
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<td>John B Flannery Co</td>
<td>Bronx, NY</td>
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<td>800/252-0500 CA only</td>
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<tr>
<td>Freeman Manufacturing Co</td>
<td>Sturgis, MI</td>
<td>800/253-2091</td>
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<td>800/632-2015 MI only</td>
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<td>Fronock-Stewart, Inc</td>
<td>Northboro, MA</td>
<td>800/243-6059</td>
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<tr>
<td>G.-MBRO, Inc</td>
<td>Barrington, IL</td>
<td>800/323-4156</td>
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<tr>
<td>Gaymar Industries, Inc</td>
<td>Orchard Park, NY</td>
<td>800/828-7341</td>
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<td>Genac Incorporated</td>
<td>see Theradyne</td>
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<td>Gendron, Inc</td>
<td>Archbold, OH</td>
<td>800/537-2521</td>
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<tr>
<td>George Clove Co., Inc</td>
<td>Englewood, NJ</td>
<td>800/631-4292</td>
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<tr>
<td>Gottfried Medical, Inc</td>
<td>Toledo, OH</td>
<td>800/537-1968</td>
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<tr>
<td>Graham-Field Surgical Co, Inc</td>
<td>New Hyde Park, NY</td>
<td>800/645-8176</td>
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<tr>
<td>Grant Airmass Corp</td>
<td>Stamford, CT</td>
<td>800/243-5237</td>
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<tr>
<td>Harvy Surgical Supply Corp</td>
<td>Flushing, NY</td>
<td>800/221-0142</td>
</tr>
<tr>
<td>Housesmann Industries, Inc</td>
<td>Northvale, NJ</td>
<td>800/525-689</td>
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<tr>
<td>Heelbo, Inc</td>
<td>Niles, IL</td>
<td>800/323-5444</td>
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<tr>
<td>Her-Mar Inc</td>
<td>Miami Beach, FL</td>
<td>800/327-8209</td>
</tr>
<tr>
<td>Human Restraint Co., Inc</td>
<td>Madison, WI</td>
<td>800/356-7472</td>
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<tr>
<td>Humanicare International, Inc</td>
<td>East Brunswick, NJ</td>
<td>800/631-6270</td>
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<tr>
<td>The Hunteleigh Group, Inc</td>
<td>New York, NY</td>
<td>800/223-1218</td>
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<tr>
<td>The Independence Chair Co, Inc</td>
<td>Waukesha, WI</td>
<td>800/558-2151</td>
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<tr>
<td>Inmed Corp</td>
<td>Norcross, GA</td>
<td>800/241-1926</td>
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<tr>
<td>Intec Medical, Inc</td>
<td>Blue Springs, MO</td>
<td>800/821-8598</td>
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<tr>
<td>Intermed Inc</td>
<td>Sparta, NJ</td>
<td>800/631-3689</td>
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<tr>
<td>Invacare Corporation</td>
<td>Elyria, OH</td>
<td>800/321-5715</td>
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<td>800/362-7415 OH only</td>
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<tr>
<td>Jefferson Industries, Inc</td>
<td>Princeton, NJ</td>
<td>800/257-5145</td>
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</tbody>
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Except where noted, use 800 number only outside the respective state.

Johnson & Johnson Products, Inc
Patient Care Division
New Brunswick, NJ
800/526-2459

Jordan Plastics Corporation
PLASTA-MEDIC
Carson, CA
800/421-5536

LaJolla Technology, Inc
San Diego, CA
800/854-1915

Labtron Scientific Corporation
Hauppauge, NY
800/645-9066

Lattoflex International
Hudson, NY
800/341-1522

Lec Tec Corp
Eden Prairie, MN
800/328-6276

Leisure L'it Chairs
Kansas City, KS
800/255-4147

LifeLine Systems
Massachusetts
800/343-4632

Lossing Orthopedic
Minneapolis, MN
800/328-5216

Lotus Health Care Products
Naugatuck, CT
800/243-2362

Lumen
Bay Shore, NY
800/645-5272

The Lumiscope Co., Inc
Edison, NJ
800/221-5726
800/221-5747

MGI Strength/Fitness Systems Inc
Independence, MO
800/821-3126

Maclaren
New York
800/233-1224

MacLevy Products Corp
Elmhurst, NY
800/221-0277

Made Medical Products, Inc
Carlstadt, NJ
800/526-6370

Marathon Medical Equipment
Denver, CO
800/525-0654

Mercy Fitness Products
Alhambra, CA
800/423-3920

Mark One Healthcare Products, Inc
a member of the Seton Group
Philadelphia, PA
800/523-3660

Medela, Inc
Crystal Lake, IL
800/435-9316

MEDFURN Systems
Flushing, NY
800/847-4018

Med Inc
Holbrook, 12640, 30590, MA
800/225-8634

Medical Devices, Inc
St. Paul, MN
800/328-0875

Medical Devices International Corp
Waukegan, IL
800/323-9035

Medical Specifics
Dallas, TX
800/448-4511 x 304
800/962-1480 x 304 NY only

Medpro, Inc
East Brunswick, NJ
800/526-0988 x 121

Medtek Corporation
Princeton, NJ
800/257-5103

Medtronic Neuro Division
Minneapolis, MN
800/328-0810

Minnetonka, Inc
Minnetonka, MN
800/328-5927
800/328-5926

Mistogen Equipment Co
Oakland, CA
800/227-0925

Mobil-ity Plus
Santa Paula, CA
800/325-7397

Mobilizer Medical Products
Mount Vernon, NY
800/431-1720

Mor-Loc Corporation
Claremont, NC
800/438-9201

Motion Designs
Clovis, CA
800/888-2827
800/888-2837

Mountain Medical Equipment, Inc
Littleton, CO
800/525-8950

Mulholland
see Mobility Plus

John Nageldinger & Son, Inc.
Westbury, NY
800/645-3496

NARCO Scientific, Air Shields Division
Halboro, PA
800/523-5756

National Wheel-O-Vator, Inc
Patterson, LA
800/551-9095

Neuromedics, Inc.
Clute, TX
800/231-2330
800/392-3726 TX only

Newton, USA
Rochester, NY
800/828-6284

Nissen Corp
Cedar Rapids, IA
800/553-7901

OTC Professional Appliances
Cincinnati, OH
800/543-0458

Ortho Corporation
Costa Mesa, CA
800/854-6900

Ortho-Med, Inc
Portland, OR
800/547-5571

Otto Bock
Minneapolis, MN
800/328-4058

OWL Biomedical
Charlotte, NC
800/828-1186

Oxygen Enrichment Company, Ltd.
Schenectady, NY
800/833-4751

PCP-Champion
Rickey, OH
800/543-0458

Palmer Industries
Endicott, NY
800/847-1304

Parke Davis & Co
Med/Surg Division
see Professional Medical Products
Except where noted, use 800 number only outside the respective state.

Parker Laboratories, Inc
Orange, NJ
800/831-8888

Polychem Corporation
New Haven, CT
800/243-3093

J.T. Posey Co
Arcadia, CA
800/423-4292

Posture Support Mfg., Inc
Salon, OH
800/321-6870

J.A. Preston Co
Clifton, NJ
800/631-7277
800/221-2425

The Procter & Gamble Co
Cincinnati, OH
800/543-0400
800/582-0313 OH only

Professional Medical Products, Inc
Greenwood, SC
800/845-4560

Pryor Products
Salina Beach, CA
800/854-2280

PyMaH Corp
Somervilee, NJ
800/526-3538

Quadra
Westwood, CT
800/824-1068

Renal Systems, Inc
Minneapolis, MN
800/328-3324

Respromics, Inc
Monroeville, PA
800/245-2767

Rockford Medical & Safety Co
Rockford, IL
800/825-9451
800/892-9435 IL only

KOHO Research & Development, Inc
East St Louis, IL
800/851-3449

Rolyan Medical Products
Menomonee Falls, WI
800/858-8633

Murray Salt, Inc.
Allston, MA
800/343-4497

Salt Lab
Arvin, CA
800/235-4203

Salton Inc
Bronx, NY
800/221-8794

Schuco
div American Caduceus Industries
Williston Park, NJ
800/645-2500

Science Products
(formerly Science for the Blind Products)
Southeastern, PA
800/233-3121
800/222-2148 (PA only)

Sci-o-Tech
Lancaster, PA
800/233-0291

Shugerman Surgical Supply
Toledo, OH
800/537-8918

Skilled Development Equipment Co
Anaheim, CA
800/854-6085

Smith & Davis Mfg Co
St Louis, MO
800/325-9512

Solo
see Mobility Plus

Spenco Medical Corp
Waco, TX
800/433-3334

St Louis Ostomy & Medical Supply
St Louis, MO
800/325-0979

Stand Aid of Iowa, Inc
Sheldon, IA
800/831-8580

Staedynamics, Inc
Longmont, CO
800/525-2114

Stryker Corp
Kalamazoo, MI
800/253-3210

Sween Corp
Lake Crystal, MN
800/533-0464

Temco Healthcare Industries, Inc
Passaic, NJ
800/831-0170

Texas Instruments
800/858-1802

Theradyne Corporation
Lakeville, MN
800/328-1014

Thompson-Blair
St Louis, MO
800/325-0877

Timeter Instrument Corp
Lancaster, PA
800/233-0258

Toce Brothers Mfg., Ltd
Eroussard, LA
800/862-8158

Tubular Fabricators Industry, Inc
Passaic, NJ
800/526-0178

Ulster Scientific, Inc
Highland, NY
800/431-8233

Uni-Path, Inc
Webasha MN
800/328-9454

Union Carbide Medical Products & Distribution Center
Memphis, TN
800/238-5055

Urocare Products, Inc
South El Monte, CA
800/423-4441

Vacumed, Inc
Ventura, CA
800/235-7

Veratex Corporation
Troy, MI
800/521-2470

Vix Breathing Equipment
Jamestown, CA
209/984-5212 collect

Western Enterprises
Avon Lake, OH
800/321-4148

Whitestone Products
Piccataway, NJ
800/526-3567

Wright & Filippis, Inc
Drayton Plains, MI
800/482-0222 MI only
The National Health Information Clearinghouse publication "Healthfinder" lists toll-free numbers for health information. Some of the numbers which may be relevant to products for disabled people include:

Alzheimer's Disease and Related Disorders Assn
800/621-0379
800/572-6037 IL only

Cancer Information Service (CIS)
800/4-CANCER

Children's Defense Fund
800/424-9602
202/483-1470 Washington, DC only

Shriners Hospital Referral Line
800/237-5055
800/282-9161 FL only

National Down Syndrome Society Hotline
800/221-4602
212/784-3070 NY only

Epilepsy Information Line
800/426-0660
206/323-8174 WA only

Library of Congress National Library Services for the Blind and Physically Handicapped
800/424-8567
202/287-5100 Washington, DC only

National Health Information Clearinghouse
800/336-4797
Provides an information and referral service designed to bring together consumers and health information resources. A service of the Office of Disease Prevention and Health Promotion, U.S. Department of Health and Human Services

National Hearing Aid Hotline
800/521-5247
313/478-2610 MI only
Provides information on hearing aids and distributes a directory of hearing aid specialists certified by the National Hearing Aid Society

Hill-Burton Hospital Free Care Program
800/428-0742
800/492-0359 MD only
Provides information on hospitals participating in the Hill-Burton Hospital Free Care Program.

Federal Internal Revenue Service for TDD Users
800/428-4732
800/382-4059 IN only
Answers questions on Federal income tax, including questions on medical deductions for the cost of telecommunications devices for the deaf (TDDs), hearing aids, trained hearing-ear dogs, and sending deaf children to special schools. Accepts orders for the free publication "Tax Information for Handicapped and Disabled Individuals" and other free IRS publications.

Medicare/Medicaid Complaint Line
800/368-5779
202/472-4222 Washington, DC area
Handles complaints regarding the fraud, waste and abuse of Medicare and Medicaid. Assists people who have been overbilled for services or billed for services not rendered

Practitioner Reporting System
800/638-5725
Offers a service for health professionals to report problems with drugs or medical devices. A service of the Food and Drug Administration, U.S. Department of Health and Human Services.

Consumer Product Safety Commission
800/638-CPSN
Answers questions and provides free material on different aspects of consumer product safety, including product hazards, product defects, and injuries sustained as a result of using products.

Spina Bifida Information and Referral
800/621-3141
**CONSUMER PROTECTION**

**BUYER BEWARE -- SHOPPING FOR ADAPTIVE DEVICES**

"Technology advances in recent years have created a multitude of aids for disabled people -- aids that have opened up doors of employment and independence. But these aids are expensive, and sometimes have bugs which have not been ferreted out. Individuals and agency representatives need to exercise caution when purchasing expensive, new equipment.

**Will It Solve the Problem?** "Before deciding on a particular device, make sure it will solve the problem. Identify the tasks the equipment will solve and then thoroughly question vendors to assure that their device can handle those tasks...."

**Get Promises in Writing** "Before committing several thousand dollars to a particular vendor, insist on a demonstration. Do not buy a piece of equipment based on a brochure. If an aid appears suitable, but a demonstration isn't possible, make sure the device can be returned with a full refund. Any reputable vendor will agree to this, but get the agreement in writing. A verbal promise of a device's capability and capabilities, or the vendor's capabilities, is no promise. Always save correspondence, letters of agreement and technical information.

**Service and Reliability** "When considering any device, check it out for service and reliability. Ask to talk to satisfied customers using the equipment. In a similar application, if a vendor is unwilling to supply customer references, there may be a good (or bad) reason. Find out the cost of a yearly service contract versus the cost of a typical repair bill for the aid. What is the turnaround time for service? If there is not good, timely service available, reconsider the device, particularly if it's needed every day for a job.

**Solving Interface Problems** "Find out what kind of technical support is available for solving interface problems. Interface problems are the most important issues in the effective use of braille and audio terminals. Make sure that support is available from the vendor, your company or an outside organization.

**Proper Training** "Finally, when considering a complex device, find out what training is available and how much it costs. To purchase a device like an electronic braille system, or an audio terminal, without training will usually prove disappointing because of the struggles to learn how to use it. Besides the vendor's technical support, if available, look to user groups; they can be a great source of help when problems arise or new applications are uncovered.


**STEPS TO FOLLOW IF YOU HAVE PROBLEMS WITH YOUR ASSISTIVE DEVICE**

"Read the instructions and your warranty carefully. If you have not received a copy of a warranty with your device, write the manufacturer or seller and ask if your device is warranted. Be sure that you don't expect features or performance your device isn't designed to give or expect warranty coverage that was never promised.

"Contact the warrantor. The seller may not be the warrantor. Write or call the company at the address given in the warranty. Describe your problem and explain exactly what you think the company owes you under the warranty -- repair, refund, or replacement. When you call a company, send a follow-up letter to put in writing what was said. Send all letters by certified mail and keep copies. But remember: having a warranty doesn't mean you automatically get your money back. If a product is defective, the company is entitled to try to fix it.

"If the company is not helpful, contact a state or local consumer protection office or complaint center. At present, agencies handling problems of the disabled are not accustomed to giving warranty information or resolving warranty problems, but your state consumer protection office or complaint handling center routinely helps people solve warranty problems and gives warranty information.

"If contacting a consumer protection office doesn't resolve the problem and the amount of money involved is small, you can go to a small claims court. The costs are low, procedures are simple, and lawyers are usually not needed. The clerk of the small claims court can tell you how to bring your lawsuit.

"If your device has a written warranty and was manufactured after July 4, 1975, you may want to sue the company under the Warranty Act. You should contact a lawyer or consumer protection office for information. If you win, you can get money damages or any other type of relief the courts choose to give you. This includes the cost of bringing the lawsuit and your attorney's fees. If your device was manufactured before July 4, 1975, you may want to sue the company under state law. In California, all assistive devices come with a warranty which enables you to sue under state and federal law.

"Report violations of the law to the Federal Trade Commission, Warranties, Washington, DC 20580. The FTC cannot help you directly with a warranty problem, but it needs to know if companies are obeying the warranty law. Write the FTC if a company does not make warranty information available; does not label the warranty as required, or does not perform service as promised. While the FTC does not handle individual cases, it does look into business practices which affect many consumers.


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PUBLICATIONS WHICH PROVIDE AN OVERVIEW OF TECHNOLOGY FOR DISABLED PEOPLE

Some publications cover a broad spectrum of technology applications. To avoid listing these books over and over in each section of the Resource Guide, this general book list is included for your use.

DISABILITY BOOKS WHICH HAVE USEFUL INFORMATION ON DEVICES

Disability and Rehabilitation Handbook, Robert M Goldenson, editor. McGraw-Hill Book Company 1221 Avenue of the Americas, New York, NY 10020 846 pages $27.50 1978 The book is organized in four parts Part I, Foundations of Rehabilitation, explores the practical approaches to aiding the disabled, such as the role of the family, the development of social and sexual relationships, arrangements for independent living, housing and transportation adaptations, employment possibilities, educational and recreational programs, legal rights, and financial assistance Part II, Disable-Disabilities, covers the major handicap-related diseases and defects Part 3 comprises Ill-strative Cases. Part 4 is the Data Bank, an extensive compilation of statistics, names and addresses of relevant national organizations, federal agencies, and programs, periodicals and directories, and major sources of information and supplies. Chapter 5, Independent Living Ways and Means, describes the broad range of devices available within the context of independent living.

Disabled? Yes Defeated? No K Cruzic Prentice-Hall, Englewood Cliffs, NY 07632 211 pages 1972 Contains information resources for disabled persons, their families, and therapists. Chapters discuss daily living aids, clothing, housekeeping, and cooking, as well as educational programs, recreation, finances, careers, and community services.


SELECTED PUBLICATIONS SPECIFICALLY ON TECHNOLOGY

Aids to Independent Living Self-Help for the Handicapped, Edward Lowman and Judith L Klinger McGraw-Hill, 330 42nd Street, New York, NY 10036 796 pages, many illus., bibliography $41.00 Out of print, but available in rehab departments.


Functional Aids for the Multiply Handicapped P. Robinault, Editor Harper & Row, Hagerstown MD Prepared under the auspices of the United Cerebral Palsy Associations, Inc. this book discusses where to buy or how to construct items that would enable a multiply handicapped person to function more independently. Aids are classified according to function: transfer, travel and mobility, personal care, including feeding and eating equipment, clothing and dressing aids, toileting, personal hygiene aids, communication and learning, and recreation. Includes a list of resources for aids and information.

A handbook of ideas for the Disabled Ideas and Inventions for Easier Living, Suzanne Lunt Charles Scribner’s Sons, New York, NY 1976 276 pages $17.95 This handbook has hundreds of devices and ideas to make life easier and more active. You’ll find directions for simple homemade aids as well.
as information on equipment available on the market; devices that help you sit up, get out of bed, dress, walk, handle household chores, travel, cook -- do anything more easily than you thought possible. Written by a layperson for the general reader, the book's aim is to tell you what is available rather than persuade you to buy anything. The final section of the book helps you deal with the cost of equipment and medical help. You'll find suggestions and the names of organizations that will help you obtain jobs, government money, home care, tax breaks, and other assistance. The appendix, "Sources of Equipment and Information," provides a complete directory of the suppliers mentioned throughout the book and helpful organizations. This book was inspired by the needs of the author's terminally ill mother, who was nursed at home, and the information's practicability reflects that fact.

Helping the Handicapped A Guide to Aids Developed by the Telephone Pioneers of America Telephone Pioneers of America, 195 Broadway, New York, NY For availability, call your local telephone company in the U.S. or Canada for the name of the local chapter administrator.

This book probably represents only a small percentage of the devices that the Pioneer group has developed. These are the ones that were documented.

Groups of Pioneer volunteers serve the people of their communities in innumerable ways, but this book is dedicated to the hundreds of Pioneers and their creative volunteers who have used the know-how, their know-how, and countless hours of volunteer time to develop and build aids to help their handicapped neighbors.

This handbook is not a catalog of aids and devices for sale. In many cases, the items described are available only in the area where the chapter listed under "CONTACT" operates. However, "how to make it" information (drawings, diagrams, parts lists, etc.) is included from these chapters. We suggest that anyone who needs a particular device shown in the book contact first the Administrator of the local Pioneer chapter to inquire whether one can be made available locally. A list of headquarters locations of each chapter, by state, is included. The Administrator can be reached by calling the telephone company headquarters in the city indicated and asking for the chapter by name.

With a few exceptions, the amount shown under the "COST" heading is not a selling price. It is the approximate cost of the materials required to build the device. Most aids built by Telephone Pioneers are donated to local schools, hospitals or agencies which serve handicapped people.

PRODUCTION DIRECTORIES

Accent Special Publications, P.O. Box 700, Bloomington, IL 61701, 1983 Manufacturers and distributors of equipment listed by category, as well as addresses of national organizations and associations concerned with disabilities. Published annually.

Catalog of Aids for the Disabled: Nancy Kreisler and Jack Kreisler McGraw-Hill Book Company, 1221 Avenue of the Americas, New York, NY 10020, 246 pages, $24.95, 1982. Over 600 separate pieces of equipment are described in this text, listing the latest in equipment needs from the kitchen to your automobile, from children to adults, for all manner of disabilities. Each equipment entry includes a photograph if deemed necessary, a brief description, a price category, and the name of the supplier. The appendix then lists the addresses of all suppliers, addresses of helpful organizations, and periodicals that might be useful.

Design for Accessibility Equipment and Aids Catalog (The 1979 edition was Barrier Free Design Equipment and Aids Catalog) Michigan Center for a Barrier Free Environment, West Bloomfield, MI 1981 Guide to equipment and aids available to help create a barrier-free environment. Includes standing aids, aids for the blind, auto or van adaptations, building equipment, doors, floor surfaces, kitchen and laundry, plumbing accessories, windows, and other special equipment. This is not a commercial catalog, you can't buy things from it.

Product Inventory of Hardware, Equipment and Appliances for Barrier Free Housing Design National Handicap Housing Institute, Inc., 12 S 6th Street, Suite 1215, Minneapolis, MN 55402, $25.00, 1979. Catalog with 418 pages provides descriptive summaries, prices and pictures of approximately 200 products. It includes products in general use as well as those specifically designed for disabled persons.

NOTE The Green Pages, and Rehabilitation Purchasing Guide (RPG) which replaced it, are no longer being produced.

Virginia Stern and Martha Redden, editors. American Association for the Advancement of Science, 1776 Massachusetts Avenue NW, Washington, DC 20036, 1983.
A DIFFERENT APPROACH TO ASSISTIVE DEVICES

The Comfortably Yours catalog isn't your typical rehab products catalog. It distributes "Aids for Easier Living" and does not specifically focus on the handicapped/health care audience. It's a mass market catalog for "just folks." About half the products are clever convenience products. The other half are the kinds of things we'd expect to see in a clinical catalog -- bathtub benches, tub safety bars, reachers, an adult bib, eating aids, etc.

What makes this catalog fun to read is how the products are described. It's hard to remember that there is a difference between the "rehab" products, and all the other gadgets that their copy writer has you so eager to buy. (Is there really a difference?) I personally find the catalogue somewhat dangerous. I have to exert real self-control not to buy something from almost every page.

We can all learn from the catalog's marketing approach. It could teach us how to talk about technology for people with physical limitations in a way that doesn't intimidate or alienate the people who need them. It provides a way for people to think about their equipment as "aids for easier living" rather than stigmatizing signs of being "crippled" or weak.

Comfortably Yours, Aids for Easier Living, 52 West Hunter Avenue, Maywood, NJ 07607, 201/368-0400

Some examples of the Comfortably Yours product descriptions.

"How many times in the middle of the night do you have to put the light on? You fumble under the sheet for the switch, hoping you won't knock something over, turn on the light -- and blind yourself! This lamp dimmer is actually for any room, but I want you to put it by the bed. It glows in the dark. All you do is open one eye just a little bit, push down on the glowing knob, and the light is on -- as soft as you like. This is great, too, for a sick room, for children, or for anyone who has trouble moving about and can't turn knobs. UL listed. 6 foot cord.

"A few years ago my mother stopped using fitted sheets, even though she preferred them, because her arthritic hands hurt whenever she pulled at the tight corners. We found these cotton terry sheets in Europe and brought them back for her. She was thrilled. They have fitted elasticized corners and, because the terry material has a natural stretch, there is no strain when putting them on the bed. These long wearing quality sheets absorb perspiration, feel comfortable year round, and machine wash and dry beautifully. Available in champagne and blue. Please specify color. P.S. Mom, who wastes nothing, now uses her old flat bottom sheets as top sheets.

"Being able to take care of yourself by yourself is a wonderful thing -- especially when it comes to bathing and personal hygiene. The new open-front design of this chair allows you to clean more effectively and independently. You can reach more areas, even while seated. The open design also allows you to place your foot directly behind you as you get in and out of the bath, giving you an extra measure of safety. The molded seat is contoured for comfort and the legs adjust in height easily by push button from 14 1/2" to 22" and have non-slip rubber tips. The chair is corrosion resistant and is also available without a back. A special chair for special needs with features well worth the cost.

We received this good-looking eating smock in the mail recently. The lady who sent it to us says she designed it for her father who needs it to protect his clothing while eating but wouldn't dream of wearing a bib. She chose this up-to-date blue denim fabric and styled it so that it goes on easily and stays on securely with ties in the back. He accepted it so readily that she felt others might prefer it too. The terry front has a water-proof backing and a generous pocket across the front to catch food crumbs. It measures 21 1/2" across the front and is machine washable and dryable. One size fits all.

"A few years ago my mother stopped using fitted sheets, even though she preferred them, because her arthritic hands hurt whenever she pulled at the tight corners. We found these cotton terry sheets in Europe and brought them back for her. She was thrilled. They have fitted elasticized corners and, because the terry material has a natural stretch, there is no strain when putting them on the bed. These long wearing quality sheets absorb perspiration, feel comfortable year round, and machine wash and dry beautifully. Available in champagne and blue. Please specify color. P.S. Mom, who wastes nothing, now uses her old flat bottom sheets as top sheets."
Sources of Current Information

Trade and consumer magazines offer one of the most timely means for learning about new equipment availability. Scanning periodicals on a regular basis can be an effective means to acquire product information and remain generally aware of equipment and service availability.

Each of the periodicals listed below regularly features a section devoted to new products/ideas. Each item entry in the periodical generally includes a description and picture of the device.

Accent on Living
"New Products and Services"
Cheever Publishing Company
Gillum and High Drive
P.O. Box 700
Bloomington, IL 61701

Communication Outlook
"News on Aids"
Artificial Language Laboratory
Computer Science Department
Michigan State University
East Lansing, MI 48824

The Coordinator
"New Products"
Coordinator Publications, Inc
11417 Vanowen Street
North Hollywood, CA 91605

Homecare/Rehab Product News
Miramar Publishing Company
2048 Corner Avenue
Los Angeles, CA 90025

ICTA Inform
"Technical Aids"
Swedish Institute for the Handicapped
Box J03
S-161 26 BROMMA
Sweden

Medical Device & Diagnostic Industry
"New Products"
Canon Communications, Inc
2422 Wilshire Blvd
Santa Monica, CA 90403

Paraplegia News
"Innovations"
5201 N. 19th Ave., Suite 111
Phoenix, AZ 85015

Rehabilitation Digest
"Let’s Get Technical"
Canadian Rehabilitation Council for the Disabled
One Youngue Street, Suite 2110
Toronto, Ontario M5E 1E5
Canada

Rehabilitation Literature
"New Products"
National Easter Seal Society
2023 W. Ogden Avenue
Chicago, IL 60612

Rehabilitation Technology Review
"Left To Our Own Devices"
Rehabilitation Engineering Society of North America
Suite 402
4405 East-West Highway
Bethesda, MD 20814

RX Home Care
"Product Gallery"
“Equipment Spotlight”
Barrington Publications, Inc
825 S. Barrington Avenue
Los Angeles, CA 90049

Sports “N” Spokes
"Nifty New Stuff"
5201 N. 19th Avenue, Suite 111
Phoenix, AZ 85015

These journals also periodically have technology-related information:

Bulletins on Science and Technology for the Handicapped
American Association for the Advancement of Science
Office of Opportunities in Science
1775 Massachusetts Avenue NW
Washington, DC 20036
No subscription charge
Quarterly

Journal of the Association of the Severely Handicapped
The Association for the Severely Handicapped
7010 Roosevelt Way, NE
Seattle, WA 98115

Rehab Brief
National Institute of Handicapped Research
Office of Special Education and Rehab Services
Department of Education
Washington, DC 20201

Rehabilitation Gazette
Gazette International Networking Institute
4502 Maryland Avenue
St. Louis, MO 63108
Annual
Back issues, $8 each
Volume 25, $10

Rehabilitation Literature
National Easter Seal Society
2023 W. Ogden Avenue
Chicago, IL 60612
Bi-monthly $21
Two of the six issues in 1983 were technology-related "Technology & Disability,” March—April 1983 (44, 3-4) and "Technology & Disability II,” November—December 1983 (44, 11-12)

Rehabilitation World
Rehabilitation International USA
1123 Broadway
New York, NY 10010
AUDIOVISUALS


Assistive Devices for the Rehabilitation Patient Rehabilitation Institute of Chicago, Education and Training Center, 345 East Superior St, Chicago, IL 60611 Videotape, 30 minutes. Presents devices and demonstrates common adaptive equipment used in dressing, feeding, grooming, avocation, and wheelchairs, as well as the carry-over of the use of adapted devices from a rehabilitation setting to an acute setting.

Devices for Self-Help Performance Bureau of Education for the Handicapped Available from National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington, DC 20409 16mm color film, 18 minutes. Illustrates the problems of persons with multiple physical handicaps and demonstrates supportive devices for task performance. Includes moving from place to place, sitting, standing, writing, turning pages, communicating, and eating.

It's A New Day, Fern Field South Bay Mayors' Committee for Employment of the Handicapped, 2409 N Sepulveda Blvd #202, Manhattan Beach, CA 90256 16 mm color film, 9 minutes. 1981. Celebrates new attitudes and new technologies available to disabled people to increase their integration into the mainstream of life. Shows braille menu, elevating wheelchair, talking calculator, Opticon, and so on.

One Giant Step, Michael McFarland Canadian Rehabilitation Council for the Disabled, Suite 2110, One Younge Street, Toronto, Ontario M5E 1E5, Canada 16 mm color film, 40 minutes. 1981. Demonstrates the range of technical aids available from environmental control systems to communications aids, showing how they can be used in various settings to improve independence and mobility of disabled people. First Prize, Technical Aids, 1981 International Rehabilitation Film Festival.

To Find Answers United States Social Rehabilitation Services Available from National Audiovisual Center, National Archives and Records Service, General Services Administration Order Section/RT, Washington, DC 20409 16 mm color film, 29 minutes. Discusses research for the handicapped. Demonstrates several devices to illustrate how science is improving life for the disabled.
DISABILITY SPECIFIC PUBLICATIONS

Many books written about specific disabilities have chapters and/or extensive references to technical aids. Some examples include:

**ARThRITIS**

Aids and Adaptations (2nd Edition) K.P. MacBain, editor. The Canadian Arthritis and Rheumaism Society, 1976. Describes items which have been used successfully by patients in an occupational therapy department. Part I contains drawings and instructions for self-help aids; Part II covers environmental adaptations. Bathing, toileting, homemaking and ambulation or transfer are emphasized.


"Self-Help Manual for Patients With Arthritis." Prepared by the Arthritis Health Professors, Section of the Arthritis Foundation, 1315 Spring Street NW, Atlanta, GA 30309. May be obtained from local chapters of the Foundation 1980

**CEREBRAL PALSY**


Handling the Young Cerebral Palsied Child at Home. N.R. Finnie. E P Dutton, New York, NY $5.95 1975. This book is a classic. It provides information on home management of children with cerebral palsy for parents, teachers and therapists. Contains suggestions on do-it-yourself devices as well as commercially available equipment, particularly mobility aids. Also includes lists of resources for equipment and accessories.

Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages. E C High. George Washington University, Job Development Laboratory, Washington, DC (NARIC Call No 0102) 1977. Contains resources for aids, equipment, techniques and programs to help people with cerebral palsy. Lists print and nonprint material about cerebral palsy. The guide is divided into sections covering general information, positioning and seating, feeding, dressing, hygiene, and household and community involvement. Lists suppliers of aids and equipment, and publishers illustrated.


The second edition has been widely revised, with new material added on the visually handicapped child, behavioral therapy for movement, the development of play, feeding techniques, the clumsy child, and equipment.

**DISABLED CHILDREN**

Aids for Children International Committee on Technical Aids, Housing and Transportation (ICTA), Information Centre, S-161 03, Bromma 3, Sweden 1972. An international catalog of children's assistive devices.


Disabled Child Book 9 in the series Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Pestalode, Brighton, England. One of a 10 booklet series which provides guidelines to help in the selection of equipment. Lists and describes, with photographs, equipment to aid in the care of disabled children and to increase their independence. Covers categories such as home design, mobility, wheelchairs, personal hygiene, feeding and dressing, includes reference and resource lists.

Pictures of commercially available and do-it-yourself aids.


Environments for All Children. Access Information Bulletin. National Center for a Barrier-Free Environment, Suite 1006, 1140 Connecticut Avenue, N W, Washington, D C 20036. This bulletin summarizes some of the accessibility issues that include all children, regardless of their disabilities.


**INFORMATION SERVICES AND RESOURCES**

**ARThRITIS**

Lists of resources for equipment and adaptations.

Many books written about specific disabilities have chapters and/or extensive references to technical aids. Some examples include:

Effective references to technical aids are suggested, but special emphasis is given to the underlying principles involved.

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Environments for All Children. Access Information Bulletin. National Center for a Barrier-Free Environment, Suite 1006, 1140 Connecticut Avenue, N W, Washington, D C 20036. This bulletin summarizes some of the accessibility issues that include all children, regardless of their disabilities.

Palsy Association, Inc., 66 East 34th Street, New York, NY 10016. A revised second edition is to be available soon.

Handling the Young Cerebral Palsied Child at Home N. R. Pinne, E. P. Dutton, New York, NY. $5.95 1975. Equipment suggestions are made throughout the book for commercially available and do-it-yourself devices. Also, a list of resources for equipment and accessories is included.

Handicapped Children - Strategies for Improving Services Gary Breuer and James Kakalik McGraw-Hill, 1221 Avenue of Americas, New York, NY 10020 1979

Handi-Sitters: How to Sit for the Handicapped M. Cohn and K. Caffey. Available from Melissa Cohn, OTR, 1812 Mapleleaf Blvd., Oldsmar, Florida 33575 63 pag. 1. 1979 Chapter 4 Special Equipment Introduction to special apparatus a caregiver needs to understand, simple sketches and reasons for use. A companion teaching manual is also available.


Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, Second Edition, and More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities. Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740. 50 pages $5.00 plus $1.00 postage and handling 1982. This book gives simple directions for constructing toys and switches that can be easily operated by severely and profoundly handicapped children. This book has a wide range of applications and should be useful to parents, teachers, specialists of vision, hearing, speech, physical and occupational therapists.

How to Build Special Furniture and Equipment for Handicapped Children Nath B Hofman, Charles C. Thomas, Publisher, 130 S First Street, Springfield, IL 62717. 100 pp. $10.95 1974. Explicit instructions including pictures, measurements and materials for making a standing board, a cut-out table, a standing table, chair inserts, a potty chair, etc.

Inexpensive Equipment for Activities of Daily Living Kathryn S. Cervenyansky, COTA. Occupational Therapy Department, Job Development Laboratory, George Washington University Medical Center, 2300 Eye Street NW Room 20, Washington, DC 20037. 18 pages $1.00. 1973. Manual of easily made aids for feeding, dressing, hygiene, etc.


Please Help Us Help Ourselves: Inexpensive Adapted Equipment for the Handicapped: Carol Nathan, OTR. Available from: OT Program, Indiana University Medical Center, 1232 W. Michigan Street, Indianapolis, IN 46202. $2.00. Illustrates the fabrication of inexpensive adaptive equipment for disabled children.

Project PROJIMO: A Villager-run Rehabilitation Program for Disabled Children in Western Mexico. The Hesperian Foundation, Box 1692, Palo Alto, CA 94302.

Products for People with Vision Problems. American Foundation for the Blind, Consumer Products Department, 15 W. 16th Street, New York, NY 10011. Section on Preschool Products, as well as other devices used by children with vision problems.


are included, especially in the chapters on Academics, Severe Communication Problems and Self Care. Sketches and photographs are used to show device applications; advantages and disadvantages of equipment are listed.

Technical Aids for Handicapped Children Rehabilitation Centre for Children, Winnipeg, Canada. A resource book of both commercially available and custom made equipment.

Additional Sources of Information for Parents of Disabled Children

The following associations and agencies are among many that provide resources. Write for a list of their publications.

American Academy of Pediatrics
P.O. Box 1034
Evanston, IL 60204

American Medical Association
Bureau of Health Education
525 N. Dearborn Street
Chicago, IL 60610

The Association for the Severely Handicapped
7010 Roosevelt Way, NE
Seattle, WA 98115

National Congress of Parents and Teachers
700 N Rush Street
Chicago, IL 60611

National Foundation of Dentistry for the Handicapped
1726 Champa
Denver, CO 80202

National Information Center for Handicapped Children and Youth
155 Wilson Blvd.
Suite 600
Rosslyn, VA 22099

DISABLED ELDERLY

Easier Way: Handbook for the Elderly and Handicapped, Gean Sargent. Iowa State University Press, 2121 South State Avenue, Ames, IA, 50010 515/294-5280. 223 pages $11.50 1981 This book describes devices and adaptations both commercially available and homemade to help elderly disabled persons who want to remain as independent as possible. It is arranged by subjects such as cooking, cleaning, bathroom, dressing, grooming, relieving aches, sewing and handwork, and mobility. Related publications are listed.

A Handbook of Assistive Devices for the Handicapped Elderly New Help for Independent Living Joseph Breuer Haworth Press, 28 East 22nd Street, New York, NY 10010 212/228-2800 80 pages $20.00 1982 This illustrated book describes a broad array of devices designed to assist handicapped elderly persons. A major emphasis is given to devices to help the bedridden elderly with limited strength and mobility in performing activities of daily living. Devices are classified under such topics as sitting, communicating, dressing, eating, toileting, and walking. Each chapter has an accompanying bibliography.

LARYNGECTOMY

Aids and Devices for Laryngectomees Speaking Devices for Laryngectomees Supply Sources for Items Used by Laryngectomees Available from International Association of Laryngectomees, American Cancer Society, 777 Third Avenue, New York, NY 10017 212/371-2900 The Association's Annual Directory includes local sources of supplies for the laryngectomee patient. Reprints and fact sheets include Aids and Devices for Laryngectomees, Supply Sources for Items Used by Laryngectomees, and Speaking Devices for Laryngectomees.

MULTIPLE SCLEROSIS


ONE-HANDED

"Adapted Living Aids for a Bilateral Shoulder Disarticulation" M A Marker American Journal of Occupational Therapy, #9, 584, 1977

Handbook for One-Handers A L Danzig, 3rd edition. Federation of the Handicapped, 211 West 14th Street, New York, NY 10011 $1.00 1986 Description of a wide variety of actions involved in everyday living, with detailed advice to the one-handed person for easy performance.

The One-Hander's Book A Basic Guide to Activities of Daily Living Veronica Washam Harper & Row Publishers, 10 E 53rd Street, New York, NY 10022 Also available from Independent Living Research Utilization Project, The Institute for Rehabilitation and Research, 1333 Moursund Avenue, Houston, TX 77030

Single-Handed Devices and Aids for One Handers and Sources of These Devices Betty Garee, ed Cheever Publications, F O Box 700. Bloomington, IL 61701 25 pages, illustrations $3.50 1978 This book is primarily product-oriented, i.e., it lists devices which could be useful to a one-hander and the various sources of these devices.
OSTOMY


United Ostomy Association, Inc., 2001 W Beverly Blvd, Los Angeles, CA 90057. 213/413-5510. The Association provides a list of manufacturers and suppliers of equipment for the ostomy patient.

PARKINSON'S DISEASE


STROKE

Do It Yourself Again. Self Help Devices for the Stroke Patient. American Heart Association, National Center, 7320 Greenville Avenue, Dallas, TX 75231. 45 pages, 1969. Practical aids for eating, dressing, reading, housework, using the bathroom and walking are described and illustrated. Suggestion for selection of a wheelchair and rearrangement of the home are provided.


"I'd Rather Do It Myself." N Wall. Occupational Therapy Department, Massachusetts Rehabilitation Hospital, 125 Nashua Street, Boston, MA 02114. $2.00. A 12-page booklet containing descriptions and illustrations of devices and equipment.

Stroke Bibliography. Available from National Easter Seal Society, 2023 West Ogden Ave, Chicago, IL 60612. Has information on books, pamphlets, reprints to read, catalogs to order.

INFORMATION SERVICES AND RESOURCES

FOR INFORMATION SPECIALISTS


Automated library catalogs which students interrogate through computer terminals are becoming commonplace. This report examines the situation at the University of Wisconsin-Madison campus, and analyzes the general computer access problem in libraries as it impacts upon severely handicapped students.


Library Aids. Gaylord Brothers, Inc., P.O. Box 4901, Syracuse, NY 13221, 800/448-6180. Some items include: study carrel, convenient height revolving displays for newspapers, magazines, paperback, records and cassettes, aids for partially sighted individuals, including free-standing desk and floor model high-intensity magnifying lamps.

Library Services for the Handicapped Adult. Carol H. Thomas and James L. Thomas, editors. The Oryx Press, 2214 North Central at Encanto, Phoenix, AZ 85004. 152 pages. $25.00. Part I of this multi-authored book presents a background overview and discussion of needs and approaches to preparing librarians in serving handicapped people. The bulk of the work is contained in Part II, which addresses programs and services to special populations. Part III reproduces a detailed resources listing, subdivided in various categories, such as books, articles, retrieval systems, equipment sources, and nonprint media.

The Mainstreamed Library. Barbara H. Bashkin and Karen H. Harris, editors. American Library Association, 50 East Huron, Chicago, IL 60611. 293 pages. $35.00. 1983


The Equipment Selection Process
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EQUIPMENT SELECTION PROCESS

Kathy Bowman, OTR/Project Threshold
Rehabilitation Engineering Center
Rancho Los Amigos Hospital
Downey, California

All of us who have been involved in the field of rehabilitation have heard "horror stories" of equipment problems - devices that take forever to be built and then cannot be used by the client, custom duplication of design at many times the cost of a commercially available item, and clients who have one problem solved only to have the solution prevent them from functioning independently in another aspect of the task. And all of us have probably been involved in at least one case which became overwhelming in complexity of problems, number of personnel involved and questionable client use of the end product. Some of these situations may be unavoidable, but utilization of a systematized process for equipment selection can hopefully keep them to a minimum. Such a selection process should include a functional assessment of the client and determination of equipment needs utilizing appropriate personnel.

Importance of a Systematic Selection Process

What does a selection process accomplish? To begin with, a systematized approach specifically defines the problem in the context of other activities. A client may be referred for one item, say, for example, a means of getting paper into a typewriter. Upon further investigation of the problem, it may become clear which exact aspects of this activity are difficult, and why, in reference to the client's capabilities. This would certainly affect the type of equipment needed. In addition, it may be determined that the client's problem is affected by fatigue of having to first position the typewriter, or that, indeed, all aspects of desk activities are difficult for him. The original equipment request is dealt with not in a void, but in a context which may reveal other areas of investigation which are also needed to improve functioning.

A key focus of the selection process is utilization of a functional assessment of the client as a basis for determining equipment needs. Knowledge of diagnostic such as "spinal injury C-6 level" or "muscular dystrophy early stages" is helpful, but hardly adequate. The functional assessment is a thorough evaluation of the client's problem areas, compensatory methods and strongest assets in terms of physical and mental skills. This often includes muscle strength, active ranges, pain limitations, sensory abilities, visual skills including perception, coordination and cognitive abilities. The functional assessment goes a step further than information found in many medical charts of muscle grades and range degrees in that it is done in the context of activity. A description of what problems affect hand use, for example, and why it then makes it difficult to perform certain activities, is much more helpful than the degree of range in the joints of the fingers.

A selection process helps to ensure use of the simplest, most cost-effective solutions. With the vast array of commercial products on the market, and constant changes in technology, it is imperative that a means of search be utilized to avoid "re-inventing the wheel" with each case. Design and fabrication of custom equipment is time-consuming and costly, and assurance that it is indeed the only means of providing needed technology is essential in our budget-conscious society.

The client should be actively involved in the selection process. This not only ensures that the end product will actually be useful, but may serve as a learning experience for the client. Many are then able to extrapolate from this experience and apply problem solving to future situations, approach new obstacles in an organized manner and identify appropriate resources when equipment needs arise in the future.

Experience in using a selection process results in the accumulation of information which may be useful for future clients. The knowledge of means of solving a particular problem, the actual equipment design, and resources for obtaining devices grow with each case and become a rich resource for future clients, provided the information is organized and obtainable within a system.

Project Threshold Implementation of a Selection Process

In order to discuss the application of a selection process in detail, I am going to describe the program I am most familiar with, Project Threshold. To begin with some background, Project Threshold is a client service delivery program designed to meet the needs of the severely disabled person who requires specialized assistance in performing daily life tasks. It was originally funded in 1976 by the California State Department of Rehabilitation. Following this initial innovation and expansion grant, a contract was awarded in 1978 which established Project Threshold as a block-funded vendor of services for the Department of Rehabilitation. Similar case service contracts have been awarded each year since 1978. In addition, as of July 1981, private clients may also be referred to Project Threshold on a fee-for-service basis.

Project Threshold's staff consists of a core team who are responsible for the coordination and follow-through of all cases. As part of the Rancho Los Amigos Rehabilitation Engineering Center, we have a supporting staff of engineers available for custom design and fabrication, and facilities of a prototype shop and electronics lab. The staffs of Rancho Los Amigos Hospital and Department of Rehabilitation Training and Evaluation Program are also available to lend their expertise as needed to augment the core staff abilities. Outside consultants, including occupational therapists, physical therapists, other allied health professionals, vendors and contractors, are utilized when appropriate.

Community resources such as independent living centers and agencies related to specific disabilities are used.
for resources and referrals

A key factor in Project Threshold's utilization of a selection process is use of a case coordinator While a team of personnel may actually be involved in providing services, one staff member is in charge of reviewing referral information, contacting the client and counselor, presenting the case for team discussion, coordinating the evaluation, researching solutions, and determining final recommendations. Having one person in this role lends itself to ensuring an organized approach to equipment selection and avoids duplication.

Another facet of the program which facilitates the selection process is use of a Model Home for equipment demonstration and use. As part of the REC, the Model Home houses the Rehabilitation Equipment Demonstration unit established under a grant from the National Institute of Handicapped Research. The Model Home is designed to look like a home, and is stocked with equipment and home modification examples in a realistic environment. The majority of equipment has been obtained primarily from manufacturers as a donation or on a loan basis for demonstration purposes. Certain other equipment has been obtained from the Veterans' Administration Prosthetic Center in conjunction with equipment evaluation programs. Several charitable organizations have also provided financial assistance. Several hundred inexpensive commercially available items, which have been purchased or donated, are used extensively in independent living evaluations. Use of the Model Home is invaluable in augmenting proper selection of equipment.

A final key of the Project Threshold's organization is resource material. Catalogues and brochures on commercially available equipment useful to the disabled have been collected from over 1,000 manufacturers and incorporated into a master cross-reference file. In addition, equipment search is done through ABLEDATA, a computerized data base of rehabilitation products accessed through the National Rehabilitation Information Center. This product information is delivered through an information broker who is housed in the same facility as Project Threshold. It includes descriptions and evaluation comments from users as well as basic data on the product.

Steps in the Selection Process

The first step of the selection process which Project Threshold uses is receipt and review of the referral information by the case coordinator. The information required for referral includes basic data on the client such as age, diagnosis, medical background information, a statement of problem areas, and functional changes expected as a result of the evaluation. Appropriateness of the referral is determined, some cases are referred to outside facilities or community resources, where services required are less complex or more appropriate for a local resource.

The necessary background information is collected, and clarification or elaboration on any of these aspects is accomplished by verbal collaboration with the referring person, be it rehabilitation counselor, rehabilitation consultant for an insurance company, or allied health professional. For some private clients, referral may be solely the client himself.

The next step is to interview the client. An in-depth interview, usually done by telephone, obtains information about the client's functional abilities and limitations, personal care schedule, use of attendants, current living situation, and use of adaptive behavior or equipment. All areas are covered utilizing an interview sheet, even if the referral specified only one area of need. Often problems are identified which were not included as a referral reason, but directly or indirectly affect the original problem.

Completion of the interview allows the case coordinator to identify the problems and set tentative goals. Gathering detailed information from the client prior to the actual evaluation allows formulation of a total picture of the client's needs in the context of his daily life style, and a beginning plan that will make the actual evaluation quality time.

The case is then presented by the case coordinator to a team meeting within one week of the interview. This meeting of the Project Threshold staff and the liaison person with the Department of Rehabilitation Training and Evaluation Unit is a problem-solving session. The goal for the evaluation, location (such as Model Home, client's home, or job site visit), need for specialized equipment, and personnel to be included are all determined. An occupational therapist is always included, as this profession makes up the majority of the Project Threshold staff. The need for early involvement of engineering personnel may be established, depending on the type of technology it appears will be needed. It is also determined if outside consultants such as a physical therapist should be brought in for the initial evaluation or at a later point. An agenda is prepared for the evaluation.

The staff member involved in the case then organizes and prepares for the evaluation. Scheduling is done with the client, counselor, and consultants, and appropriate equipment is obtained. When not available in the Model Home, manufacturers may be contacted to provide equipment on a trial or loan basis. In some cases, the initial evaluation must be done prior to determining possible equipment needs, so identification of equipment for trial may come at a later point.

Next the client is evaluated. Every attempt is made to include the referring person in the evaluation as well. Most evaluations take place in the Model Home, but home and job site visits are conducted when there is an identified need for that environment. The actual evaluation includes a functional assessment of the client, problem identification specifically through observation beyond the initial referral and interview, demonstration of alternate methods of performing activities, and equipment trials. Solutions may be apparent quickly as the client performs tasks, or may require an extensive trial-and-error process, with input from many personnel. In complex cases,
several problem-solving session and an extensive search for outside equipment resources may be necessary.

In any case, the final outcome of the evaluation is to determine recommendations. Solutions to problems may fall under any one of these categories: adaptive behavior, commercial equipment, custom equipment and training. Solutions always begin with the possibility of the client learning an alternate or adapting his behavior, or using an appropriate device. In some cases, on e-handed adaptability may be used. In these cases, engineering personnel then become extensively involved in the whole process, from the point of evaluation to end product. In addition to these three types of solutions, the need for training, either in adaptive behavior or use of the equipment once obtained, is determined. Extensive training such as would be needed for one-handed typing is beyond the scope of Project Threshold, and the client and referring persons are then provided with appropriate community resources.

The next step in the selection process is a written report, two to four weeks following the last session with the client. The evaluation results and recommendations are summarized, and details given of the specific tasks evaluated. The selection of commercially available equipment is recommended. The exact model numbers, local sources, and approximate costs are given. Every attempt is made to provide clear documentation of need, assist the referring person with financial considerations, and make clear expectations of the results in terms of the client's change in abilities with the device, and how that will affect his performance at home, work, or school. Arrangements for fabrication of custom devices are clearly stated, and cost estimates given.

The last step in the process is follow-up with the referring person and client to ensure that Project Threshold recommendations were relevant and easily understandable. The avenue is left open for further refinement of information and modification of custom devices when indicated. Clients are sometimes referred to the program if their situation changes and new goals are established, or problems arise.

Case Example

This case is that of a 53-year-old woman, four years post-stroke with right hemiplegia. Shirley was referred to Project Threshold by her Department of Rehabilitation counselor, and had a vocational goal of homemaking. She was residing in a board and care home, and evaluation was needed, particularly in the area of kitchen activities, to determine her potential to live independently. Clarification of the referral revealed that the reason for evaluation was not only to identify equipment needs in relation to one-handed use, but also to determine if behavior problems such as confusion with memory loss would affect safety in performance.

During the interview, the client revealed that she had had little opportunity to attempt homemaking activities since onset of her disability, but that she was independent in her personal care. It was noted that her speech was rambling and often tangential, causing the case coordinator to question her organizational abilities.

After discussion in team meeting, a plan for evaluation in the Model Home by an occupational therapist was determined. Emphasis was to be placed on task performance in cooking an actual meal to determine appropriateness of commercially available devices and the client's ability to adapt to new methods and use one-handed equipment. Of particular concern was an assessment of her judgement, problem solving and organization in the kitchen, and safety with environmental distractions. After the appropriate equipment was located, preparation was made for a cooking evaluation, and staff and client were scheduled. Functional assessment showed Shirley to be ambulatory for short distances, but that she sat frequently in the wheelchair to perform activities. She was left-handed with good dexterity, but non-functional in the upper right extremity. The evaluation revealed that the client's task performance outweighed her verbal skills, and that she was organized, attentive, and safe in home skills. As she had no use of the right arm, she was an ideal candidate for commercial devices designed for one-handed use, and learned quickly how to utilize them in the equipment trial. Overall, problem-solving and planning skills were noted as being adequate for independent living, despite verbal distractability. Adaptive behavior was introduced to her in methods of kitchen organization and performing activities once it was determined she was capable of making changes. Resource reading material and commercially available equipment were recommended for her. These recommendations were included in the written report to the rehabilitation counselors, and local vendors for specific pieces of equipment were listed.

The report also included recommendations for further professional input once Shirley obtained her apartment, as she would not have the adapted bathroom facilities of the board and care home. After several months, she was re-referred to Project Threshold, and a home visit was made for equipment recommendations for toileting and bathing. She had already obtained a frame for the toilet and a small tub bench. Assessment revealed that she needed additional equipment, including a raised toilet seat and tub safety rail, for greater ease and safety in these activities. An additional report with description of performance and specific equipment recommendations was sent, and the case was closed.

This case is an example of a relatively simple evaluation in terms of personnel, time, complexity and cost of solutions. Even so, use of the selection process was valuable in determining evaluation parameters early, assuring a thorough releva-
vant evaluation and appropriate follow-up. To Stu.ale.; this intervention was a major factor in her change in lifestyle to a happier, independent 8"

Implications of Selection Process

The steps of this process have evolved over the first six years of Project Threshold's existence. We have felt the implications of use of this systematized approach in noting growth and changes in the program. Initially, the vast majority of solutions involved custom devices, now the majority of solutions are found in adaptive behavior and/or commercially available equipment.

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<th>Service Categories</th>
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<td>Problem identification and/or adaptive behavior recommendations</td>
<td>20%</td>
</tr>
<tr>
<td>Evaluation and recommendation of commercially available equipment</td>
<td>57%</td>
</tr>
<tr>
<td>Evaluation and modification of commercially available equipment</td>
<td>9%</td>
</tr>
<tr>
<td>Evaluation and custom design and fabrication of equipment</td>
<td>14%</td>
</tr>
</tbody>
</table>

Service Category Statistics for Project Threshold 1981-1985 (Total = 80 clients)

It is significant to note that despite the fact that 91% of clients served are severely disabled, in 77% of these cases the solutions involved adaptive behavior and/or commercially available devices. This resulted in lower average costs per client. When these more conservative methods have been exhausted, however, custom modification and fabrication of equipment becomes crucial to problem solution. This occurred in 23% of the cases.

EVALUATION FORMATS

The following evaluation forms are two examples of client assessments that can be used in the selection process to identify problem areas prior to the formulation of solutions. The first is from Project Threshold, it provides guidelines for an initial client interview, and would be completed by the service provider. The second has been used at the Center for Independent Living, it could be filled in by the client prior to meeting with the service provider. Both lend themselves well to preparing written reports.

The following evaluation formats are two examples of client assessments that can be used in the selection process to identify problem areas prior to the formulation of solutions. The first is from Project Threshold, it provides guidelines for an initial client interview, and would be completed by the service provider. The second has been used at the Center for Independent Living, it could be filled in by the client prior to meeting with the service provider. Both lend themselves well to preparing written reports.
# PROJECT THRESHOLD

## Guidelines for Initial Client Interview

### I. General Information

<table>
<thead>
<tr>
<th>Client's Name</th>
<th>Height</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Telephone</th>
<th>Age</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Previous Rehabilitation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Current Living Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

- Alone
- With Attendant
- With Family

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>House</th>
</tr>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Apartment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Own</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Rent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Assistance Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendant</td>
</tr>
<tr>
<td>Homemaker Chore Services</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Number of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>per</th>
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<tbody>
<tr>
<td></td>
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### II. Mobility

<table>
<thead>
<tr>
<th>Ambulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Devices used</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wheelchair</th>
</tr>
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<tbody>
<tr>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Method of Propulsion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Powered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
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</table>

<table>
<thead>
<tr>
<th>Method of Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Describe use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

| Ability to get in and out of house (ramps, steps, doors, locks) |
|                                                               |

<table>
<thead>
<tr>
<th>Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Equipment Used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transfer</th>
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<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Public Transportation Use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

| 57   |
THE EQUIPMENT SELECTION PROCESS

III. Description of Extremities Use

<table>
<thead>
<tr>
<th>Under Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lower Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Devices used

<table>
<thead>
<tr>
<th>Sensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Right</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Other Factors Affecting Use

<table>
<thead>
<tr>
<th>ROM/Contractures</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Endurance</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Other</th>
</tr>
</thead>
</table>

IV. Body Handling Skills

<table>
<thead>
<tr>
<th>Sitting Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Supported</td>
</tr>
<tr>
<td>Wheelchair</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roll from side to side</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Come to sitting from supine</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Stand from sitting position</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bed Transfers</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Position self in bed</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Relief of ischial pressure</th>
</tr>
</thead>
</table>

V. Activities of Daily Living

A Eating

<table>
<thead>
<tr>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Describe methods/equipment used</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Light Hygiene/Grooming</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Methods/equipment used</th>
</tr>
</thead>
</table>

B Dressing

<table>
<thead>
<tr>
<th>Upper extremity</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower extremity</td>
<td>Independent</td>
<td>Assisted</td>
<td>Unable</td>
</tr>
</tbody>
</table>
### C. Toileting

<table>
<thead>
<tr>
<th>Bladder Control</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bowel Control</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Toilet Transfer</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hygiene/Management of Clothing</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### D. Bathing

<table>
<thead>
<tr>
<th>Bathing</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathub</td>
<td>Bathtub with Shower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower Stall</td>
<td>Bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers</td>
<td>Independent</td>
<td>Assisted</td>
<td>Unable</td>
</tr>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### E. Homemaking

<table>
<thead>
<tr>
<th>Cooking</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marketing</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laundry</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Light Housekeeping</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heavy Housekeeping</th>
<th>Independent</th>
<th>Assisted</th>
<th>Unable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods/equipment used</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THE EQUIPMENT SELECTION PROCESS

VI. Vocational Information

Current Activities/Plans

Skills
Writing Independent ______ Assisted ______ Unable ______
Methods/equipment used

Typing, Independent ______ Assisted ______ Unable ______
Methods/equipment used

Phoning Independent ______ Assisted ______ Unable ______
Methods/equipment used

Filing: Independent ______ Assisted ______ Unable ______
Methods/equipment used

Managing books and papers Independent ______ Assisted ______ Unable ______
Methods/equipment used

Note Taking, Independent ______ Assisted ______ Unable ______
Methods/equipment used

Other

VII. Leisure

Describe leisure activities

Describe methods/equipment used

VIII. Description of a typical day

IX. Preliminary goal setting for Project Threshold intervention
<table>
<thead>
<tr>
<th>ACTION OR ACTIVITY</th>
<th>FUNCTIONAL ABILITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Always independent</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can, but usually don't</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Absolutely can't</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Want to change</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>

### Dressing

- Dress upper body
- Dress lower body
- Shoes, socks
- Buttons, zippers, bras

### Transfers

- Getting into bed
- Getting out of bed
- Positioning yourself in bed
- Getting on toilet
- Getting off toilet
- Getting into car
- Getting out of car

### Grooming & Hygiene

- Getting into tub/shower
- Getting out of tub/shower
- Washing hands & face
- Light Grooming
- Washing hair
- Brushing teeth
- Toilet hygiene
### The Equipment Selection Process

Please check (X) the appropriate box, if equipment is used, mark the box (E), if personal assistance is used mark the box (P); if either (E) and/or (P) is marked, please describe in the last column.

<table>
<thead>
<tr>
<th>Light Grooming, cont.</th>
<th>Always independent</th>
<th>Can, but usually don't</th>
<th>Absolutely can't</th>
<th>Want to change</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nail care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ear care</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brushing hair</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shaving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feminine hygiene</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating &amp; Drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feeding self</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROBLEMS (describe)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bowel & Bladder**

Controlling urination (describe, day & night)

If catheter, reserve set available? Yes _____ No _____

Controlling defecation (describe)
Please check (X) the appropriate box, if equipment is used, mark the box (E), if personal assistance is used mark the box (P), if either (E) and/or (P) is marked, please describe in the last column.

### Physical Mobility
- Mobility aids
- Walking - inside home
- Walking - outside home
- Up/Down Stairs
- Escalators
- Elevators
- Curbs

### Wheelchair
- Manual - propelling inside home
- Manual - propelling outside home
- Electric - functions in rain

### Using Public Transportation
- Bus
- BART (rapid transit)
- Airplanes/trains

### Using Private Transportation
- Drive self
- Own vehicle
- Valid driver's license
- DP plates

<table>
<thead>
<tr>
<th>FUNCTIONAL ABILITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always independent</td>
<td>Can, but usually don't</td>
</tr>
</tbody>
</table>

Where relevant, please describe the aid, either personal or mechanical, that you use.
<table>
<thead>
<tr>
<th>FUNCTIONAL ABILITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always independent</td>
<td>Can, but usually don't</td>
</tr>
</tbody>
</table>

Please check (X) the appropriate box, if equipment is used, mark the box (E), if personal assistance is used mark the box (P), if either (E) and/or (P) is marked, please describe in the last column.

**COMMUNICATION SKILLS**

- **Writing**: signature
- **Speaking**: 
- **Reading**: 
- **Listening**: 
- **Signing**: 
- **Typing**: 
- **Work board**: 
- **Telephone**: 

**ADL TASKS**

- **Cooking**: 
  - Using range
  - Using oven
  - Using refrigerator
  - Using freezer
  - Using sink - faucets
  - Transporting cookware, ingredients, etc
  - Using can openers

- **Kitchen accessibility**: (describe)

- **Safety precautions**: (describe)

Where relevant, please describe the aid, either personal or mechanical, that you use.
<table>
<thead>
<tr>
<th>FUNCTIONAL ABILITY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Always independent</td>
<td></td>
</tr>
<tr>
<td>Can, but usually don't</td>
<td></td>
</tr>
<tr>
<td>Absolutely can't</td>
<td></td>
</tr>
<tr>
<td>Want to change</td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td>Where relevant, please describe the aid, either personal or mechanical, that you use</td>
</tr>
</tbody>
</table>

**Cleaning**

- Washing dishes
- Laundry
- Housecleaning
- Vacuuming
- Dusting
- Floors

**Other**

- Opening/closing doors
- Problem door openings
- Keys
- Light switches
- Pay phones
- Money handling
- Checking account
# The Equipment Selection Process

Please check (X) the appropriate box, if equipment is used, mark the box (E), if personal assistance is used mark the box (P), if either (E) and/or (P) is marked, please describe in the last column.

## ADL - Health

<table>
<thead>
<tr>
<th>Activity</th>
<th>Functional Ability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet/nutrition (describe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range of Motion - Exercise (frequency)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-going therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin care (pressure sore prevention)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ADL - Equipment

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Functional Ability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water in battery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air in tires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recharging battery on electric chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance of mobility aids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance of assistive devices</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where relevant, please describe the aid, either personal or mechanical that you use.

**FUNCTIONAL ABILITY**

- **Always independent**
- **Can, but usually don’t**
- **Absolutely can’t**
- **Want to change**
- **Not applicable**

**DESCRIPTION**

Where relevant, please describe the aid, either personal or mechanical that you use.
The following resources have more information on assessment and the selection process:

**Aids to Independent Living - Self Help for the Handicapped**, Edward Lowman, M.D., Judith Klinger, OTR. McGraw Hill Book Company, Blakeston Division, New York. The American compendium of assistive devices, also describes adaptive techniques and innovative ways to use devices. (Out of print, but available in most rehab dept libraries, OT depts, etc.) 1989

**Basic Rehabilitation Techniques - A Self-Instructional Guide**, Robert D. Sine et al, editors. Aspen Systems Corporation, 1600 Research Blvd., Rockville, MD 20850. 1981. 268 pages. $20.95 This book was written for nurses who work with disabled persons. Its goal is to provide the nurse with the basic rehabilitation techniques to enable him/her to train disabled people in ordinary functional activities. This includes self-care activities, mobility, pressure relief, pain, etc. The techniques described are simple and utilize equipment that is readily available. The text is written in clear language. Excellent drawings and pictures add to comprehension of details of the technique. Because the techniques include training in the use of assistive devices, this book is also useful to more than just nurses as an introductory guide to the equipment most commonly used by the disabled. It discusses selection, use and training with the devices.

**Exercises and Self-Care Activities for Quadriplegic People**, Accent Special Publications, Box 700, Bloomington, IL 61701

**Handling the Young Cerebral Palsied Child at Home**, N.R. Finnie, FCSP, A Sunrise Book, E. P. Dutton, 2 Park Avenue, New York, NY 10016. $5.95, 1975

**Mealtime Manual for People with Disabilities and the Aging**, Institute of Rehabilitation Medicine, New York University Medical Center and Campbell Soup Company, Box (MM) 56, Camden, NJ, 1978

**Physical Management for the Quadriplegic Patient**, J. Ford and B. Duckworth, FA Davis Company, Philadelphia, PA. (Out of print, look for it in an OT or PT or rehab dept.) 1974 $16.95 This textbook on the physical management of quadriplegic patients includes an appendix which describes do-it-yourself aids for these individuals.

**Providing Early Mobility**, Intermed Communications, Inc., 132 Welsh Road, Horsham, PA. 19044. 1980. This book is part of a series of training manuals for nurses. It includes detailed instructions needed to use the following pieces of transfer -- d positioning equipment: cradle boots, hand rolls, footboards, hand splints, transfer boards, and mechanical lifters. In other sections of the book concise captions and how-to-do-it photos show you how to safely transfer a patient with help traction, how to select the proper crutches, cane, walker, or wheelchair for your patient, and how to teach him to use the equipment correctly. It also includes step-by-step procedures and photos for turning and positioning, range-of-motion and isometric exercises, and transfer techniques. This is an excellent training manual for anyone, for instance, a disabled person could use it

**The Equipment Selection Process**

**SELECTED PUBLICATIONS: DEVICE SELECTION, BASIC USE AND TRAINING**


**Basic Rehabilitation Techniques - A Self-Instructional Guide**, Robert D. Sine et al, editors. Aspen Systems Corporation, 1600 Research Blvd., Rockville, MD 20850. 1981. 268 pages. $20.95 This book was written for nurses who work with disabled persons. Its goal is to provide the nurse with the basic rehabilitation techniques to enable him/her to train disabled people in ordinary functional activities. This includes self-care activities, mobility, pressure relief, pain, etc. The techniques described are simple and utilize equipment that is readily available. The text is written in clear language. Excellent drawings and pictures add to comprehension of details of the technique. Because the techniques include training in the use of assistive devices, this book is also useful to more than just nurses as an introductory guide to the equipment most commonly used by the disabled. It discusses selection, use and training with the devices.

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**Project TEACH Technical Education Aids for Children with Handicaps: A Model and Demonstration Project**, Memphis City Schools, Division of Special Education, Department of Pupil Services, Memphis, Tennessee

**Project Threshold: A Model System for Delivery of Rehabilitation Engineering Services**, Rancho Los Amigos Rehabilitation Engineering Center, Downey, California. April 1979

**Project Threshold: A Model System for Delivery of Rehabilitation Engineering Services**, Annual Report 1980, Rancho Los Amigos Hospital, Rehabilitation Engineering Center, Downey, California

**Rehabilitation Engineering Sourcebook**, Institute for Information Studies, Falls Church, Virginia, 1979, updated annually


**Team Assessment of Device Effectiveness**, Rehabilitation Engineering Center, Children's Hospital at Stanford, Palo Alto, California. October 1980

These publications offer information on selection, training and use of devices.
THE EQUIPMENT SELECTION PROCESS

It to train a personal care attendant. The photos are so explanatory, the text is almost unnecessary.

The Selection of Toilet Aids for Disabled People
Results of an Evaluation Study and Guidelines for the Selection of Toilet Aids for Adult Disabled People. The Institute for Consumer Ergonomics, 75 Swingbridge Road, Loughborough, Leicestershire, LE11 OJB, England. 1981. This booklet is the first of two, and deals only with toilet aids. A second booklet will be concerned with bath aids.

Self-Help Manual for Patients with Arthritis
Arthritis Health Professions Section of Arthritis Foundation, 3400 Peachtree Road, N E Atlanta, Georgia 30329. 1980.
TECHNOLOGY AT HOME

It seems that once you open the door to (information about) the home, the room gets very unorganized. A great deal has been written in this area about assistive devices, adaptive techniques, ideas, inventions, designs. Most books have a little of everything in them. An attempt to separate publications by function — e.g., cooking, self-care — is no more successful than trying to categorize according to type of aid (furniture, bathing aid).

In this section, a few more obvious categories of devices and/or applications have been drawn out from the general publication guide, and listed as separate categories. But to save space, most home-oriented devices remain joined together. The list of references to self-care aids looked a lot like the books on bathroom aids. The categories that did stand out in the available literature are often also covered in the general topic publications, so you should refer to Information Resources section, too.

HOSPITAL BEDS COME HOME

For the person who needs a hospital bed at home, the available options make careful selection essential.

This list of Hospital Bed Options and considerations for selection is excerpted from the article "Hospital Beds Come Home" by Helen Crochi, RN, and Mary Pat Erdner, RN, which appeared in the May, 1984 issue of Rx Home Care, Vol. 6, No. 6, pp. 70-76. It is reprinted here with permission of Barrington Publications, 825 Barrington Avenue, Los Angeles CA 90049. For more information please refer to the article.

"Once the need for a hospital bed has been determined, a thorough assessment of the patient's bed and mattress requirements is necessary. Equipment is selected on the basis of its suitability to the patient's level of function, home environment, and access to funding."

"Factors in Bed Choice"

"Will the bed and mattress meet the medical and functional needs of the patient? Will they provide safety and support?"

"Can the patient use the equipment to maximize independence? Are the bed controls accessible to the patient? Can the bed and mattress height be adjusted for a safe wheelchair-to-bed transfer? Would it be helpful to the patient to have side rails that adjust up or down? Is the mattress durable, comfortable, and easy to maintain? Is it more important for the patient to have functional mobility or skin pressure relief?"

"What kind of repair and delivery service will the dealer provide? What kind of service is offered after the warranty expires?"

"Is it more cost-effective to rent or purchase this equipment?"

Hospital Bed Options

<table>
<thead>
<tr>
<th>Optional Features</th>
<th>Characteristics &amp; Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Side Rails</strong></td>
<td></td>
</tr>
<tr>
<td>1 Full length</td>
<td>o Ensure safety of neurologically impaired, confused or sedated patients o Increase bed mobility of patients when turning side to side o May limit transfer mobility</td>
</tr>
<tr>
<td>2 Half length</td>
<td>o Ensure safety of patients with minimal neurologic impairment by reminding them to seek assistance o Increase bed mobility of patients when turning side to side o Easier than full-length side rails for patients to put up and down for independent transfer</td>
</tr>
<tr>
<td>3 Half length tuckaway</td>
<td>o Reclines under the bed when in down position o Facilitate transfers by allowing wheelchair to be moved closer to bed o Appear less conspicuous than fixed side rails o May be less secure than fixed side rails when not in locked position</td>
</tr>
<tr>
<td>4 Home-style</td>
<td>o Can be placed on a non-hospital bed o Cost-effective for patients who do not require a hospital bed but who need the security of side rails o Adjust to an up or down position o Ensure safety of neurologically impaired, confused,</td>
</tr>
</tbody>
</table>
Bed Controls

1 Located on side rail
   - Easily accessed
   - Patients must have good hand control
   - Patients must be cognitively intact
   - Can be reached easily by patients who are cognitively intact or can be placed out of reach of patients who are confused
   - Control buttons can be recessed, raised, or touch-controlled depending on patient’s fine motor function

2 Hand
   - Assists patients who lack finger or upper extremity strength to control both the bed and electrical elements such as lighting
   - High cost may be prohibitive
   - Sophistication of unit may result in complex repairs in the event of breakdown

3 Environmental control unit
   - Holds mattress adequately
   - May puncture a water or gel mattress
   - Time-consuming to clean

Bed Deck

1 Link
   - Flat surface will not puncture a water or gel mattress
   - Easy to clean

2 Pan
   - Least expensive
   - Will fit into a small room
   - Size does not allow for optimal positioning

Bed Size

1 Single
   - May enhance mobility, especially for larger clients
   - Adequate space for bedmate

2 Double
   - Preferred by many patients
   - Size may interfere with bed mobility
   - Adequate space for bedmate

3 Queen
   - Allows patient to use hospital bed while bedmate uses nonhospital bed
   - Allows patient to use water mattress while bedmate uses standard foam mattress

4 King (two single beds side by side)
   - Available in various densities and thicknesses
   - Those with vinyl covers resist staining
   - Do not distribute weight or decrease skin pressure
   - Patient’s position must be changed frequently

Mattresses

1 Standard foam
   - Distribute weight and decrease skin pressure
   - Useful for patients with skin “breakdown” or high risk of skin breakdown
   - Will not enhance and may interfere with functional mobility
   - May be heavy and require additional motors or reinforced frame to support the weight

2 Water
   - Distribute weight and decrease skin pressure
   - Provide a poor base of support
   - May interfere with the function of patients

3 Air
   - Distribute weight and decrease skin pressure
   - Provide a firm base of support for functional mobility
   - Available in sections or as a whole mattress

4 Gel
   - Distribute weight and decrease skin pressure
   - Provide a firm base of support
   - Available in sections or as a whole mattress
Mattress Surfaces

A study, "Pressure Relief Characteristics of Six Therapeutic Mattress Surfaces," by I. Herszkowicz et al., was reported in the Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, 1983.

"The objective of this study is to compare the effectiveness of various bed support surfaces in providing pressure relief and redistributing loads away from areas of bony prominence and to determine if body build affects related effectiveness."

The team evaluated these six mattress surfaces: Stryker, ROHO, Puff Pak 2", Puff Pak 4", Gaymar (low cycle) and Lapidus (low cycle), and reached these conclusions:

1. All of the therapeutic mattresses appear to be significantly more effective in producing lower pressures than the standard mattress, especially under the trochanters.

2. The ROHO mattress appears to be slightly more effective in reducing the maximum pressures under the trochanters than the other therapeutic mattresses tested. However, even though the ROHO appears to be more effective in reducing lower pressures, it may be impractical from the nursing care standpoint, due to the difficulty of using it.

3. When considering all of the pressure areas monitored in the study, the therapeutic mattresses are all of statistically equal value in reducing pressures. However, a particular mattress should be matched to a specific patient, since, as can be seen from the ranges noted from each mattress, each subject did do better on one mattress than on the rest.

4. The Lapidus has the disadvantage of a large pump, which cannot be placed under the patient's bed due to its size. This may be a potential problem in some hospitals or home settings, as it is a safety hazard for those taking care of the patient.

5. Females generally have lower maximum pressures than males on all the mattresses tested.

6. There appears to be a slight difference between the "thin" and "average" body type subjects, with thin subjects generally having high pressures under the trochanters and the sacrum.

7. The magnitude of the pressure under the sacrum is often dependent on the patient's lower back curvature which causes the pressure to shift to the coccyx.

Please refer to the article for more specific information on methodology and results.
HOME MANAGEMENT

There are many devices on the market designed to help able-bodied people perform household tasks more efficiently. Because of their design, some require no adaptations for use by disabled people. Other commercially available products need only simple adaptations to be usable.

There are also products made especially to help the disabled person to be more independent. These available gadgets are too numerous to include here. Product information can be obtained from ABLEDATA, or by paging through some of the books in the publications list.

Selected Publications

These two free booklets about designing environments for disabled people, "Aids to Independent Living" and "Designs for Independent Living," show how everyday tools and household products can be adapted for easier use by disabled people. Available free from Appliance Information Service, Whirlpool Corp., Administrative Center, Benton Harbor, MI 49022.

Aids to Independent Living provides suggestions for installing and operating home appliances for easier use by disabled persons. In many instances, a special tool, control or installation may be needed so someone with a disability can use an appliance most conveniently. While most of these modifications are made by the user, some manufacturers do offer special aids to help owners adapt their appliances to meet the need of a specific disability. Such aids include soft adaptor knobs for those with arthritic hands and Braille controls and instructions for blind consumers. Some manufacturers and appliance retailers offer these aids at no charge or at a very moderate cost.

Designs for Independent Living addresses the problems of selecting, positioning, and installing major home appliances in a kitchen or laundry room for most convenient use by homemakers with physical disabilities. While it is designed primarily for those who must work from wheelchairs, many of the designs and ideas can be readily adapted to kitchens and laundries for use by other disabled persons -- strokes, arthritis, multiple sclerosis, heart disease, visual impairment, and many others -- and impose other limitations.


The Disabled Homemaker: Hoyt Anderson, Charles C. Thomas Publisher, 2600 S First Street, Springfield, IL 62717. 1981 Opening chapters focus on psychological need for independence, while realistically pointing out the risks involved in independent living. The following chapters provide advice on personal care and homemaking tasks for both ambulatory and nonambulatory individuals. Also included are architectural considerations.

Homemaking Unlimited Series: A. M. Burton and Trotter Independent Living Rehabilitation, Dept. of Human Development and the Family, University of Nebraska, Lincoln, Nebraska 68583 $0.10 each

1. Easy-to-Use Kitchen
2. No Stoop, No Stretch Kitchen Storage
3. Easy-to-Use Sink Center
4. Easy-to-Use Cooking and Serving Center
5. Easy-to-Use Mixing Center
6. Streamlined Household Tasks
7. The Bathroom Made Safe and Usable
8. Cleaning Supplies -- Keep Them Handy

Brief descriptions of principles and applications for persons with physical disabilities.

Home Management (Equipment for the Disabled Series): Oxford Regional Health Authority 2 Foredown Drive, Post office, Brighton BN4 28B, ENGLAND Lists and describes, with photographs, devices and equipment for the physically disabled homemaker. Covers categories such as safety, kitchen planning, storage, food preparation and cooking, cleaning and refuse disposal. Includes reference and resource lists.

"Kitchen Aids: Resources for the Visually Impaired Cook" Mary Beth Caruso. Aids and Appliances Review, Issue No. 8, Spring 1983. The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158 617/969-6200 This issue presents the most commonly used aids designed for the visually impaired and some alternative uses for everyday cookware. The text is divided into sections dealing with the various aspects of kitchen management and food preparation. A resource guide follows sections where appropriate. Each resource guide is a sampling of the types of aids explained within the text. For simplicity, many of the common use items have been selected from national mail order houses, however, most of these items are also commercially available in local retail stores. The modified or adapted aids listed are available from distributors, nationally and internationally, who specialize in aids and appliances for the visually impaired and blind individual.


TER M OLOGY FOR INDEPENDENT LIVING SOURCEBOO K RESNA 1984
Mealt ime Manual for Peop le with Disabilities and the Aging. Prepared by Institute of Rehabilitation Medicine (New York University Medical Center). Available from Campbell Soup Company, Box (MMI 56, Camden, NJ 08101 1978. Principles, techniques and equipment suggestions for meal preparation and homemaking. Updated to include information on food processors, etc. This is a highly recommended book.

On Your Own. Division of Continuing Education, University of Alabama. Published monthly from January, 1970 through December, 1980. Produced as a special project of the Division of Continuing Education in Home Economics program at the University of Alabama, this newsletter provided information about methods of adapting the home environment for use by disabled people. Designed for use by disabled homemakers and professionals working with them.


Audiovisuals.


The Homemaker with the Use of One Hand. Station K, Atlanta GA 30324. National Medical Audio-Visual Center (Annex), M-2243-X. 16mm color, sound, 28 minutes. Free on short-term loan. Describes equipment, kitchen planning, and techniques of one-handed cooking and kitchen work.
TECHNOLOGY AT HOME

PERSONAL CARE

Bowel Management, Accent Special Publications, Box 700, Bloomington, IL 61701

Disabled Eve Aids in Menstruation, Disabled Living Foundation, 346 Kensington High Street, London, W14 8NS ENGLAND

Personal Care, Equipment for the Disabled Series, Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB ENGLAND

Lists and describes, with photographs, personal care aids for disabled persons. Covers categories such as grooming, bathing, toileting, incontinence and pressure sore prevention. Discusses do-it-yourself materials and includes a section on problem-solving.


CLOTHING

Clothing For Handicapped People, An Annotated Bibliography and Resource List, Naomi Reich, Patricia Otten, Marie Negr Carver, University of Arizona, Tucson, AZ 85721. Available from President's Committee on Employment of the Handicapped, Washington, DC 20210 1979. This book is comprehensive, it seems to list everything related to clothing prior to its publication date in 1979. If you are interested in any aspect of clothing, start with this book.

Other Publications on Clothing

These have been printed since 1979, and are therefore not in the above bibliography.


Adapted Shirts to Fit Over a Halo Vest, VA Motlitz, American Journal of Occupational Therapy, 8, 524–525 1979

Clothes for Disabled People, Maureen Goldsworthy, BT Batsford, Ltd, North Pomfret, VT 05052, 117 pages $11.95 1981

Clothing and Dressing for Adults, ER Wilshire, Editor, Oxford Regional Health Authority, 2 Foredown Drive, Postslade, Brighton BN4 2BB ENGLAND, 67 pages $11.05 1981. Booklet includes a variety of readily available clothes, a range of patterns showing different styles and features which may provide ideas for the home seamstress, as well as various specially designed clothes and adaptations.


Clothing for the Handicapped, the Aged, and Other People with Special Needs, A Hoffman, Charles C Thomas, Publisher, 2600 South First Street, Springfield, IL 62717. 176 pages $14.75 1979. A comprehensive volume providing information on all aspects of clothing needs of the physically disabled, aged, chronically ill, and mentally retarded. Included are psychological aspects, selection and adaptation of clothing, and sources of specially designed clothing.

The Cover-up Neckwear for the Laser-Gynecomee and Other Neck-Breather. Dan H Kelly and Peggy Wellborn. College-Hill Press, 4580 E Alvarado Canyon Road, San Diego, CA 92123. 98 pages $15.00 1980

Information Systems for Clothing and Daily Living Needs of Handicapped People, P Reich, N Reich, and J Mott, University of Arizona, Division of Clothing, Textiles, and Interior Design, School of Home Economics, Tucson, AZ 85721. 93 pages. $5.00 1980

A Manual for Solving Clothing Problems for Persons with Physical Disabilities, Kay Caddel. Route 8, Box 1272. Lubbock, TX 79407. $3.00. Describes how to take body measurements of a disabled person, to identify fitting problems and to adjust patterns for home sewing.

SHOES

Cinderella Shoes specialize in sizes 1 1/2 through 5.

Helen's Shoe Service, Route 4, Red Wing, MN 55066. File of information and service to individuals who wear two different sized shoes or only need one shoe. Correspondence carried on between those who have available shoes and those who need them to facilitate exchange.

Hill Brothers, 99 Ninth Street, Lynchburg, VA 24504. Free catalog of hard-to-find ladies' shoes sizes 2 1/2 to 14, AAAA to EEE.

National Odd Shoe Exchange, 3100 Neilson Way, Apt 220. Santa Monica, CA 90405. You send your name in to seek a mismate with whom to exchange shoes. Does not handle the shoes themselves, only names of people.

Jeanne L Sallman, Odd Shoe Exchange, RR4, Indiana, IA 50125. $15 registration fee, plus annual dues of $7.50.
ARCHITECTURAL ADAPTATIONS

Access Information Bulletins, National Center for a Barrier Free Environment, 1015 Fifteenth Street NW, Washington, DC 20005 May, 1981

Accessibility Assistance A Directory of Consultants on Environments for Handicapped People National Center for a Barrier Free Environment, Washington, DC $3.25 1978

Barrier Free Design Equipment and Aids Catalog Michigan Center for a Barrier Free Environment, 6879 Heather Heath, West Bloomfield Michigan-48033 1978 $5.00


"Designing for the Handicapped" Better Homes and Gardens Building ideas Spring 1983 issue $2.50 pp 97-111

Design for Independent Living Raymond Lifchez and Barbara Winslow Watson-Guptill Publications, 1515 Broadway, New York, NY 10036 1979 208 pages $25.00 (also available in softcover)


Home in a Wheelchair Joseph Chasin, Jules Saltman, Editor Paralyzed Veterans of America, 801 18th Street NW, Washington, DC 20006

The House Book, 1974, 448 pages Terence Conran New York, NY $30.00 Small concise section on design ideas for the disabled and elderly

Housing and Furniture Equipment for the Disabled Series Oxford Regional Health Authority, 2 Foredown Drive, Postislade, Brighton, BN4 2BB, ENGLAND Lists and describes, with photographs, adaptive furniture and housing accommodations for physically disabled persons. Covers categories such as ramps, handrails, doors, stairs and lifts, windows, electrical fittings, beds, chairs, and other furniture adaptations and accessories

Housing Interiors for the Disabled and Elderly Bettyann Aschko Van Nostrand Reinhold, New York, NY 1982 360 pages $34.50

Ideas for Making Your Home Accessible B Gale, editor Accent Special Publications, Cheever Publishing, Inc, P O Box 700, Bloomington, IL 60701 1979 104 pages $6.50 Describes architectural adaptations to make houses accessible to people who use wheelchairs. Discusses costs, location, garage, entrance, general interior, kitchen, bathroom, living room, mobile homes, ramps and lifts. Lists sources of equipment and devices, publications on accessibility, and ideas about funding. Illustrated with drawings and photographs


Tools for Accessibility A Selected List of Resources for Barrier Free Design National Center for a Barrier Free Environment, 1015 Fifteenth Street NW, Washington, DC 20005 May 1981

Wheelchair Bathrooms Paralyzed Veterans of America, Inc, 801 18th Street, NW Washington, DC 20006 1971

Wheelchair House Designs Eastern Paralyzed Veterans Association, 432 Park Avenue South, New York, NY 10016

Wheelchair Interiors Sharon Olson and Diane Meredith National Easter Seal Society, 2023 W Ogden Ave, Chicago, IL 60612 1973

Organizations

Adaptive Environments Center
621 Huntington Avenue
Boston, MA
617/739-0088

Architectural and Transportation Barriers Compliance Board (A&TBCB)
330 C Street SW
Room 1010 Switzer Building
Washington, DC 20202
202/245-1591

National Center for a Barrier Free Environment (NCBFE)
1015 Fifteenth Street NW #700
Washington, DC 202/466-6896
MORE PUBLICATIONS ON AT-HOME TECHNOLOGY AND TECHNIQUES

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Publisher</th>
<th>Date</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Bed and Bath Book</td>
<td>Terance Conan</td>
<td>Crown Publisher's</td>
<td>1973</td>
<td>$6.95</td>
</tr>
<tr>
<td>Do It Yourself Again: Self Help Devices for the Stroke</td>
<td>Alex H Townsend</td>
<td>American Heart Association</td>
<td>1982</td>
<td>$5.00</td>
</tr>
<tr>
<td>Handicapped at Home: Sydney Fott's Quick Fox</td>
<td>Owens-Corning</td>
<td>Beaufort Books</td>
<td>1977</td>
<td>$11.95</td>
</tr>
<tr>
<td>Helping the Handicapped: A Guide to Aids Developed</td>
<td>Jean V Sargent</td>
<td>Iowa State University Press</td>
<td>1981</td>
<td>$10.50</td>
</tr>
<tr>
<td>Independent Living for the Handicapped and the Elderly</td>
<td>Elizabeth May, Nina R Waggoner, and Eleanor B Hotte</td>
<td>Houghton Mifflin Company</td>
<td>1977</td>
<td>$20.00</td>
</tr>
<tr>
<td>Instructional Materials in Independent Living: A Bibliogra</td>
<td>Alex H Townsend</td>
<td>American Foundation for the Blind</td>
<td>1978</td>
<td>$5.00</td>
</tr>
</tbody>
</table>

Note: The list includes books, articles, and other resources related to technology for independent living. Prices and availability may vary.
International Guide to Aids and Appliances for Blind and Visually Impaired Persons, 2nd edition
American Foundation for the Blind, 15 W 16th Street, New York, NY 10011
Printed by Pot City Press, Baltimore MD 21208, 255 pages. This is a comprehensive guide to more than 1,500 devices of 270 distributors in 28 countries. Listings for each item include name, manufacturer's address, price, availability, description. (Out of print)

It Isn't Always Easy But It's Possible To Lipton, Inc., Englewood Cliffs, New Jersey, 1976
A booklet that describes how to teach food preparation skills to blind people

The One Hander's Book, A Basic Guide to Activities of Daily Living Veronica Washam The John Day Co., 10 East 53rd Street, New York, NY 10022

Physically Handicapped: Aids to Self-Help in Home-Making, Grooming, and Clothing ES Hinshaw and D.L. Barrier Agricultural Extension Service, North Carolina State University at Raleigh, State University Station, Raleigh, NC 27604 $0.25

Product Inventory of Hardware, Equipment and Appliances for Barrier Free Design Second edition, 1981 National Handicap Housing Institute, 12 South Sixth Street, Minneapolis, MN 55402

Rehabilitation Engineering Sourcebook Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046 1979

Rehabilitation for Independent Living A Selected Bibliography President's Committee on Employment of the Handicapped, Washington, DC 20402 $4.50

Self Help Manual for Arthritis Patients Judith Lonnefeld Klinger Prepped by the Allied Health Profession Section, Arthritis Foundation, 3400 Peachtree Road NE, Suite 1101, Atlanta, GA 30326 Available from Arthritis Foundation, 221 Park Avenue South, New York, NY 10003 1974 $1.50

The Source Book for the Disabled Glora Hale, editor Paddington Press, Ltd Distributed by Grosset & Dunlap, New York 1979

Therapeutic Devices, 1956-1976 J Bellman, et al American Journal of Occupational Therapy, American Occupational Therapy Association, Inc., 6000 Executive Blvd, Rockville, MD 20852 Do-it-yourself instructions for devices which have appeared in AJOT, includes wheelchair trays, ADL devices, communication aids, etc 112 pp 1977

Toward Independence: The Use of Instructional Objectives in Teaching Daily Living Skills to the Blind Anne Yeardon American Foundation for the Blind, New York, New York 1978


Other Resources
More information useful to disabled people in their homes is available from these national organizations

American Council of the Blind
1221 Connecticut Avenue NW
Washington, DC 20036
202/833-1251

American Foundation for the Blind
15 West 16th Street
New York, NY 10011
212/620-2000

American Heart Association
7320 Greenville Avenue
Dallas, TX 75231
214/750-5300

Arthritis Foundation, Inc
134 Spring Street NW
Atlanta, GA 30309
404/872-7100

National Easter Seal Society
2023 West Ogden Avenue
Chicago, IL 60612

Paralyzed Veterans of America
801 18th Street, NW
Washington, DC 20420
202/872-1300

President's Commission on Employment of the Handicapped
Washington, DC 20402

United Cerebral Palsy Associations, Inc
66 East 34th Street
New York, NY 10016
212/481-6300

United Cerebral Palsy Institutes
66 East 34th Street
New York, NY 10016
212/481-6300
WHAT IS AN ENVIRONMENTAL CONTROL SYSTEM?

"As a result of severe physical impairment, many people are unable to perform tasks normally suited to able bodied people. When operation of electrical devices is desired, frequently the device or the method of operation can be adapted to fit the capabilities of the physically handicapped."

An environmental control system permits a physically disabled person to control his or her immediate surroundings without assistance. The person becomes able, independently, to turn lights, radio and television on and off, to answer or initiate telephone calls, and to unlock a door. Virtually any aspect of the environment can be controlled depending upon the complexity of the system used. A variety of switches ensures that the equipment can be operated easily regardless of the disability. The objective is to use modern technology to enable physically disabled people to gain greater personal independence, a better quality of life and to add a new dimension to the rehabilitation process.

"The technical components of an environmental control system are the switch, the control box, the feedback information display, and the appliances to be controlled. The complete environmental control system also includes the disabled person and the environment over which he/she is able to exercise control."

For devices which assist a blind or deaf person to control his/her environment, see SENSORY AIDS in CONTROL, COMMUNICATION & SENSORY AIDS

HOME CONTROL SYSTEMS WHICH HAVE BEEN ADAPTED TO THE NEEDS OF THE SEVERELY DISABLED

"New environmental control systems for the severely disabled which have become popular utilize a controller energized from a 110 volt outlet which transmits push-button commands over the house wiring to appliance modules which are also plugged into 110 volt outlets. The controller module systems were originally developed for home use by the general public and require no special home installation or wiring. These systems have been adapted for use by severely disabled persons through the use of rocker, 'puff' and 'sip' switches, or other low form switches.

"The controller-module systems have the advantage of low cost. The following prices are all approximate and as of July 1982: Modules $1700 to $2000 each, four-function controller $1160, eight-function controller $1360, rocker lever switch $43, 'puff' and 'sip' pneumatic switch $90.

"A few words of caution in the utilization of home controller systems: "Care must be taken in the handling of the molded plastic controller enclo-
# HOME ACCESS AND MODIFICATIONS

Jim Tobias  
Rehabilitation Engineering Volunteer (REV) Network

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<th>COST</th>
<th>NOTES</th>
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<tr>
<td>ENVIRONMENTAL</td>
<td>BSR X-10 Standard</td>
<td>$50-$120</td>
<td>Available in several models. 16-appliance master control or ultrasonic remote control with small push-buttons similar to a calculator, and mini-controller for 4 appliances. Larger and easier buttons. Both versions have bright and dim functions for lights. You need one master and as many modules as appliances as you want to control. Modules to replace wall switches (for overhead lights) are available. Sold as 'Plug n' Power' Home Controller.</td>
</tr>
<tr>
<td>CONTROL</td>
<td>BSR X-13 Modified</td>
<td>$160-$240</td>
<td>Can control four or eight devices (2 models). Good rocker-type switch. 4-device master. 3 modules, $190. With 8-device master, $210. Other switches, such as sip-and-puff, can be used. They require a 5-pin DIN plug. Contact BSR or REV Network for wiring information. Available at some medical houses, Prentke Romich, or BSR, R13 303, Blauvelt, New York 109 13, phone (914)358-6060.</td>
</tr>
<tr>
<td></td>
<td>Touchplate Switch</td>
<td>$20/kit</td>
<td>Available from Heath-Kits (see phone for local store) or other electronics sources. Relatively easy to build with soldering iron, a few tools. Plug appliance into switch box, plug switch box into wall. Current limits are: Lamps &amp; Heaters = 300 watts, TV Receivers = 225 watts, Fans, Blowers, etc = 180 watts. Small metal disk can be placed anywhere, requires just a light touch to turn device on or off. Can use more than one in the same dwelling. Not recommended for radios and some stereos, due to audio interference.</td>
</tr>
<tr>
<td></td>
<td>Whistle Switch</td>
<td>$20</td>
<td>Available from electronics or some department stores, also Carol Wright Gifts, Box 8502 Lincoln, NE 68544, or Neil H in Co., Box 132, Jackson, MO 63755. As above, plug appliance into wall. Transmitter is really a squeeze whistle. Device may triggered accidentally by jangling keys, dog whistle, etc. Only one per room. Do not use with a dog in the house.</td>
</tr>
<tr>
<td></td>
<td>Computer environmental controls</td>
<td>$100-$400</td>
<td>All brands of home computers now offer plug-in peripherals designed to work the BSR modules described above. If you use a computer already, this may be an inexpensive way to go. Call-off low-cost computers can also be found as donations. Some software is available to make these easy to use. See Trace Center's International Software Hardware Registry. Contact REV Network for suggestions and software help.</td>
</tr>
<tr>
<td>TELEPHONE</td>
<td>Various Dealers</td>
<td>$40-$120</td>
<td>Many electronic outlets offer automatic dialers, which can store 5-40 commonly used phone numbers, recalled and dialed automatically. Some can repeat dial if there is a busy signal, some are complete with telephone handsets and touch-tone pads. Radio Shack sells one for 16 numbers for $50.00.</td>
</tr>
<tr>
<td>FUNCTION</td>
<td>DEVICE</td>
<td>COST</td>
<td>NOTES</td>
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<td>-----------------------------------------------------------------------</td>
</tr>
<tr>
<td>TELEPHONE,</td>
<td></td>
<td></td>
<td>Suggestion: Check all local stores and try them all out, don't buy</td>
</tr>
<tr>
<td>cont</td>
<td></td>
<td></td>
<td>more storage than you really need</td>
</tr>
<tr>
<td>Phone</td>
<td>Phone Directories</td>
<td>$5-$25</td>
<td>Stationary stores, Radio Shack sell motorized personal phone directories that can hold several hundred names and addresses; they operate by push-button to either scroll or flip pages like a Rolodex. Perfect for other uses, such as workplace modifications.</td>
</tr>
<tr>
<td>Cordless</td>
<td></td>
<td>$50-$200</td>
<td>These are mobile phones with a stationary base unit. You can mount the portable part on your wheelchair for hands-free private conversation (an advantage over speaker phones). Find a model with a hand-up/lift-up switch you can use, or modify it. Prices of the models are indicative of reliability, range, and resistance to interference. Beware of the cheapest ones. (See warning on cordless phones)</td>
</tr>
<tr>
<td>Visual</td>
<td></td>
<td>$20</td>
<td>Radio Shack offers a “Fo-Flasher” which lets you connect a lamp (or whatever) to your phone line such that when your phone rings, the lamp flashes.</td>
</tr>
<tr>
<td>TELEVISION</td>
<td>Mechanical Channel Selector</td>
<td>$17</td>
<td>This is a mechanical device that attaches to the stem of the channel knob. A long cable like the one on a bicycle brake runs to a hand-held unit that has a rotary lever. To operate, you turn the lever, it takes a good amount of force. It would be possible to extend the lever arm to minimize force required. Another disadvantage is having the cable lying around and getting in the way. No permanent modification to the TV, and you can move it from one set to another. Available from Starcrest of California, 3159 Radcliff Avenue, Costa Mesa, California 92626. Get their catalog before you order, or contact manufacturer RAMCO, 7271 N Cicero, Lincolnwood, Illinois 60646.</td>
</tr>
<tr>
<td>TELEVISION,</td>
<td>Electronic Channel Selector</td>
<td>$60-$120</td>
<td>Available in at least two models from Jerrold. Should be at your local TV repair or specialty store. Both models are remote-wired push-button channel changers, one for standard broadcast, the other for cable. Easy to install. You can put the box wherever you want it. Buttons are relatively stiff. No commercially available keyguards.</td>
</tr>
<tr>
<td>UNLOCKING</td>
<td>Electric Door Lock</td>
<td></td>
<td>Available through average lock shop. Manufacturer is Trane Company. Many models available.</td>
</tr>
<tr>
<td>DOOR</td>
<td>Electric Strike</td>
<td>$25-$30</td>
<td>If you are installing it yourself, you will need good tools and good measurements. Lock shop will charge $7.50 to install it.</td>
</tr>
<tr>
<td></td>
<td>12 VAC, 1 amp</td>
<td>$10</td>
<td>Should be enclosed in chassis box and equipped with a 2 amp fuse (slv. b/w)</td>
</tr>
</tbody>
</table>
FUNCTION | DEVICE | COST | NOTES
--- | --- | --- | ---
UNLOCKING | Radio Control | $40-$90 | Generally, the more expensive ones have more codes on the transmitter for more security. Sears garage door kits cost $75.00 for transmitter and receiver. (See Note 1)

NOTE 1 Test transmitter and receiver before mounting. Be sure user can operate transmitter button, or modify it with a big plastic plate, etc. Mount the receiver near the door. User can probably push door easily, make sure he/she can pull door (as is, with a door knob strap, or convenient pulley arrangement).  

NOTE 2 Some disabled people may be able to use the standard models, with or without a keypad (not commercially available). Modified design has no ultrasonic remote control. These devices are expensive, but they have some drawbacks. Limited current (no heaters or air conditioners, for example) interference (from wireless intercoms, heavy motors, etc.), but they are easy to install and change, since they plug into the wall outlets.

GENERAL INFORMATION

Knobs Sometimes all you need is a big knob to fit the same control stem. Most TV and radio repair shops have a box of junk for this kind of knob. Plastic parts, etc. Bring your knob to ensure a match in sizes. If that doesn't work, glue or screw an extender arm onto the knob.

Switches Toggle switches can be adapted with a short length of stiff plastic or metal tubing to add leverage. You may have to replace the switch, however. Make sure you get on that matches the chassis hole size, current limit, number of poles, type of activation, etc. Ask for help at an electronic store.

Pushbuttons A small pushbutton can be adapted by using a flat lever over the button to make a bigger "target," or by gluing on a slightly larger plastic plate, or by putting a sort of keypad on the chassis if the problem is hitting more than one button at a time. Otherwise, you may have to replace the button with a bigger or softer-action one. See above for matching information.

Where To Get Help
- Put up a sign in an electronics shop.
- Trade unions (ask about retired workers apprentices).
- High school shop department.
- Telephone Pioneers (call telephone company business office for their number).
- Vocational schools.
- Local technology companies (try the public relations office).
- Colleges, especially engineering and industrial design departments.
- Special vocations schools.
- Computer user groups.

Remember, with all of these people, make sure you define the problem and keep tabs on their designs. These little gadgets should be cheap, unbreakable, attractive, and useful. Only the user can guarantee use. Often people doing a project as a hobby want to experiment with components and devices for their own amusement. That's okay, but it shouldn't get in the way of the service you are requesting.

If you turn up a "live one, someone competent and attuned to the user's needs, cultivate them. Also, have them contact us for information exchange.  

Jim Tobias  
Rehabilitation Engineering Volunteer (REV) Network  
201 W 85th Street #2E  
New York, New York 10024  
212/874-0312  

Also see sections on CONTROLS, COMMUNICATION, AND COMPUTER APPLICATIONS.
A CONSUMER ALERT was reported by Judy Berke in the April 1984 issue of The Coordinator Magazine.

CONSUMER ALERT

"We have received communiques from some readers telling us about repair problems in electronic protection systems. These are the systems in which a device -- either part of a "terminal" or worn as a pendant -- signals a self-dialer to connect into a hospital, police station or central computerized office (The devices can be either one or two way). Most of these systems seem quite valuable to the elderly or infirm who spend a lot of time alone.

"However, it now seems that many of the systems are sold by independent operators. In some of these cases, neither the salesperson nor the parent company is taking true responsibility for repairs, service and replacements of the system although some of them offer what looks like a good warranty until the customer needs to use it. Then the complications begin.

"If you or any of your patients are contemplating the lease or purchase of one of these systems, ask the following questions:

1. How long is the warranty, and does it cover both labor and parts?
2. Where will the repairs be made? If the location is in another town, is postage or shipping covered in the warranty?
3. Will the local rep pick up the machine for mailing? (Sometimes it is difficult for a patient or older person to get to a post office.)
4. Will the rep or company supply a 'loaner' while the system is being repaired?
5. Is reprogramming of the machine (usually phone numbers) difficult? Can the consumer do it? If a service rep must reprogram, can it be done in the home or must the machine be transferred somewhere else? If reprogramming must be done by special equipment, does the local rep have that equipment? In either case, again, if the machine will be out of order for any amount of time, is there a loaner?
6. If the representative cases to handle the equipment, is there another representative in the area who will take over service?

"These questions arise because of past problems some of our readers have had with servicing of their protective systems. Most of the systems we have seen seem to be of excellent quality, but quality is also measured by service reliability and consumer safety. Quality is certainly not directed [sic] if one is without the system because of repair or reprogramming service problems."

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WARNING ON CORDLESS TELEPHONES

The following warning on cordless telephones, by Congressman Henry A. Waxman, appeared in The Coordinator, April 1984.

"Users of cordless or portable telephones should always make certain that the phone is in the 'Talk' position before bringing the phone to their ear. Should the phone ring while still in the 'Listen' position, the user may be exposed to an extremely loud ring.

"Some cordless phone users have complained that the ring was so loud as to be painful. Some doctors speculate that the ring might result in some hearing loss.

"To file complaints or obtain additional information, consumers should call the Consumer Product Safety Commission toll-free hotline at 1-800-638-CPSC. The teletypewriter number for the hearing impaired is 1-800-638-8270."

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Design for Independent Living: Raymond Lifchez and Barbara Winslow. Watson-Guptill Publications, 1515 Broadway, New York, NY 10036. 1979. 208 pages. $25.00 (also available in soft cover).

Environmental Control Systems and Vocational Aids for Persons with High Level Quadriplegia. Institute of Rehabilitation Medicine, New York University Medical Center, Rehabilitation Engineering Center, 400 E 34th Street, New York, NY 10016. 1979. Clinical evaluation of electronic devices.


Product Inventory of Hardware, Equipment, and Appliances for Barrier-Free Housing Design.

National Handicap Housing Institute, Inc., 12 S 6th Street, Suite 1216, Minneapolis, MN 55402. 1981. The section on Hardware (po 193-276) covers door levers, door and cabinet pulls, hinges, automatic doors, shelf brackets, grab bars.

Film

The Box and I. Canadian Rehabilitation Council for the Disabled. Available from Marlin Motion Pictures, 1 Younge Street, Suite 2110, Toronto, Ontario M5E 1E8, Canada. 16 mm color, 22 1/2 minutes. 1978. Illustrates the use and benefits of environmental control units in various settings.
Environmental Control

Mouthstick and holder allow use of inexpensive general consumer marketplace environmental control unit (J3SR-10)

Drawing reprinted from A Guide to Controls, Children's Hospital at Stanford

Home Access

Bracket and transmitter allow independent home entry, using garage door opener modified for front door use

Drawing reprinted from A Guide to Controls, Children's Hospital at Stanford
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INTRODUCTION

Technical aids can be beneficial to students at all levels of the education process, from kindergarten to post-secondary. In the existing literature, the emphasis for the elementary school child seems to be on finding the most appropriate aid for communication, positioning, mobility and self-care. A good deal of the literature focuses on the most severely disabled children, and the emphasis tends to be on personal aids for the individual child. As the high school years are reached, and it is assumed that basic needs are met, the approach changes to finding technology to make the classroom useable for the disabled teenager. This same orientation holds through the college years, with increased emphasis on making the entire campus accessible.

This section contains references to all three stages. I believe that those seeking information about technology that can aid education will look beyond their immediate target age range or disability. There is benefit to be gained in crossing disciplines. You may find that you can readily apply much of this information to your own area of interest.

There are some glaring gaps in the literature. I would like to find more information about adapting existing classrooms at the primary school level and about approaches to meeting basic needs, such as mobility and written communication, for the secondary school age group. Additionally, there is a dearth of information about how devices could be better used by less severely disabled kids.

Attention to the benefit to be gained from applying technology in all three areas relevant to education -- person, classroom, and campus -- needs to occur throughout the education process, not one step at a time.

TECHNOLOGY SERVICE DELIVERY

"For this technology to be most beneficial, an effective and coordinated delivery system of technological services is essential. The objective is to assure that students in need of adaptive aids and equipment have access to them and are trained in their most efficient use.

"In the past, a variety of agencies have been involved in seeking assistive devices for handicapped children, ranging from Easter Seal Societies and the March of Dimes to service 'sibs and others. With the advent of federal and state mandates and funding, university programs, hospitals and rehabilitation centers, state and local education agencies, and regional resource centers have also become concerned with service delivery. This has resulted in an increase in the availability of services, but even in a real concern that such fragmented, piecemeal service might be neither comprehensive nor cost-effective.

"Although there have been significant technological advances in the development of assistive devices, there still remains the task of assuring that they become available to those persons who could benefit from them. To accomplish this goal, it is essential that all related disciplines -- researchers, engineers, educators, manufacturers, therapists, and medical personnel and patients -- coordinate their efforts on a statewide and national basis."


ARE WE LOOKING FOR PROBLEMS?

Joseph J Stowitschek adds a voice of concern in the forward to that issue.

"As we develop technology, we must continue to ask ourselves Are we developing, testing, and using technology to solve problems? Or, ready with enthusiasm, do we produce solutions for which we must then find problems? For instance, the growing interest in microcomputer-assisted instruction may tend to foster the development of a solution for which a problem must then be located. In this mood of enthusiasm over the technology itself, we tend to treat each technological device as an entity in and of itself, instead of as part of a whole range of instructional options.

The questionable logic behind this tendency is as follows: "The (microcomputer) is becoming popular and can be used to teach. We need assistance in teaching handicapped children, therefore, the (microcomputer) should be used to teach ( ) skills to ( ) children.

Instructional alternatives should not be ignored."

Technological Advances in Special Education, the Winter 1984 issue of Exceptional Education Quarterly

PROJECT TEACH: A MODEL APPROACH

"The provision of appropriate technical aids within an educational setting can have a profound impact on improving the educational achievement experienced by severely handicapped children. In some cases, the support of technical services can lead to the mainstreaming of children that otherwise would not be candidates.

"Technical aids can assist the handicapped child to actively participate in the educational program. Federal and state policy makers need to be made aware of the potential of technical resources to supplement the goals mandated by Public Law 94-142 -- Education of the Handicapped Act -- so that these resources can be planned into budgetary allocations for implementation in the future."

Project TEACH (Technical Educational Aids for Children with Handicaps) was a cooperative project by Memphis City Schools Division of Special Education and University of Tennessee Rehabilitation Engineering Program that developed a model program for providing appropriate technical aids within a regular educational setting in 1978-1981.
The provision of technical aids, whether it be a commercially available device, a modified commercial device, or a custom-designed device, should be preceded by a multi-disciplinary evaluation in which the abilities, potential, and needs of the child are carefully defined.

When attempting to meet the educational needs of severely handicapped children, commercial technical devices as the sole source will rarely be sufficient to meet the wide-ranging needs of these children. Additional technical resources which will permit the custom modification of commercial devices and/or the design of unique customized devices will be necessary.

The provision of specialized technology, upon which the child and the special educator become dependent, must be supplemented by a maintenance and repair capability that can rapidly respond to malfunctions or breakdowns in the equipment.

The more sophisticated the technology, the more essential the need for liaison personnel to explain the operation and features of the devices, and provide immediate support if it appears that the "gadget tolerance" of the teacher or student is being exceeded.

That there be a person or persons within the educational setting that have been assigned the responsibility for the ongoing evaluation, updating, maintenance, trouble-shooting and liaison related to the technical aids being used by children and teachers in the educational setting.

Support be provided to facilitate the mainstreaming of children with specialized technical aids, especially during the critical periods when the child first enters the regular classroom.

That the necessary arrangements be made, particularly related to seating, powered mobility, and communication aids, so that a child can benefit from the devices during evenings, weekends, and summer vacations; i.e., so that the devices can truly become integrated into the child's total activities.

That the most expensive devices are not necessarily the most appropriate devices; i.e., there is no linear relationship between cost and effectiveness. When all factors are considered, the choice of the most appropriate aid is based on the child's abilities, potential and needs, and not on the potential offered by the features of a sophisticated device.

Since breakdowns with lengthy repair delays can severely interrupt and demoralize a student, durability of equipment should be a major consideration during the evaluation and equipment selection process.

Routine maintenance and repair of technical devices is necessary for their proper functioning. Our experience indicates an additional 10% expense above cost of provision of technical aids should be budgeted for the ongoing maintenance and repair.

The full report is available for $5.00 from Memphis City School, Division of Special Education, 2541 Avery Avenue, Memphis, TN.

A movie about the project, "A Special Magic," is also available.

Also see Service Delivery Models, page 257, in the section on FUNDING, MODELS, POLICY, STATISTICS.

ORGANIZATIONS

These groups have a particular interest in disabled children and technology in the classroom.

Artificial Language Laboratory
Department of Computer Science
Michigan State University
East Lansing, Michigan 48824
517/332-1970

Assistive Device Center
California State University-Sacramento
6000 J Street
Sacramento, California 95813
916/454-8316

Children's Hospital at Stanford
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, California 94304
415/327-4800

The Communication Aids and Systems Clinic
University of Wisconsin Madison
1500 Highland Avenue
Madison, Wisconsin 53705
608/293-7725

Educational Technology Center (ETC)
Box 64
Foster, Rhode Island 02825
401/822-4622

The Non-Oral Communication Center
Plavan School
9675 Warner Avenue
Fountain Valley, California 92708
714/425-6220

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8
Canada
416/425-6220

PAM Assistance Centre
601 W Maple Street
Lansing, Michigan 48909
517/371-5897

Tufts University
Rehabilitation Engineering Center
171 Harrison Street
Boston, Massachusetts
617/956-5036
A RESOURCE CENTER AND DATABASE PROVIDING EDUCATIONAL AND VOCATIONAL ACCESS TO TECHNICAL FIELDS FOR PERSONS WITH DISABILITIES

"Students with disabilities are underrepresented in the fields of science and engineering. One reason for this is a lack of information regarding methods by which they can complete educational programs (particularly involving laboratories) and successfully complete careers. Specifically, information regarding adaptive equipment, altered instructional formats and resources appropriate to aiding students and faculty is not readily available to these people. All too often, college students with disabilities are advised against entering specific fields or taking certain classes for fear their disability will present them from full participation.

"Much of this situation is the result of 1) lack of knowledge regarding adaptive aids, and 2) the failure to procure or develop/modify aids in time for the student to access the class or the employee to meet job requirements. The irony and indeed tragedy of this situation is that an abundance of information on aids exists. Rehabilitation professionals are virtually inundated with information on new products from a variety of sources, including conferences, workshops, computer fairs and expositions. With this information explosion, the problem is one of information storage and retrieval.

"As a response to these problems, we developed a resource center, including a computer database, that provides information helpful to disabled individuals desiring to study science or engineering."

From a paper by Helen E. Woodall and Albert M. Cook in the Proceedings of the Sixth Annual Conference on Rehabilitation Engineering, San Diego, 1983.

The database is now available to other institutions and the general public: see ADDS in the INFORMATION RESOURCES section, page 9.
**EDUCATIONAL AIDS INFORMATION RESOURCES**

**MANUFACTURERS OF CLASSROOM AIDS**

For information on Manufacturers & Distributors of equipment for children and the severely handicapped are answered by TASH's Information Department. TASH maintains a library of resource materials. The Information Department also conducts surveys of integrated schools and parent needs.

**ORGANIZATIONS**

Council for Exceptional Children (CEC)
1920 Association Drive
Reston, VA 22091

For more information on CEC, see the Microcomputer Applications section, page 243

HEATH (Higher Education and the Handicapped) Resource Center
One Dupont Circle NW
Washington, DC 20036
202/333-4707 (voice /TTY)

The HEATH Resource Center is a national clearinghouse on postsecondary education for disabled people. A program of the American Council on Education, it is funded by the U.S. Department of Education. It publishes a regular newsletter.

National Association of State Directors of Special Education (NASDS)
1701 16th Street NW, Suite 610E
Washington, DC 20036

The Technology and Media for Exceptional Individuals (TAM) is an international organization which facilitates closer relationships between educators and others concerned with the application of technology to meet the needs of gifted persons, senior citizens, and individuals experiencing handicaps. TAM is a division of the Council for Exceptional Children, will develop new technologies and disseminate this information through professional meetings, training programs, and publications. The organization will also cooperate with education and government agencies as well as business and industry in research, demonstration, review and validation, among other professional studies.

TAM will publish a journal and newsletter, conduct training programs, conferences and workshops, develop new technology and media network, and plans to evaluate and field test equipment and software.

**DATABASES AND INFORMATION NETWORKS**

These systems have a strong educational focus.

For more information on these and other electronic information exchanges, also see Information Resources and on Microcomputer Applications.

**The Assistive Device Database System (ADDS)**
American International Data Search, Inc
2326 Fair Oaks Boulevard, Suite C
Sacramento, CA 94205
916/925-4554

Handicapped Education Exchange (HEX)
11523 Charlton Drive
Silver Spring, MD 20902
301/681-7372

HEX is a computerized bulletin board, available through the public telephone network. It is primarily intended as a free service to those involved in the education of, or communicating with, the handicapped. It serves as a means of exchanging ideas and information concerning application of technology to aid the handicapped.

Handicapped Learner Materials Distribution Center
Audio-Visual Center, Indiana University
Bloomington, IN 47405
812/337-1511

The Handicapped Learner Materials Distribution Center (HLMD) is a part of the Special Materials Project established by Indiana University. HLMD loans, free (except for return postage) selected materials such as films, videotapes, kines, games and adaptive devices relevant to the general special education population. Materials are divided into three collections represented by separate catalogs: 1) teacher training materials in special education and media production (mostly of 16mm films), 2) handicapped learner collection (mostly classroom curricular materials, primarily for examination and evaluation), and 3) videotapes that are duplicated into other formats at cost. These services are available to anyone in the USA involved with education a handicapped learner.

SpecialNet

SpecialNet, a special education communication information network, is part of a computer network accessed by a terminal with telephone communication capability. It provides information on special education, improves programs and skills, and a network of educators and organizations involved in special education. It also features personal correspondence and information retrieval access to major databases, as well as data collection and information management systems. At least two of sections of SpecialNet will be focused on technical aids EDUTECH and ASSISTIVE DEVICES.
TECHNOLOGY IN THE CLASSROOM: RESOURCES

- Able Scientists: Disabled Persons Biographical Sketches Illustrating Careers in the Sciences for Able Disabled Students. S. Phyllis Stearn Foundation for Science and the Handicapped. 154 Juliet Court, Clarendon Hills, IL 60515. 312/323-4181. $12.95. The major objectives of this publication are to illustrate possible career options open to physically disabled students and to encourage teachers, counselors, and parents to help scientifically talented and disabled students get the education they need to prepare for scientific careers.


- Adaptive Equipment for the Handicapped Student. A Resource Manual. Michigan Alliance of Physical and Occupational Therapists, c/o Wing Lake Center, 8490 Wing Lake Road, Birmingham, MI 48010. $8.00. 1982


- Bibliography of Children's Books About Disabilities. Pediatric Projects, Inc. P.O. Box 1399, Santa Monica, CA 90406. No charge.


- Classroom-Made Movement Materials. Tom Hall

$6.95. Front. Front Row Experience. Every Bay Blvd., Byron, CA 94514-9454. 415-34-571G. Easy "how to" illustrated instructions for making and using simple, inexpensive, and effective perceptual motor equipment right in the classroom.

- Communication Outlook. Quarterly publication. Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824


- Fact Sheet. Access to the Science Laboratory and Classroom. M. Zimmerman, M. R. Redden, S. B. Forman, Editors. HEATH Resource Center. One Dupont Circle, Washington, DC 20036. Directed towards disabled high school and college students; science instructors, and college administrators. This sheet provides advice and encouragement on making the science lab and classroom accessible to disabled students. Includes examples of coping strategies, disability-related accommodations with references, and selected resources.

- Functional Aids for the Multiply Handicapped. Isabel Robbins. Medical Department, Harper & Row, Hagerstown, MD. 1973

- A Guide to Developing a Classroom Curriculum for Visually Impaired Mutilhandicapped Infants. Stocking Publisher. 1350 South Kostline Avenue, Chicago IL 60023
Classroom-Made Movement Materials (listed above) on Education, 0.16 Dupont Circle, Washington, DC 20036 202/833-4707 (voice); FDD) Free 1982

Inexpensive Movement Materials. Tom Hall. Front Row Experience, 540 Discovery Bay Blvd. Byron, CA 95614-9454 415/634-5710 $6.95 Follow-up to Classroom-Made Movement Materials (listed above) Includes all new movement materials that are not only inexpensive, but fun to use and easy to make with simple illustrated instructions Guidebook is loaded with plenty of fun-filled illustrated activities for Tilt-O-Board, Roll-O-Balance, Batting Tees, Color Squares, Dexterity Rod, Flying Foam Saucers, Isobands, and much, much more


Materials and Aids for Special Education. Danish Folk-School's Materials and Aids Research Centre, Herning, Denmark Also available from NARIC 1982 Catalog of teaching materials and aids for disabled students, including aids and machinery for learning solo-performance aids, furniture and related accessories, domestic science aids, school subject materials and training materials Includes drawings


The Modification of Educational Equipment and Curriculum for Maximum Utilization by Physically Disabled Persons. Educational and School Equipment for Physically Disabled Students. Human Resources Center, Alberton, NY. 1967 Discusses non-limiting school equipment and attempts to provide guidelines for modifying and selecting equipment that presents no barriers or removes barriers for disabled students. Examples from the experiences of the Human Resources School are presented. To be used in coordination with other volumes in the series on school design, transportation of disabled students, staffing, and curriculum and instructional techniques. Includes bibliography


Multi-Sensory Educational Aids from Scrap. Kendrick Coy. Charles C Thomas, Publisher. 301-327 East Lawrence Avenue, Springfield, IL 62717 216 pages 1980 Describes learning tools for disabled children that can be developed by parents, teachers, therapists and others at low cost from scrap or inexpensive materials. Patterns and instructions are included for language, mathematics, and science aids


Ready Willing and Disabled. Norman Kunc Personal Library Publishers, Suite 439, 17 Queen Street Est., Toronto, Canada M5C 1F9 111 pages $7.95 1981. Describes the process of integrating a physically handicapped student into a regular school system. Includes specific suggestions for equipment and adaptations for classes in math, social science, electives, etc. Written by a college youth with cerebral palsy who entered mainstreamed programs at age 3

Rehabilitation Engineering Sourcebook. Institute for Information Studies. 400 N Washington Street, Falls Church, VA 22046


Special Technology for Special Children. Computers to Serve Communication and Autonomy in the Education of Handicapped Children. E Pr 1 Goldenburg. Ed D University Park Press, 300 N Charles Street. Baltimore, MD 21201 183 pages $12.95 1979 Emphasis is on how the computer can become the tool of the child instead of the tool of the teacher. Instead of the computer being used as a medium for a program designed by the teacher to lead the child through a sequence of steps to learn a desired behavior, this author views it as a prosthetic medium through which the child can explore. A discussion of the use of the computer language LOGO for exploration by handicapped children is a major focus of the book.
Teaching Biology to Visually Handicapped Students


Teaching Physically Handicapped Children Methods and Materials. Harold D. Love. Charles C. Thomas, Publisher, 2600 S. First Street, Springfield, IL 62717. 176 pages. $15.75. 1978. An informational as well as a resource book including chapters on disabling conditions, educational goals, and architectural barriers in schools.

"Technological Advances in Special Education." Exceptional Education Quarterly. Vol. 4, No. 4, Winter 1984. James M. Kauffman, Journal Editor; Joseph J. Stowitschek, Issue Editor. This issue offers an array of articles on technology applied to special education. Some are devoted to the problems that must be addressed in current and future applications of instructional technology; some describe the use of technology to solve particular problems in educating handicapped persons; and still others describe the coming generation of technological devices for which the problem solution potential is only now being demonstrated.

Test Adaptations for the Handicapped. P. Wassan T. Tyman and P. Gardiner. Education Service Center, Region 20, 1314 Hines Avenue, San Antonio, TX 78209. August, 1982. Describes special adaptations for common assessment instruments (standardized tests); includes equipment which is useful for test adaptation.

Testing Physically Handicapped Students in Science: A Sourcebook for Teachers. Harry G. Lang, editor; Dean R. Brown, Kenneth Ricker, E.C. Keller. Jr. Pintech, 1125 University Avenue, Morgantown, WV 26505. $4.50. Numerous suggestions are provided to assist in development and administering teacher-developed tests in classes having physically handicapped students. Although specifically written for science teachers, the recommendations are made by the authors to help reduce testing bias are applicable to all areas of the curriculum. Many suggestions are appropriate for standardized testing as well.


See also sections on: SEATING, CONTROL, COMMUNICATION AND SENSORY AIDS, MICROCOMPUTER APPLICATIONS, TOYS & GAMES
The resources available in the field of vocational and industrial education are often overlooked by adult rehab personnel and by special educators. These resources span the transition zone between classroom and employment. It stands to reason that if an equipment modification was needed to train a disabled student in shop, the same adaptation may be needed on the job. Some of the technical aids, adaptations and approaches that are useful at work may also be beneficial in school (and vice versa). Hopefully, exposure to the realm of vocational education will draw us closer to vocational goals, then the transition will be complete.

Publications from the Vocational Studies Center (Publications Unit, University of Wisconsin- Madison, 964 Educational Sciences Building, 1025 W. Johnson Street, Madison, WI 53706, phone 608/263-4357) have found their way into "rehab" by the force of aggressive marketing.


Tools, Equipment & Machinery: A New Catalog Supplement. Adapted for the Vocational Education & Employment of Handicapped People. The supplement contains descriptions and illustrations of 231 products modified for use in educating and employing handicapped people. There are no duplications from the original Tools (described above), but 671 pages of all new, modified products. A valuable guide for employers, consumers, vocational and special needs educators. 1983 $32.00.

Others, such as Spec. Needs Education Material for Vocational and Industrial Education (see below) are not as easy to locate. (This book is, however, cited in Tools, Equipment & Machinery.)

Special Needs Education Material for Vocational and Industrial Education Apparatus Plan Book. Kenneth L. Bruwelheide, Project Director. Department of Agricultural and Industrial Education, Montana State University, and Montana State Office of Public Instruction, Vocational Education. Helena, Montana 1981. This planbook is a collection of technical drawings, illustrations, and bills of material of apparatus developed to assist the physically handicapped while working in a vocational area laboratory/shop setting. Most apparatus are designed as retrofit items to be placed on, or added to, existing commercial wood-working and metal working tools and equipment.

"Safety and proper tool usage was a prime consideration while developing these apparatus. Every effort was made to preserve correct operational procedures."

"It is noted that these apparatus will not solve machine/tool operation difficulties for all handicapped individuals. Each handicapped individual has their own set of abilities and disabilities. Hopefully these plans may serve as a guide for the continued development of such apparatus for many handicapped individuals."

"While planning, constructing and testing these apparatus the following factors were kept in mind:
A. Safety of use
B. Simplicity
C. Availability of materials
D. Expense
E. Ease of construction
F. Not to restrict the use of tools and equipment by the non-handicapped

"Each of the items is complete with an orthographic drawing, an isometric illustration, and a bill of materials. It should be noted that dimensions may need to be changed to fit particular pieces of equipment."

Special Needs Education Material for Vocational and Industrial Education is a four-part series: Apparatus Plan Book, Bibliography, Planning Guide for Vocational Area Teachers, and Classroom Teachers Handbook. Part of the bibliography is included here.

"The purpose of this bibliography is to present references pertinent to Special-Needs Mainstreaming Topics. In particular, this listing reflects the effects of Public Law 94-142 upon the various disciplines of vocational education and related topics by presenting material published since the law's passage in 1975. Selected earlier references were included when determined to be of particular value."

"Resources examined include:

- Applied Science and Technology Index
- Business Periodicals Index
- Current Index to Journals in Education
- Dissertation Abstracts International
- Education Index
- Monthly Catalog to United States Government Publications
- Monthly Checklist of State Publications
- Public Affairs Information Service
- Resources in Education (including an ERIC database search)
- Resources in Vocational Education
- Social Sciences Index
- State Education Journal Index
- Subject Guide to Books in Print

"This bibliography is compiled in an effort to assemble as many sources and references related to mainstreaming as possible. It should not be considered complete or comprehensive. Citations have not been systematically evaluated, and no implications regarding quality of materials should be drawn."
"Since the first edition of this bibliography was compiled in May of 1980, there has been an explosion of printed material on the subject of mainstreaming. Thus, the above resources have again been searched and the findings have been incorporated to form this second edition."

The section on "Adaptive Equipment, Materials and Facilities" has the following references:


BROWN, R. N. Development of curriculum for a non-traditional machine tool technology program accessible to the physically handicapped. Chabot College, South County Community College District, Hayward, CA 1979

"Building Without Barriers. Occupational Center of Union County, Roselle, New Jersey." American School and University, July, 1979, pages 22-23


CORLEY, J. "Breaking Down the Barriers." Florida Vocational Journal, 3(5), 1979, pages 20-23


LITTON, F.W. et al. (Comp.) "Materials for Educating Nonhandicapped Students About Their Handicapped Peers." Teaching Exceptional Children, 13, Fall 1980, pages 39-43


"Modifying Facilities at Minimum Cost to Meet the Needs of the Handicapped." College and University, 54, Summer 1979, pages 292-293


PETRIE, J.A. Media and Mainstreaming: An Annotated Bibliography and Related Resources. ERIC Document Reproduction Service No ED 192 839 1980
Physically Handicapped -- Adaptive Aids and Equipment/Communication Systems/Architectural Design A

Selected Bibliography

Council for Exceptional Children, Reston, VA 1981


Rieth, H.J & Semmel, M.I: "The Use of Microcomputer Technology to Prepare and Enable Teachers to Meet the Educational Needs of Handicapped Children" Teacher Education and Special Education, 9(2), 1979, pages 56-60


Seaman, J. "Adapted Recreation and Equipment" Exceptional Parent, 9, April 1979, pages R12-R13 9, June 1979, pages 51+


Steinfeld, E. "Barrier-Free Design Begins to React to Legislation Research" Architectural Record, 165, March 1979, pages 69+


Wihoyte, C.H. "Contracting A Bridge Between the Classroom and Resource Room" Reading Teacher, 30, 1977, pages 376-378


INTRODUCTION

"Appropriate technology for the workplace becomes an issue when a disabled person takes a new job or when a person becomes disabled and returns to an old job. Questions are often raised about appropriate technology and cost-effectiveness when considering job site modifications and the use of adapted equipment."

Dr. Nancy Crewe lists seven criteria for successful job site modifications for handicapped workers. Each criterion asks a question or series of questions which, if answered correctly, can create a successful job site adaptation to help a worker become more productive. The seven criteria and some related questions are:

- Function: Will the adaptation meet the need? Will it do what is expected of it?
- Adaptability: Will the modification impair the usefulness of equipment for nondisabled co-workers? What are the attitudes of co-workers toward the adaptation?
- Availability: Can the equipment be obtained? Can it be manufactured easily?
- Cost: How much does it cost? Can the money be found to pay for it? Is it cost-effective?
- Maintenability: Can it be maintained easily? Is it simple enough to minimize maintenance problems?
- Comparability: Is this adaptation better than the available alternatives?
- Acceptability: Will a handicapped worker use the adaptation?

These criteria and questions are from "Technology for Independent Living II," Project on Science and Handicapped Workers. Available from American Association for the Advancement of Science, 1776 Massachusetts Avenue NW, Washington, DC 20036

COSTS

For statistics on costs of reasonable accommodation, and the percentages represented by special equipment, refer to:

A Study of Accommodations Provided to Handicapped Employees by Federal Contractors
Commissioned by the Department of Labor

Excerpts from this study can be found in the FUNDING section of this Sourcebook, page 262

WORKSTATION DESIGN

Samuel R. McFarland
Southwest Research Institute
San Antonio, Texas

A. INTRODUCTION

In the Third Wave, Alvin Toeffler predicts that, in the future, the "electronic cottage" will enable people to remain at home while on the job. Electronic communication and materials handling systems will nullify the need for co-workers to be housed under the same roof. Indeed, recent trends in production assembly lines and office architecture toward flexibility in spatial arrangement and furnishings tends to support his forecast. Modular offices are being created so that a work area can be easily rearranged to suit the needs of a specific worker and his job description. By quickly interchanging modular components, a work area can be expanded or contracted and changed from a drafting area to a secretarial area to an electronics assembly area to a recreational area. A great deal of research and innovative design has gone into these new concepts.

But, at present, most offices are fixed by rigid walls, heavy file cabinets, and twin pedestal desks. Manufacturing areas have rigid piping, bolted down workbenches, and crowded floor space. To change an expense beyond the present budget. The disabled job applicant must deal with the fact that his prospective work area is inflexible, and his prospective employer is cost-conscious. Rehabilitation engineering for workstation adaptation must deal with the practical realities of the irresistible force versus the immovable object. The wheelchair user must be squeezed into a confined space, raised to table height, and his available functional capacity must be augmented with adaptive devices. This must be done at minimal cost with only minor alteration of the employer's work area. The resulting adaptation must be delivered quickly, allow for frequent updating, and last "forever."

As if the mechanical requirements were not stringent, the interfacing systems are even less workable. The vocational rehabilitation agency, in an effort to mix the two extremes of client service and taxpayer accountability, will delay the placement process in order to document the procedures. The potential employer understandably, does not want to modify his building, threaten his insurance program, or alter a worksite for a handicapped applicant, if an able-bodied person has also applied. Besides, the employer probably wants someone "now," not six weeks downstream when all the evaluations and adaptations have been completed.

This presentation will attempt to describe realistic, cost-effective, quick response methods for approaching the challenge of workstation adaptation for persons whose neuromuscular, auditory, or visual function differs significantly from the norms which guided the configuration of an existing worksite.
B. FUNDAMENTAL PRINCIPLES

1. Validate in Use

There is no place in our methods for a “disability type.” The individual for whom adaptations are planned is unique and must be intimately involved in the process. He alone will determine the success of the adaptation. The prospective employee must ultimately demonstrate, to himself and his potential employer, that he can perform the work required by the job. Only then can the validity of the adaptation be proven.

2. Focus on Function

It is altogether too easy to be distracted by a person’s disability. To do so is to dilute the energy directed toward augmenting the ability that is available. By focusing on the work tasks required, we are able to concentrate adaptive resources on the positive, usable functions.

3. Strive for Simplicity

A designer may have a tendency to create elaborate, sophisticated, high-performance adaptive modifications. To do so is to introduce complexity, unreliability, and high-cost. Worse still, there is a significant risk that the adaptation will stymy growth and advancement on the job. Inexpensive, readily purchasable consumer products should be utilized to the ultimate.

4 Generalize

Many worksite adaptations intended for a handicapped person have proven to benefit the non-handicapped co-worker as well. After all, if optimizing work function is the goal, it is likely that anyone’s function at the workstation will be enhanced. This can be a strong convincing argument for a potential employer.

C. CONSTRAINTS

As a workstation designer, you must realize that you are a small part of the system which is involved with preparing a suitable work situation for its client. Each part of that system is guided by expectations regarding time, cost, documentation, and definition of success. The key participants in that system are the client, his prospective employer, the service provider (counselor, rehab nurse, placement specialist). You must recognize that the needs of each are not necessarily compatible.

1. Client

The person for whom the worksite is being designed is either a “new hire,” has not worked for that employer before, or he is a “re-employ,” has worked for the employer before, but not necessarily at the same job. If he is already knowledgeable about the job, he is your most important source of information. If not, reserve his input for the trial-use stage mentioned later. He will be concerned with time and appearance, not costs.

2. Employer

If the client is a “new hire,” the employer will be concerned about the compatibility of the client and any intended adaptations with his status quo. Unless he is under pressure to provide accommodations for handicapped workers, he will push for minimal changes to the work area and demand that modifications be performed quickly and at small cost to his budget. It will be important for the client to perform competitively with respect to his non-handicapped co-workers.

If the employer is trying to satisfy a requirement that he accommodate handicapped persons, then time and cost may not be serious constraints. His primary mission will be to show good intent, whether he actually hires or not. If he has a strong resistance to hiring handicapped workers, he may wish to extend the period of adaptation.

On the other hand, if the employer is trying to reinstate an experienced employee who has become disabled during a term of employment, he will probably be more seriously motivated toward getting an appropriate workstation adaptation. He will, in this case, be more likely to commit time and money to the task, especially if the adaptation will enable return to the same job function as before the disablement occurred.

3. The Service-Provider

The intermediary in most vocational rehabilitation cases is the agent who attempts to marry the employer and the disabled client. He may be a government employee, a medical professional, or an insurance person. In most instances, the service provider is either medically or educationally oriented, and almost always requires a great deal of documentation. Typically, a client file contains reports from a medical doctor, a psychologist, one or more therapists, and a vocational evaluator. In most instances, he will have undergone a physical capacities examination, various skills and preference tests, and work adjustment training. At the time he is presented to the prospective employer (and the workstation designer), he has been declared “work ready.”

For most of these reports and tests, the professional who wrote the report has been paid according to a negotiated fixed fee schedule or hourly rate. The client passed through this system at a pace set by the professionals. There is no set fee schedule for workstation design, however, so it is usually necessary for the designer to prepare a cost-estimate and be prepared for competitive bidding or a delay pending justification of a sole-source contract.

4. Payment System

The workstation designer will not be paid up front. He must wait as much as several months after completion of the job. In decreasing order of promptness, payment will come most quickly from the employer, then the insurer, then the government agency. If special adaptive equipment is to be specified by the designer, then purchased by the service-provider, expect to be delayed by the procurement system.
These experienced observations are colored with cynicism, admittedly, but are offered as realistic precautions. If the designer is aware of the pitfalls, he should be better prepared to plan and schedule his design and creative services. He must access a capital base which will allow him to survive until the backlog of work and receivables becomes balanced to the point of being financially self-sustaining and evenly paced.

D. DESIGN PROCESS

To ensure that the client is successfully and permanently adapted to his intended work, the designer must consider the worker and workstation as components of a steady work flow process. There are two processes that must interact smoothly, getting to and from the workstation and doing the work itself.

1. Access

A worker is not a permanent attachment to his worksite; he must move to it, away from it, and around it during the course of a work period. If access is a time and energy-consuming struggle, it not only reduces the efficiency of the work period, but it also limits the freedom for occasional stress-relieving breaks. The entire employment environment should be surveyed for accessibility. Not only the main entrance, restrooms and water fountains (as is most common), but also the supervisor's office, the coffee urn, the lunchroom, and the emergency exits.

Access space requirements are three-dimensional. A common mistake in examining accessibility is to focus on the floor plan. Remember that barriers can include poor illumination, lack of tactile and audible labels, and overhanging obstacles for visually handicapped workers, time period bells and safety alarms or sirens for hearing impaired workers; and door thresholds, heavy door closers, and dirty or cluttered floors for mobility impaired workers. Of course, there are many other details to be considered for each client such as intolerance to temperature extremes in the SCI quad. It is essential, however, to take time to thoroughly flush out potential barriers. If possible, include the client in your evaluation at the worksite. If not, make a concerted effort to play his role, complete with cane, wheelchair, or whatever adaptive devices may be used by the prospective employee.

2. Positioning

Locating the worker relative to his work function can be a key element in the efficiency and endurance of his daily performance on the job. In many cases, the disabling condition causes a significant deviation from the norms used in the original design of furniture and machinery used by non-handicapped employees. Because of visual impairment, a worker may need to be positioned so that his eyes are very near his work without accessing an uncomfortable sitting, standing, or bending over position. Necessary occasional supplies may have been stored in overhead cabinets that are beyond the reach of a seated person. A cerebral palsied person may require that the work be located in her lap or to one side. A quadriplegic client may not be able to tolerate upright seating for prolonged periods.

3. Interface

Assuming that the client has been accessed to and positioned at his workstation, we can now attempt to plug him into the work flow. As stated previously, the workstation design should neither modify the person nor the work to be done. Both should be considered inviolate. The remainder is the space between the worker and the work, the interface. We can attach to the worker and the workpiece and we can design the linkage between them.

It is appropriate at this point to bring up and emphasize a common pitfall in adaptive workstation design: When supplied with a limited array of worker functions and a requirement for competitive productivity, there is a tendency to automate, to supplant worker function with machine function. The danger is that "supplant" can easily become "replace" and the outcome of such an evolution is to eliminate the role of the worker. Automation is a useful ally in workstation design, but, like alcohol, needs to be used in moderation and with a cautious appreciation for the effects of its abuse.

Attachments to the worker are nominally encompassed by the professions of occupational therapy, orthotics, and prosthetics. If a mouthstick, head-pointer, hand splint, torso harness, or leg bracing are required for a workstation system design, the professional should be consulted or retained.

Attachments to the machinery or workpiece are sometimes better understood and produced by the plant engineer or the machine manufacturer. If a keyguard, a switch relocation, or a workbench alteration are needed, these specialists should be contacted. Many times, a rough concept of the required modification is all the workstation designer need to supply. The machine technician can often take it from there.

The linkage between worker and workplace is the most fertile ground for the specialized equipment knowledge and creativity of the adaptive workstation designer. In that arena, the designer can achieve a successful extension and augmentation of available function without changing the worker or the machinery and furniture. Switches, electronic communicators, reaching aids, turntables, adaptive telephones, environmental controls, and specialized tools and material handling equipment are some of the specific linkages which are used.

E. SIMULATION

There is no more revealing evaluation technique than real, on-line trial work by the prospective employee. If the employer will cooperate, the trial should be conducted on-site, at a conventional production worksite. If not, in his training area. If not that, then opt for remote simulation, incorporating as much detail as practical.
EDUCATIONAL AND VOCATIONAL TECHNOLOGY

Since this is probably the most impactful opportunity for the workstation designer, he should attempt to simulate a completed adaptation, if possible. To do so requires access to a broad array of commercially available adaptive equipment and materials for fashioning crude modifications on site. In our experience, there are a few materials that will enable a broad sweep of adaptations, namely duct tape, cardboard boxes, and balsa wood. They can be formed into many shapes, are reasonably durable and are readily available at most neighborhood hardware stores.

Simulation is a powerful, non-threatening way to test a workstation design concept. If it works, it strengthens the resolve of all concerned; if it doesn’t, it is easy to change. The margin between success and failure in adaptation is measured in fractions of an inch, best gauged by actual trial use, which simulation provides. Until it has proven to be functional, a workstation should remain flexible. Size, color, illumination, height, angle, separation, and location of workstation components must be tailored to the user for optimum performance.

F. TOOLS

This section relates closely to interface design, but so important it needs to be discussed separately. Tools are machines intended to enhance human performance. Pliers amplify gripping force, a hammer increases impact energy, a template guides a pencil to improve the accuracy of a shape. Force, accuracy, speed, and endurance can be aided by appropriate tool selection.

Tools are often assigned to a specific worker and are considered as expendable and renewable supplies. If a custom adaptation is needed for disabled worker, it should be applied, if possible, to the tool rather than the worksite. In most areas, the vocational rehabilitation agency will purchase tools and simple modifications for its client. Tools are readily available, inexpensive, easy to service or replace, and familiar to non-disabled co-workers. The last feature aids in the attitudinal adaptation of the worksite. The other features introduce a more general, very important principle.

G. PROCUREMENT

1 Supply Resources

In adaptive design there is a tension between two principles:

- Custom workstations optimize performance (but are expensive to produce)
- Conventional workstations are less expensive (but may not aid performance)

Recalling that time delays for adaptation and expensive changes are major barriers to successful job placement, we are forced to lean toward the latter principle. A greater success pattern will derive from consistently quick, inexpensive adaptations, even though that may not promote the optimum performance from the worker.

The adaptive designer should develop a knack for identifying common, commercially available tools, materials, and components to incorporate into supply houses, and industrial or office supply catalogues are fertile resources for ideas and solutions. The immediate shop or office environment may offer significant clues for adaptive products.

2 Equalizers

There are products in daily use in modern industry that are adaptive in nature, largely insensitive to a disabling condition. They are familiar, commercially available, and relatively inexpensive because of a broad market. While examining a potential employer/worksite, look for and point out the adaptability of:

- modular furniture
- movable partitions
- adjustable furniture (drafting tables)
- electric carts
- intercoms and speaker phones
- microcomputers
- horizontal files
- elevators

H. SUMMARY

As workstation designers, we need to be timely, cost-conscious, and practical. We should emphasize and enhance the "normalcy" of our client.
THREE CASE STUDIES

The Rehabilitation Engineering Center at Wichita, Kansas provides vocational opportunities for severely handicapped people through the medium of engineering. These case studies are a brief outline of the process used in the application of rehabilitation engineering to vocational problems confronting severely handicapped people. They range from the simple to the complex, relatively inexpensive to the expensive. They are an example of how rehabilitation engineering can be put to work effectively solving problems in living and independent vocational realm.

John Leslie
Cerebral Palsy Research Foundation of Kansas
Wichita, Kansas

I. Case Study One
The development of a head switch to allow a handicapped person to operate a numerically controlled lathe

A Definition of the Problem
1. The person was unable to open and close the jaws of the chuck of the lathe since he had only one functional arm.
2. The job necessitated two good arms in order to open and close the jaws of the lathe while, at the same time, handling materials.
3. The simultaneous use of both hands was necessary in order to perform the job as the machine was originally configured.

B The Problem Solution
1. It was determined that the handicapped employee could open and close the jaws of the chuck of the lathe through a switch that he could control with his head.
2. By interdicting the existing controls on the machine, the head control switch could be utilized by the handicapped employee and still the machine could be operated by the able-bodied employee in the normal manner.
3. The cost of such an adaptation which allowed the handicapped person to be productive on the job was less than a total of $2000.

C The Outcome
1. The individual is productive as an artist using the adaptive device.
2. The cost was approximately $4000.
3. The adaptation was relatively simple and could be performed by local technical personnel.

II. Case Study Two
Development of adaptive hardware to allow a quadriplegic spinal cord injured person to pursue a professional career in painting

A Definition of the Problem
The handicapped person involved desired to pursue a career in professional painting. He performed painting activities through the use of a mouth stick since he was a high level quadriplegic because of an automobile accident.

1. He needed to be able to adjust a drafting table both up and down and fore and aft.
2. He wanted to be able to select one specific color from a group of colors on individual magic markers.
3. These operations had to take place under the control of a head stylus.

B The Problem Solution
1. A commercially available drafting table with "up and down" controls was purchased.
2. A modification was made in the table through the design of the bracket and the utilization of electric actuator which allowed the table to be tilted fore and aft.
3. A lazy susan type carousel was designed to accommodate 100 magic markers so that the individual could obtain one magic marker from the selection of 100.

C The Outcome
1. The individual is productive as an artist using the adaptive device.
2. The cost was approximately $4000.
3. The adaptation was relatively simple and could be performed by local technical personnel.

III. Case Study Three
The operation of a three-axis crimper by a severely handicapped cerebral palsied individual

A Definition of the Problem
It was desired to have a severely handicapped individual crimp a tube at three places, 120 degrees apart.

1. The able-bodied person would utilize a punch press and perform three separate crimping operations requiring that the tube be inserted, crimped, extracted and rotated, crimped, extracted, etc.
2. The cost of the adaptation was charged off in a very short period of time due to the high volume rate of production that is characteristic of numerically controlled lathes.

The individual selected for the job had very little functional capability, either handling material or placing the tubes within the
The volume of production was such that 1,800 units per day was needed.

The Problem Solution

A three-axis crimper was designed in conjunction with a feeding mechanism to allow this severely handicapped individual to perform the job.

1. The tube was crimped at three places simultaneously thus eliminating any insertion or extraction process.
2. A feeding mechanism was designed to feed the handicapped employee one tube at a time so that he could place it in the feeding cradle of the machine.
3. A feeding device was designed to insert the tube onto a crimping device and retract it after the crimping operation took place.
4. The handicapped person disposed of the tube after the operation was successfully completed.

The Outcome

The handicapped individual was assigned to the job and became productive after a relatively short training period.

1. He easily met or exceeded the 1,800 unit per day criteria.
2. After working on the job for approximately two years, his posting and general physical well being improved.
3. This individual became a valued employee at Center Industries Corporation and received minimum wage or above and has a total fringe benefit package including hospitalization, life insurance, paid vacations, etc.

The Cerebral Palsy Research Foundation of Kansas publishes the quarterly Tech Brief Problem Solving with Rehabilitation Engineering. Some of the articles in this series include:

- Pneumatically-Powered Wirebender
- Digital Readout Numerical Counter
- Morse Code Typing Aid
- Reaction and Reach Timing Device
- Cylindrical Parts Selector Feeder
- Spindle Drilling Fixtures
- Floor Sweeping Collector
- Work Station for a Quadriplegic CP Typist
- Intra-Individual Ability Evaluation Using the Available Motions Inventory
- Power Lawn Mower "Dead-Man Switch"
- Water Hydrant Torque Assisting Tool

FARMING

Breaking New Ground, Bill Field, Ed. Dept of Agricultural Engineering, Purdue University, West Lafayette, Indiana 47907. This quarterly newsletter is published through the handicapped Farmer Project at Purdue University. The newsletter reports on developments and resources in the field and carries accounts of farmers who have successfully overcome their disabilities. Although there is no subscription fee, donations of $10 or more are requested for this client supported newsletter.


"Nature and Proportion of Physical Impairments Among Indiana's Farm Operators" Roger L Tormoehlen and Bill Field. Department of Agricultural Engineering, Purdue University, West Lafayette, Indiana 47907. $1.00. A summary of a study to determine the nature and proportion of physical impairments affecting Indiana farm operators. Selected case histories are included.

"Working the Land Adapting Farming for Disabled People." Disabled USA Volume 4, No. 6, 1981. The President's Committee on Employment of the Handicapped, Washington, DC.

Further information on adapted equipment used by disabled farmers may be found by contacting:

Jiri J Vasa
Rehabilitation Engineering Section
Biomedical Engineering Unit
Queen's University
Kinston, K7L 3N6
CANADA

William E Field
Extension Safety Specialist
Department of Agricultural Engineering
Purdue University
West Lafayette, Indiana 47907
314/494-1191

There have been a series of workshops for handicapped farmers (Lansing, Michigan, March 1983, Grand Forks, North Dakota, July 1983). Field says that it is sometimes difficult to get the farmers to come to the workshops "because they don't see themselves as handicapped." But these independent and self-reliant farmers have quickly come to realize the many benefits to be had from swapping ideas and resources. The workshops include examples of owner-built manlifts and controls for tractors, combines, and other equipment, an overview of agricultural equipment adaptations, and a review of resources available to the farmer/grower or family member.

If you would like to have a workshop in your area, or know of an event that would be of special interest to farmers with physical disabilities, please contact Bill Fields at Purdue University.
TECHNOLOGY FOR EMPLOYMENT: RESOURCES

ORGANIZATIONS

These groups focus on employment for the disabled, they can provide information and/or publications on employment related technology.

Human Resources Center
I U Willets Road
Albertson, NY 11507
(516) 747-5400

Mainstream, Inc
1200 15th Street, N W
Washington, DC 20005
(800) 424-8089, also for TTY
(202) 833-1136

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout
Menomonie, Wisconsin

President's Committee on Employment of Handicapped
1111 20th Street, N W, 6th Floor
Washington, DC 20210
(202) 653-5044

Rehabilitation Engineering Center
Cerebral Palsy Research Foundation of Kansas
P O Box 8217
Wichita, KS 67208
(316) 688-1888

RehabTech (formerly IMPART)
Texas Rehabilitation Commission
118 East Riverside Drive
Austin, TX 78704
512/445-8375

University of Wisconsin-Stout
Vocational Rehabilitation Center
Menomonie, WI 54751
715/232-1464

PROFESSIONAL RESOURCES

American Institute of Independent Engineers
25 Technology Park-Atlanta
40 Cross, Georgia 30092
(404) 449-0460

American Society of Mechanical Engineers
345 E 47th Street
New York, NY 10017
(212) 644-7722

American Society of Safety Engineers
850 Busse Highway
Park Ridge, IL 60068
(708) 932-4121

International League of Electrical Association
2101 L Street, N W
Washington, DC 20015
(202) 457-8452

National Tool and DieMakers
75 Airport Road
Hartfort, CT 06114
(203) 522-7279

GROUPS CONCERNED WITH COMPUTER EMPLOYMENT AND PROVISION OF COMPUTER-RELATED SERVICES BY SEVERELY HANDICAPPED INDIVIDUALS

Association of Rehabilitation Programs in Data Processing (ARPDP)
P O Box 2404
Gaithersburg, MD 20879
The ARPDP represents 26 programs across the country which train severely handicapped individuals as computer programmers. Graduates of these programs are placed in competitive employment. As of December 1982, 715 out of 893 students were successfully placed. The Association responds to inquiries concerning the specific needs of disabled programmers. Persons desiring detailed information are referred to the training program nearest to them. A quarterly newsletter is available from VIEWPOINT, Center for Independent Living CTP, 2020 Milvia, Room 470, Berkeley, CA 94704.

Business Information Processing Education for the Disabled Corporation (BIPED)
25 Palmer's Hill Road
Stamford, CT 06902
203/324-3935

Non-profit educational project for computer programming and related information processing skills for the disabled.

Georgia Computer Programmer Group
2201 Glenwood Avenue, SE
Atlanta, GA 30316

LIFT, Inc
350 Pfingsten, Suite 103
Northbrook, IL 60062
312/564-9004

Not-for-profit contract programming company which identifies, trains and hires physically handicapped to major corporations.

Pearson Computer Assessment Centre
Pearson Hospital
700 West 57th Avenue
Vancouver, BC V6P 1S1 CANADA

Test Fast Services, Inc
245 6th St Road
Pleasantville, NY 10570
914/47-1311

Gerald Warren & Associates
4825 Stanford Avenue NE
Seattle, WA 98105
“How to Use This Resource

“The following is an example of how DESIGNING FOR FUNCTIONAL LIMITATIONS can be used

“Paul has applied for the job of information receptionist at a large government office. Paul has cerebral palsy. He is qualified for the job, but he and his employer feel that some modifications to the worksite may help. The job requires access to a large directory of employees which must be accessed quickly for visitors seeking a specific office or telephone number. There is considerable use of the telephone involved, and verbal assistance must occasionally be given to visitors.

“Paul and his prospective employer have reviewed WORKSITE 1 and 2 illustrations on pages 5 and 7 to check for any major barriers in the general work environment. It is noted that the most serious barriers have already been removed, but door knobs will have to be replaced with levers.

“They then review further modifications as illustrated for functional limitations on pages 13 through 74. On the reverse side of each illustration are listed any disabilities which may require the modifications printed in dark over the WORKSITE illustration. Although Paul has cerebral palsy, he has no difficulty in interpreting information, no limitation of speech, no incoordination, or difficulty in moving his head, therefore, these modifications were not considered. His functional limitations which may affect job performance include poor balance, difficulty in using lower extremities, and difficulty in handling and fingering. The illustrations for these limitations (pp. 41, 39, 33, 73, 71, 65) suggested modifications which could help Paul be more independent at work.

“Handle assists can be placed at the desk to aid him in sitting down and rising from the chair. The stool at the worksite can be replaced with one having full arms and a backrest. Quick access to the office directory is done with a microfilm viewer and a microfilm version of the director. The viewer controls can be converted to push-button operation. A headset receiver will make use of the telephone easier. Paul and his employer agree that these modifications will be useful and cost-effective for this job/client match. In this situation, WORKSITE 1 was used. However, had the job required it, WORKSITE 2 illustrations might also have helped.

“Counselors and evaluators will find DESIGNING FOR FUNCTIONAL LIMITATIONS helpful in job planning with their clients. Employers can use it in planning affirmative action programs. Designers and engineers, as well as students of these professions, can use it to plan environments and products more suitable for use by able and disabled consumers alike. DESIGNING FOR FUNCTIONAL LIMITATIONS is a workbook, not a textbook. It is offered in looseleaf format to encourage additions, notes, and convenient use. Your comments on its usefulness to you are welcome.”

The following six pages are reprinted here with the permission of the Job Development Laboratory, George Washington University, Washington, DC.
SLIDING WINDOWS PREFERRED

WALLS
USE SLIP-RESISTANT, NON-GLARE SURFACES
AVOID ROUGH SURFACES AND PROTRUDING OBJECTS
AVOID TOTAL SOUND ABSORPTION

WINDOW CONTROLS
20-54'(508-1372mm)
MAX OPERATING FORCE
5 LB (22.2 N)

TELEPHONES
RECEIVER WITH VOLUME CONTROL
HANDSET CORD 36'(1067mm) MIN

LOCATE BULKIEST OBJECTS ON LEVEL WITH DESK

MAX SHELF HEIGHT
63'(1600mm)

WORK STATION
AVOID CENTER DRAWERS
24'(610mm) MIN KNEE WELL WIDTH
AVOID SHARP EDGES AND CORNERS
NON-GLARE LIGHTING TO MINIMIZE FATIGUE

FLOORS
NON-ABSORBENT MATERIALS IN WARM, DARK COLORS
AVOID COLOR CONTRAST EXCEPT TO DENOTE LEVEL CHANGE
AVOID SCULPTURED TEXTURES OR CHANGES IN DIRECTION OF GRAIN
THIN, HEAVY-DUTY UNPADDED LOOP PILE CARPETING PREFERRED
CARPETING SHOULD BE FIRMLY FIXED TO FLOOR

DOORS
SIDE-HUNG PREFERRED TO SLIDING TYPE
DOOR SHOULD OPEN INTO LOWER TRAFFIC AREA
GLASS SHOULD HAVE DECALS AT FACE HEIGHT
0.5'(13mm) MAX THRESHOLD

STORAGE CABINETS
DRAWERS WITH ROLLERS FOR EASY OPERATION
U-SHAPED HANDLES 4' x 1.5' (102mm x 38mm)
DRAWERS SHOULD BE OPERABLE WITH ONE HAND

SPECIFICATIONS ON THIS ILLUSTRATION SUGGEST IMPROVEMENTS TO WORKSTITES WHICH WILL AID ABLE-BODIED AS WELL AS PERSONS WITH SENSORY OR LOWER EXTREMITY LIMITATIONS.
CONSIDERATIONS FOR MORE SPECIFIC FUNCTIONAL LIMITATIONS ARE DESCRIBED ON TRANSPARENT OVERLAYS.

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George Washington University, Washington DC
Specifications on the reverse side are based on body measurements of the average adult. Extremes of size and weight may require adjustment of some specifications. Further explanations of these guidelines may be found in the following resources, from which all specifications have been compiled.

CABINETS, DRAWERS, FILES
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 2a, 3a
Goldsmith, Designing for the Disabled, 245-251, 3b
Mace, An Illustrated Handbook of the North Carolina State Building Code, 117
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 111

CLOTHES HOOKS
Goldsmith, Designing for the Disabled, 314
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 115
Veterans Administration, Handbook for Design Specialy Adapted Housing, 43

DOORS AND HARDWARE
Cary, How to Create Interiors for the Disabled, 24-31
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 28, 30
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired, A Handbook, 444
Goldsmith, Designing for the Disabled, 185-190
Harkness, Groom, Building Without Barriers for the Disabled, 31-33
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34, 35, 39, 40
Mace, Accessibility Modifications, 21-25
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 117, 77-80
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 100-103, 76
Veterans Administration, Handbook for Design, Specialy Adapted Housing, 34-37

EQUIPMENT CONTROLS
Bazar, Ergonomics in Rehabilitation Engineering, 55-71
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 111

FIRE ALARMS/EXTINGUISHERS
Harkness, Groom, Building Without Barriers for the Disabled, 16, 18
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112, 125
Steinfeld, Barrier-Free Design for the Elderly and Disabled, 72

FLOORS
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 26
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired, A Handbook, 444-445
Goldsmith, Designing for the Disabled, 196-197
Harkness, Groom, Building Without Barriers for the Disabled, 16, 18
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34-37
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 75

INTERIOR SIGNS
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 28, 29, 3b
Duncan, Gish, Mulholland, Townsend, Environmental Modifications for the Visually Impaired, A Handbook, 444-447
Harkness, Groom, Building Without Barriers for the Disabled, 16-18
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112-113

SHELVES
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 123-126
Mace, An Illustrated Handbook of the North Carolina State Building Code, 117
National Academy of Science, ccibility An Approach to the Development of Design Criteria, 102-115
Veterans Administration, Handbook for Design Specialy Adapted Housing, 43

TELEPHONES
Cary, How to Create Interiors for the Disabled, 110
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 114
Mace, An Illustrated Handbook of the North Carolina State Building Code, 115-117
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 109-125
Veterans Administration, Handbook for Design Specialy Adapted Housing, 41

THERMOSTATS
Mace, An Illustrated Handbook of the North Carolina State Building Code, 34-37
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111

WALLS
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 26
Harkness, Groom, Building Without Barriers for the Disabled, 16

WALL SWITCHES
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 3b
Goldsmith, Designing for the Disabled, 211
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111
U.S. Department of Housing and Urban Development, Barrier-Free Site Design, 17
Veterans Administration, Handbook for Design Specialy Adapted Housing, 40

WINDOWS AND CONTROLS
Diffrient, Tilley, Bardagjy, Human Scale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 178-180
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 124
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 106
Veterans Administration, Handbook for Design Specialy Adapted Housing, 38
TELEPHONE AIDS:
- Speakerphone
- Headset receiver
- Adjustable arm for receiver
- Enlarged “Touch Tone” buttons

CONTROLS:
- Optimum operating force: 3/4 lb (3.2 N)
- Provide auditory/visual feedback
- Avoid slick, untextured surfaces
- Avoid need for twisting motion
- Push—button or rocker pref. to lever or knob

PHONE AIDS:
- Electric self—correcting, auto—return typewriter
- With keyguard for greater hand support and accuracy
- Pen/pencil through rubber ball or hard foam for easier grasp
- Cassette tape recorder for messages, memos, dictation, etc.

AVOID DRAWERS DEEPER THAN 12” (305mm)
OPEN DESK—TOP STORAGE PREFERABLE

BULKY OBJECTS SHOULD BE SLID RATHER THAN LIFTED
USE SLICK SURFACES FOR EASIER MOVEMENT OF MATERIALS
USE BOLTS, CLAMPS, OR NON-SLIP MATS WHERE STABILITY IS NEEDED
DIFFICULTY IN HANDLING AND FINGERING

Persons with this limitation experience decreased mobility, range of motion, and/or strength in their hands. Approximately 1% of the US population is affected to some degree (National Academy of Sciences, 1976)

This limitation may be experienced by persons having any of the following disabilities:

- Amputations
- Arthritis
- Bilateral Hemiparetic
- Cardiac Disorders
- Cerebral Palsy
- Cerebrovascular Accidents (strokes)
- Congenital Deformities
- Dupuytren’s Contracture
- Multiple Sclerosis
- Muscular Dystrophy
- Myasthenia Gravis
- Parkinson’s Disease
- Polymyositis
- Severe Burns
- Spinal Cord Injury
- Syringomyelia

Aids suggested on the illustration below have been used by persons having this limitation. No endorsement of specific products is intended. The reader is encouraged to obtain further information from suppliers of:

- BOOKSTANDS
- CASSETTE TAPE RECORDERS
- MICROFILM VIEWERS
- NON-SLIP MATS
- OPEN DESK-TOP FILES AND STORAGE
- READING MACHINES
- TELEPHONE AIDS
- TYPEWRITERS
- TYPEWRITER KEYGUARDS, PAPER ROLLS

Further modifications to WORKSITE 1 for persons having this limitation are suggested on the illustration. Each one should be selected, amended, or rejected according to the expressed needs of the individual and the job.

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AVOID ROUGH SURFACES AND PROTRUDING OBJECTS.
AVOID TOTAL SOUND ABSORPTION.

STORAGE CABINETS
CABINET HEIGHT 63' MAX (1600mm)
U-SHAPED HANDLES: 4" x 1 5" (102mm x 38mm)
HANDLES SHOULD BE OPERABLE WITH ONE HAND.

CONVEYORS SHOULD BE ON SAME LEVEL AS WORK SURFACE.

TEMPORARY STORAGE SURFACE FOR WORK MATERIALS IN CONVENIENT LOCATION.

LOCATE NEAR DOOR FRAME ON LATCH SIDE.
LABEL USABLE FACILITIES WITH SYMBOL.

LETTERING
LIGHT-ON-DARK PREFERRED
0.625" - 1" (16 - 25mm) HELVETICA TYPE (ALL CAPS)
RAISED 0.03" (1mm)
MAY BE ACCOMPANIED BY BRAILLE.

SIGN HEIGHT
7 75" (197mm)

30-32" (762-813mm)
30-32" (762-813mm)

DOOR CLOSER RESISTANCE
6 15 LB (22.2 - 66.7N)
pref adjustable or automatic.

IF EXTINGUISHERS MUST BE RECESSED,
DOOR HANDLES SHOULD BE
U-SHAPED: 4" x 1 5" (102mm x 38mm).

DOORS
SIDE-HUNG PREFERRED TO SLIDING TYPE
60" (1524mm)
CLEAR SPACE ON BOTH SIDES OF DOOR
DOOR SHOULD OPEN INTO LOWER TRAFFIC AREA
GLASS SHOULD HAVE DECALS AT FACE HEIGHT
0.5" (13mm) MAX THRESHOLD.

FLOORS
NON-ABSORBENT MATERIALS IN WARM, DARK COLORS
AVOID COLOR CONTRAST EXCEPT TO DENOTE LEVEL CHANGE
AVOID PATTERNS OR EXCESSIVE TEXTURES.
FLOOR COVERING FIRMLY FIXED TO FLOOR.

SPECIFICATIONS ON THIS ILLUSTRATION SUGGEST IMPROVEMENTS TO WORKSITES WHICH WILL AID ABLE-BODIED AS WELL AS PERSONS WITH SENSORY OR LOWER EXTREMITY LIMITATIONS.
CONSIDERATIONS FOR MORE SPECIFIC FUNCTIONAL LIMITATIONS ARE DESCRIBED ON TRANSPARENT OVERLAYS.

WORKSITE 2.

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BIBLIOGRAPHY

Environmental modification guidelines illustrated in Designing for Functional Limitations have been compiled from resources on architectural accessibility, human factors, occupational therapy, and rehabilitation medicine, as well as from disabled persons' experiences at the worksite.


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SELECTED PUBLICATIONS - TECHNOLOGY FOR EMPLOYMENT


Assisting the Physically Handicapped An Identification and Development of Apparatus for Laboratory Shop Phase I K L Bruwelheide Montana State University, Department of Agricultural and Industrial Education, Bozeman, Montana 1979

A Comparison of Commercial Vocational Evaluation Systems (Second Edition) Karl F Botterbusch Materials Development Center, Stout Vocational Rehabilitation Institute, School of Education and Human Services, University of Wisconsin-Stout, Menomonie, WI 54751 1981 133 pages $10.50 Provides professionals in many human service fields with accurate and detailed information on wide available commercial vocational evaluation systems

Designing for Functional Limitations J Mueller The George Washington University, Rehabilitation Research and Training Center, Job Development Laboratory, 2300 Eye Street, Washington, D.C. 20037 1979 Excerpts from this document appear at the beginning of this section

Employability Restorations Engineering Program for Severely Handicapped J W McLeurung, Ph.D and C J Laenger, Sr Southwest Research Institute, PO Box Drawer 28510, 6220 Culebra Road, San Antonio, TX 78284 “3 pages 1977 The report describes how adaptations, many quite simple and inexpensive, have allowed participants in the program to hold jobs

Employing the Disabled What Are Self-Help Groups and What Assistance Can They Offer the Employer? Ramí Rabbv, 136 E 55th Street, Suite 8E, New York, NY 10022. (212) 371-7766 $5.00 plus $5.00 postage and handling 1981

Employment of the Handicapped Resource Guide US Department of Education, Office of Special Education and Rehabilitative Services, Publication No 82-22010, October, 1982. Information on programs to assist disabled persons in obtaining employment, programs creating job opportunities for disabled persons, programs regulating policies concerning employment of disabled persons, information for employers, and information resources and technical assistance


A Guide to Job Site Evaluation K F Botterbusch Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, Wisconsin How to use different types of job site evaluations, how to set up a job site and evaluate the client. Sample evaluation forms included


Human Scale 1/2/3, 4/5/6, 7/8/9 The MIT Press, Institute of Technology, Cambridge, MA 12142 Anthropometric charts for men, women, and children. Guideline requirements for physically disabled and elderly people

The Industrial Engineering Handbook for Sheltered Workshops David A Hietala and Paul M McCarley RPM Press, P O Box 627, Menomonie, WI 54751 309 pages, figures, tabs Inquire for price 1982 A reference for streamlining productivity in work centers to result in maximum realistic performance

The International Directory of Job-Oriented Assistive Devices Lifeboat, Fox Hill Garden Offices, 5855 Green Valley Circle, Culver City, California 90230 $25.95 A 200-page guide on assistive devices for over 25 disability groups. The directory includes descriptions of individual disabilities, problems encountered, solutions, how the devices work, and the manufacturer to contact

Job Redesign Antonio Suazo Goodwill Industries of America, Washington, D.C. 1974

Job Related Physical Capacities Project Final Report Florida International University, Miami, Florida Refers to an aids and accommodations catalogue compiled as part of the project

Managing and Employing the Handicapped. The Un- tapped Potential G C Pat, J I Atkins, and G Morrison Brace-Park Press, P O Box 526, Lake Forest, IL 1581 $19.95 hardcover, $14.95 softcover

Materials Development Center 1983 Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout, Menomonie, WI 54751 1583 17 pages A catalogue of print and audiovisual material about vocational evaluation and related services, rehabilitation facility operations, and independent living

Modifying the Work Environment for the Physically Disabled An Accessibility Checklist for Employers Margaret Desmond Human Resources Center, Albertson, New York 11507 107 pp 1982

Reading, Writing, and Other Communication Aids for Visually and Physically Handicapped Persons Reference Circular No 82-1, National Library Service for the Blind and Physically Handicapped,
Reasonable Accommodation Handbook  Frank Bowe
American Telephone & Telephaph Company  Available from National Center for a Barrier Free Environment, Information Service, 1015 Fifteenth Street
NW, Washington, DC 20005  202/465-6896  323 pages $37.50  1983  Although produced for AT&T, this document would also be useful to other employers and vocational counselors. It contains an introductory section discussing the concept of reasonable accommodation and reviewing the legal and regulatory requirements. The book provides one-page descriptions, with photographs, of hundreds of products and devices which may prove suitable for use as reasonable accommodations for certain individuals having job-related limitations


Rehabilitation Engineering Source Books Institute for Information Studies, Falls Church, VA  1979

Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide Compiled by Sensory Aids Foundation  Available from American Foundation for the Blind, 15 West 16th Street, New York, NY  210 pp.  1978  Lists devices and equipment which provide on-the-job assistance to visually impaired people. Each entry describes the function of the device, employment application, vendor, availability, and, in some cases, price. Listings include hard copy and paperless braille devices, braille readout, tone output or voice output, calculators, computer terminals or accessories, labeling aids, measuring aids, communication devices, etc. Indexed by employment area


Vocational and Educational Aids  Smith Kettlewell Rehabilitation Engineering Center, Smith Kettlewell Institute, San Francisco, CA  31 pp  1982  A catalog of sensory aids for blind persons, with an emphasis on low-cost electronic vocational aids. Includes information on acquiring devices or plans and circuit diagrams for devices which are not commercially available. Pictures and a discussion of applications are given. Devices include items to enable blind persons to read meters, scales and other measuring tools. Also available in braille

Work Independence and the Severely Disabled A Bibliography  G Bilotto, and V Washam Research and Utilization Institute, National Center on Employment of the Handicapped, Human Resources Center, 11 Willetts Road, Albertson, NY  11507  1980  $7.95  A review of literature covering areas related to independence at work - architectural barriers, mobility, transportation job modification, specialized equipment, and general and vocational rehabilitation

Working with Cerebral Palsy  EM Shaver and K Mallik  George Washington University, Rehabilitation Research and Training Center. 2300 Eye Street, Washington, DC  20037  1981  $6.00  Vocational training of people with cerebral palsy includes a list of alternative techniques and devices to help overcome barriers at the workplace

Two European books on Technology Assisted Employment have been translated into English recently

Project Employment and Technology Final Report Lucas Foundation for Rehabilitation, Hoensbroek Center for Rehabilitation Technology, Zandergsweg 6432 cc Hoensbroek, Holland 93 pages  1982  Between July 1979 and February 1982, the Foundation studied and developed technical provisions for their occupational training and occupational practice of individuals with physical disabilities. A new team of mechanical engineers, documentation specialists, and administrative assistants was recruited and trained to work with other Foundation members in gathering knowledge and providing experience about the applicability of technical aids to employment opportunities. The project designed, produced, and tested technical aids in the work environment in cooperation with industry. The project's successful production of usable items and procurement of jobs is discussed in the conclusion section accompanied by recommendations

Adapting Work Sites for People With Disabilities Ideas from Sweden Gerd Elmfeldt, Caroline Wise, Hans Bergsten, Ake Olsson  The Swedish Institute for the Handicapped, Box 303, 5-161 26 Bromma, Sweden  Available in the USA from NARIC or from World Rehabilitation Fund, 400 East 34th Street, New York, NY  10016  Free  The sources for supplies are all Swedish, but many of the devices are available in the U.S. Many of the adaptations, and the philosophy behind them, are readily applicable to the U.S.
Periodicals

* Specific focus on applications for disability

*Aids and Appliances Review* The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158, 617/969-6200. Each issue of this quarterly newsletter evaluates in depth one type of aid for people with visual impairments. Some are applicable to employment. Given the usual paucity of equipment evaluation data available, this publication is a real goldmine of timely and useful information.

American Industrial Hygiene Association Journal
American Industrial Hygiene Association, 475 Wolf Ledges Pkwy, Akron, OH 44311 Subscription $30.00/yr or Free to Controlled Circulation

American Printer and Lithographer McLean - Hunter Publishing Corp, 300 W Adams Street, Chicago, IL 60606

Biomedical Technology and Human Factors Engineering US Dept of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161 Subscription $55.00/yr

Biomedical Electronics Girard Associates Inc., Box 455, Mt Arlington, NJ 07856 Subscription $72.00/yr

*Bulletins on Science and Technology for the Handicapped* American Association for the Advancement of Science, Office of Opportunities in Science, 1776 Massachusetts Ave NW, Washington, DC 20036

Computers and Education Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, NY 10523 Subscription $95.00/yr

Computers and People Berkeley Enterprises, Inc., 815 Washington Street, Newtonville, MA 02160 Subscription $14.50/yr

Computerworld Computerworo, inc., 797 Washington Street, Newton, MA 02160

Construction Equipment Cahners Publishing Co., Inc, 270 St Paul Street, Denver, CO 80206

Design News Cahners Publishing Co, Inc, 22 Columbus Avenue, Boston, MA 02116 Subscription $30.00/yr

Engineer's Digest Walker - Davis Publications, Inc, 2500 Office Center, Willow Grove, PA 19090 Subscription Free to Controlled Circulation

*Homecara/Rehab Product News* Miramar Publishing Company, 2048 Cotner Avenue, Los Angeles, CA 90025 Subscription $40.00/yr or Free to Controlled Circulation.

Housing McGraw-Hill Publications Co, 1221 Avenue of Americas, New York, NY 10020 Subscription $16.00/yr

Industrial Equipment News Thomas Publishing Company, 1 Penn Plaza, 250 W 34th Street, New York, NY 10001 Subscription $12.00/yr or Free to Controlled Circulation

Industrial Maintenance and Plant Operation Annes Publishing Company, 1 West Olney Avenue, Philadelphia, PA 19120 Subscription $35.00/yr or Free to Controlled Circulation

*In the Mainstream, Mainstream,* Inc 1200 15th Street, NW, Washington, DC 20005 Subscription Bimonthly newsletter $40.00/yr

Machine Design Penton/IPC, Penton Plaza, Cleveland, OH 44114 Subscription $50.00/yr or Free to Controlled Circulation

Manufacturing Engineering Society of Manufacturing Engineers, One SME Drive, P O Box 930, Dearborn, MI 48128 Subscription $18.00/yr

Materials Handling Engineering Penton/IPC, Penton Plaza, 1111 Chester Avenue, Cleveland, OH 44114 Subscription $24.00/yr

Materials News Dow Corning Corp, P O Box 1767, Mioland, MI 48640 Subscription No Charge to Controlled Circulation

Measurement and Control News Measurements and Data Corporation, 2994 West Liberty Ave, Pittsburgh, PA 15216 Subscription No Charge to Controlled Circulation

Medical Electronics and Equipment News Reilly Publishing Company, 532 Busse Highway, Park Ridge, IL 60068 Subscription $20.00/yr or No Charge to Controlled Circulation

Metal Progress American Society for Metals, Metals Park, OH 44073 Subscription $20.00/yr

Modern Application News A Verner Nelson Associates, 382 Old Stokie Road, Highland Park, IL 60035 Subscription $15.00/yr or No Charge to Controlled Circulation

Package Engineering Cahners Publishing Co. 270 St Paul Street, Denver, CO 80206 Subscription $25.00/yr

Personal Computing Hayden Publishing Company, Inc, 50 Essex Street, Rochelle Park, NJ 07662 Subscription $19.00/yr

Plant Engineering Technical Publishing Co, 1301 S Grove Ave, Barrington, IL 60010 Subscription $30.00/yr

Plastics Technology Bill Communications, Inc, 633 3rd Avenue, New York, NY 10017 Subscription $15.00/yr

Popular Science Times Mirror Magazines, Inc, 380 Madison Avenue, New York, NY 10017 Subscription $15.00/yr

Power McGraw Hill, Inc, 1221 Avenue of Americas, New York, NY 10020 Subscription $11.00/yr
EDUCATIONAL AND VOCATIONAL TECHNOLOGY


*Rx Home Care. Barrington Publications, Inc. 825 S. Barrington Avenue, Los Angeles, CA 90049. Subscription: $40.00/yr or Free to Controlled Circulation.

*Sensory Aids Technology Update Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306. Editor: Sharon Connor. Subscription: $30/year. Available in either print or on cassette. Information about new products, special employment, education and training programs, unusual applications of technology, and what's happening in research and development. Computer hardware, software and interface problems are discussed; product comparisons are profiled. Articles have included: Comparison of paperless braille devices: The MB-2400 and the Versabraill; Users review IBM's new talking terminal for mainframe computers; Compuserve: new database for handicapped users; Telebraille prototype TDD for deaf-blind; A look at large FM systems for hearing impaired people; Financing adaptive equipment; Vocational guidance tools; Customizing software programs for speech output.

*Technical Aid to the Disabled Journal. c/o Royal Ryde Rehabilitation Hospital, 227 Morrison Road, P.O. Box 108, Ryde, N.S.W 2112, Australia. Subscription: $10.

*TechBrief. Rehabilitation Engineering Center, Cerebral Palsy Research Foundation of Kansas, Wichita, Kansas Quarterly publication.

Today's Office Hearst Business Communications, Inc., 645 Stewart Avenue, Garden City, NY 11530 Subscription: $30.00/yr or Free to Controlled Circulation.

Welding Design and Fabrication Penton/IPC, 314 Superior Avenue W Cleveland, OH 44113 Subscription: $24.00/yr

PRODUCT/EQUIPMENT DIRECTORIES

Contact ABLEDATA for specific product information

Best's Safety Directory
A.M. Best Company, Inc
Ambest Road
Oldwick, NJ 08858

Electronic Engineers Master Catalog
United Technical Publications, Inc
645 Stewart Avenue
Garden City, NY 11530

*Product Inventory of Hardware, Equipment, and Appliances for Barrier-Free Design
National Handicap Housing Institute, Inc
12 So. 6th Street, Suite 1216
Minneapolis, MN 55402

ThomCat
Thomas Register
1 Penn Plaza
New York, NY 10117

*Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People
Wisconsin Vocational Studies Center
University of Wisconsin-Madison
Madison, WI 53706
787 pages, 283 products
$33.00
1981

*A New Catalog Supplement Tools, Equipment & Machinery Wisconsin Vocational Studies Center University of Wisconsin-Madison Madison, WI 53706 671 pages, 231 products $32.00 1983
The supplement contains descriptions and illustrations of 231 products modified for use in educating and employing handicapped people. There are no duplications from the original Tools catalog.

Yellow Pages of Industrial Equipment and Supplies Industrial Research/Development
*301 S Grove Avenue
Barrington, Illinois 60010
Recreational and Leisure Technology
RECREATIONAL & LEISURE TECHNOLOGY

INTRODUCTION: TECHNOLOGY FOR RECREATION

SPORTS

DISABILITY-RELATED NATIONAL SPORTS ORGANIZATIONS
NATIONAL ORGANIZATIONS WITH INTEREST IN RECREATION FOR DISABLED PEOPLE

WHEELCHAIR SPORTS

SPORTS WHEELCHAIRS
BASKETBALL
FOOTBALL
MARATHON RACING
MOTORCYCLING
SOFTBALL
TENNIS

WATER SPORTS

BOATING
SCUBA
WATERSKIING

WINTER SPORTS

SKIING
SKATING

OTHER SPORTS

BOWLING
GOLF
FLYING
HUNTING & FISHING

ADDITIONAL PUBLICATIONS

AUDIOVISUALS

SOME LOCAL RECREATION PROGRAMS

LEISURE ACTIVITIES

GARDENING
MUSIC
NEEDLEWORK
FITNESS
TRAILS

TOYS AND GAMES

THE VALUE OF TOYS
CRITERIA FOR GOOD EQUIPMENT
CHOOSING THE RIGHT TOY
CONCEPT OF CONTROL
A NOTE ON SAFETY
DO IT YOURSELF
PEOPLE AND ORGANIZATIONS WITH A SPECIAL INTEREST IN TOYS AND GAMES
SOME MANUFACTURERS OF SPECIAL TOYS
TOY LIBRARIES
SELECTED PUBLICATIONS TOYS & GAMES

PLAYGROUNDS
RECREATIONAL AND LEISURE TECHNOLOGY

INTRODUCTION

This panel discussion on the role of recreation and leisure in the lives of disabled people explores ways in which technology can assist disabled and able-bodied people in removing barriers to participation. The discussion was presented at the La Jolla Workshop on Science and Technology for the Handicapped: Issues in Technology for Daily Living, on May 11-12, 1981. The workshop was sponsored by the American Association for the Advancement of Science (AAAS).

The panel members are involved in work related to recreation and technology:

Chester Land, Director, Therapeutic Recreation Program, Rancho Los Amigos Hospital, Downey, California

Peter Axelson, Veterans Administration Medical Center, Research and Development Center, Palo Alto, California

Marti Hacker, Supervisor of Recreation Community Service Center for the Disabled, San Diego, California

Roy Gash, Wheelchair Repair Department Manager, Community Service Center for the Disabled, San Diego, California

Marti Taylor, Community Service Center for the Disabled, San Diego, California

QUESTION: "How can technology benefit recreation for disabled people?"

MARTI HACKER: "One of the most important differences between recreation for able-bodied people and for disabled people is the need for additional manpower to help with setting things up for disabled people's use. Technology can be very useful here, since proper design and mechanical assists can eliminate the need for much extra manpower. From a disabled person's point of view, this is usually a plus, since most of us do not like having to depend on another person any more than necessary. Mechanical adaptations increase feelings of, and indeed our level of, independence.

QUESTION: "How did wheelchair sports and the development of special equipment for these sports develop?"

ROY GASH: "Wheelchair sports have promoted the development of better, lighter and more durable wheelchairs. All of the changes in wheelchair design have come about because of disabled people using available equipment and not being satisfied with it. The men and women who participate in sports and other recreational activities have developed modified wheelchairs to make them lighter, to fit the sport, and to personalize the chair to make it fit the individual.

"The use of wheelchairs in basketball, track, tennis and off-road activities has promoted the growth of a new generation of wheelchairs for the active wheelchair user. Wheelchair design has remained basically the same since the 1930s, when Everest and Jennings started selling their chair. Until the early to middle seventies, all wheelchairs were copies of this basic design. In the past five years, however, many improvements in wheelchair design have been introduced. These innovations can be traced directly to wheelchair sports, i.e., changes have been made by disabled people thinking about the equipment they use.

"All of the chairs which were designed for sports are useful for people with arm and hand weakness. The newer, lighter wheelchairs on the market today can make the difference between a person being dependent and independent -- someone with impaired arm strength can push his or her own lightweight chair, whereas it would have been impossible with the older models. This increased independence is directly related to the many hours spent developing a better wheelchair.

"Quality wheelchair hubs for everyday use are another result of sports. There are several different hubs being manufactured today. These are a great improvement over the standard wheelchair hub. Many wheelchair users find they greatly improve the way a chair rolls. They, too, are especially helpful for people with weak hands or arms.

"Most of the newer equipment on the market today which enables disabled individuals to compete in track, basketball, snow skiing and many other activities is the direct result of a disabled person or group of disabled individuals designing quality equipment for their specific needs."
RECREATIONAL AND LEISURE TECHNOLOGY

QUEST QUESTION: “What are some of the technological adaptations made to wheelchairs for recreation or competitive use?”

ROY GASH: “The wheelchairs used in basketball were the first to be modified to make the chair more manageable. This was done by adding axles plates to enable the user to change the center of gravity. Negative camber was created by using a camber bracket to spread the frame wider at the bottom than at the top. Excess metal was also cut from the frame. These changes were standard if a person wanted to be competitive while playing the game.

“Today the majority of people playing wheelchair basketball use lightweight alloy wheelchairs. These range from Quadra, Quickie or Stainless basketball chairs to locally-made lightweight non-foldable wheelchairs. All of these newer chairs have adjustable rear axle positions, quick release rear wheels, adjustable front casters and adjustable back heights. They also come in any width desired by the user. These new chairs have improved bearings all around, as well as stronger, improved hubs and front casters. They are also stronger than the old models.

“The wheelchairs used in track were originally the same basic wheelchair design. The same modifications made to the basketball chair were made to the track chair, except the track chair had more weight cut from it. Some people used sagged or sagging upholstery to lower their center of gravity. Smaller push rims were used to increase speed.

“Today race chairs are specifically made for racing. Race equipment is designed for the individual and his or her disability, using the design of the chair to increase speed and muscle groups to their utmost capacity.

“My racing chair is long and low. I use 700 centimeter wheels and high-pressure clincher tires. I also use Phil Wood hubs. I use inch-and-a-quarter pneumatics on the front so that I sit about 13 inches off the ground. I have steering handles on the chair because on downhill curves the steering is difficult. Thus are some of the adaptations that can be made.

QUESTION: “What are the benefits of cambered wheels and Phil Wood hubs?”

ROY GASH: “Cambered wheels help for stability and turns. You can turn quicker and not have the likelihood of tipping over. There are chairs now with variable cambers. You can adjust the cambers with a setting, but they’re low production chairs. In addition, there are wheels that pop off, just push the button and the wheel comes right off. That helps as far as putting the chairs in cars or other places.

“I think it would be hard to improve the Phil Wood hubs. If I took my wheel and spun it, it would spin twice as long as any other wheel in here, but I don’t know for sure what it is. They’re waterproof and dirt proof and guaranteed for a lifetime. Even on a very slight incline you just roll right down it, you don’t push. Also you don’t have one wheel rolling better than the other, they both roll a true straight line.

QUESTION: “Where can you get Phil Wood hubs?”

ROY GASH: “Go to a bike shop. If they carry Phil Wood hubs, they’ll string your wheels for $10 or $15.

QUESTION: “We see many changes in the manual chairs, but what about the power chairs?”

MARRI TAYLOR: “I would like to see more technology put into the design of power chairs. I would like to see a chair that can be used in sand, mud, dirt, and any kind of situation. I would like to see wider tires on both the front and back. I would also like to see chairs that were not all chrome, so that they don’t have the ‘hospital look.’ If wheelchairs could be manufactured so that they could get across any kind of terrain, that would be wonderful. I’d like to help anyone who wants to design that.

QUESTION: “What modifications to the terrain are necessary to make recreation accessible to disabled people?”

CHESTER LAND: “In Los Angeles, there’s an accessible path to the Marina. We constructed a concrete path under the sand and put rails along it that you could move in and out of. If a person wants to go down to the water, there is a chair available so you won’t get your chair all sandy and wet. You can transfer to the available chair and move on the concrete path down to the water. If you want to walk and use canes, you can do that.

MARRI TAYLOR: “Also I’ve been working with the state Department of Parks and Recreation and they are really willing to make all of the state parks accessible. I’m also working with the county Parks and Recreation Department. The more we can push to have our county parks and state parks accessible, the more disabled people will get out into the public. I’ve always run into an attitude with people who say, ‘I’ve never seen a disabled person here,’ and I look at the flight of steps or the rocks or whatever and I say, ‘Well, gee whiz, I wonder why?’ It’s hopefully up and coming. It’s going to take a bit of doing, and unfortunately it’s going to take a bit of money, but there is a need.

“We’re not asking them to pave all their trails. We’re asking them to make bathroom facilities accessible, to make drinking fountains accessible, a couple camp sites interspersed throughout the campground that could be made with a little harder-packed dirt or something like that. There’s a new combination of asphalt and dirt and a couple of other weird things they put into it that can make a hard-pack trail. There is a trail in Northern California — I’m not sure how long it is — but it’s a special project and a wheelchair can go the whole distance, but that’s unusual.
As a disabled person, I'm not asking for total accessibility, that's impossible. If I can't get from here to there, well, that's too bad but if there's something that can be done easily, I'm all for it. I don't expect the whole world to be ramped; it's just not possible.

QUESTION. "How can transportation barriers to recreation be eliminated?"

MARTI HACKER: "Transportation is truly the first barrier to recreation for disabled people. Because of the expense of specially-adapted vehicles, many disabled people do not drive. There is a tremendous need for inexpensive transportation for: disabled people, preferably our own vehicles. Unfortunately, few solutions have been found, although some seem obvious. For example, severely disabled wheelchair users who want to drive have no choice except to use a modified van. Vans cost considerably more than cars, not to mention the cost of gas and upkeep. One possible solution would be a small car with seats removed, allowing the wheelchair user to enter from the back of the car, in the wheelchair, from which he or she would also drive. Such a set-up would also eliminate the need for an expensive lift. In addition to getting to recreational events, driving itself can be a form of recreation. Motorcycles driven from a wheelchair in a sidecar have implemented this idea. Other vehicles, such as street-legal golf carts, double as recreation and transportation for some disabled people. Of course, modified bicycles, either those on wheels or bicycle attachments for wheelchairs, serve the same purpose for short distances."

QUESTION "Who's barrier does cost play in prohibiting the availability of chairs and other sports equipment to average consumers?"

ROY GASH: "Wheelchair sports have helped the development of the wheelchair tremendously. Many individuals are now designing their own chairs and this is bringing about some excellent technology. Price is still a major barrier. For example, if a wheelchair basketball team purchases a ten basketball chairs commercially, the cost can exceed $10,000. However, if they have a welder or a mechanic on the team, they can make all their chairs for $1,000, less the wheels."

QUESTION: "What types of ski equipment have been developed for physically disabled individuals?"

ROY GASH: "There are currently several types of snow skiing equipment on the market. These include snow sleds which are compatible with ski lifts. There are several large ski areas which have equipment to loan as well as instruction for disabled skiers. Peter, why don't you describe the ARROYA?"

PETER AXELSON: "The ARROYA is a sled-like device constructed of reinforced fiberglass. Stainless steel edges on the bottom surface allow for turning and stopping on varying terrain and in varying ski conditions. The ARROYA addresses the neglected recreational needs of disabled persons who would benefit from integration into the whole of society. The responsible application of technology toward ski-sled design development and the establishment of downhill ski-sledging protocol will allow ski programs for the disabled to offer integrative downhill skiing to just about every one.

QUESTION "How has the ARROYA been received by disabled and non-disabled skiers?"

PETER AXELSON "Demonstrations of the ARROYA ski-sled at various instructor clinics throughout the United States and in Norway generated very positive publicity. Each clinic received local newspaper coverage and some received television coverage. The objective of this publicity was to make individuals aware of the opportunity for paraplegics to use the ARROYA ski-sled and to increase general public awareness of the disabled community.

'Unlike many other sports and recreational activities available to the disabled person, the ARROYA allows a ski-sled user to interact naturally with skiers using other types of adaptive equipment (i.e., skis, boots, poles, etc.) This type of interaction between ambulatory and non-ambulatory individuals is not found in "wheelchair sports" (many recreational activities for paraplegics and quadriplegics tend to segregate them from their ambulatory friends.) In fact, able-bodied individuals also enjoy skiing in the ski-sled. It is therefore possible that this ski-sled will be used by both ambulatory and non-ambulatory individuals.

"One of the things we have had difficulty with is getting outside funding for this kind of work. We have submitted proposals but funding sources don't always recognize that recreation actually needs research. We are going to continue to monitor the evaluation process of the last prototype skis and then we can find a manufacturer that will continue with the next prototype.

QUESTION "Are disabled people who cannot or do not wish to be involved in competitive sports relegated to physical inactivity?"

MARTI HACKER. "There are other recreational activities which provide excellent ways of improving muscle tone, coordination, circulation, and cardio-vascular endurance. Most recreational sports are adaptable for many disabled people, the type and degree of disability determine the modifications necessary. Swimming is a sport that can be enjoyed by almost everyone. Adaptations for pools include lifts and sloping access for wheelchairs."

"Bowling is another sport that has been adapted for disabled people. A special chair can be used for those who are unable to roll the ball themselves."

"Sailing requires help setting up the boat and getting in and out of it -- a possibility for technology."

"Waterskiing is another sport that has recently
been adapted for disabled enthusiasts. In San Diego a ski chair called the Aquabat is used. This device consists of a seat attached to two short skis and handlebars. Some type of easily or automatically released hand gripper needs to be designed for those with insufficient hand strength.

"These are but a few of the activities which are alternatives to competitive sports. One final word -- for wheelchair users, each improvement made in everyday chairs makes participation in recreation easier and more fun.

CHESTER LAND "The disabled community is now beginning to move into the mainstream. How many men as children wanted to be football players but were not big enough, or wanted to be basketball players but were not tall enough? Those were handicapping conditions. The same situation is now beginning to occur among individuals who use wheelchairs. Everyone is not going to be able to play wheelchair sports, but the same leisure feeling can be derived from other recreational sports.

MARRI TAYLOR "For me, fishing is something very individual that makes me feel great. I look upon fishing as a competitive sport as well as basketball or anything else. Whether I am going to get that little fish or not is competition enough for me.

QUESTION "How do individuals who have not been involved in wheelchair sports gain access to communication networks that exist among technology experts?

MARRI TAYLOR "Valuable information exchanges exist among local communities of disabled athletes, sports enthusiasts, and small businesses. A major challenge for the future will be to involve small businesspeople in manufacturing innovations as they come out of the wheelchair competitions. Sports and Spokes is a valuable publication which contains useful information about wheelchair sports and equipment.

QUESTION "Are there any national centers where individuals with disabilities can receive specific training in sports and recreation?

MARRI TAYLOR "The Vinland National Center in Loretto, Minnesota is a national health sports center which offers training to disabled and non-disabled individuals. This center provides workshops which focus on skill building in a wide range of physical activities, as well as in the area of health promotion, stress management, disability education, and medical self-care skills. Canoeing, running/jogging, swimming, weight and circuit training, cross-country skiing, pulk skiing and ice sledding, archery, wheelchair, and pole and snow are some of the skill areas that are addressed by the center. Vinland also publishes Vin-Lines, a quarterly newsletter.

Summary

"The right to enjoy leisure time through a variety of sports and recreational opportunities is the right of all individuals, including individuals with disabilities. The benefits involved from participation in recreation and leisure pursuits are far-reaching, and include physical, emotional, and psychological benefits.

"Wheelchair sports have opened up sports participation to wheelchair users. As the popularity of these sports increases, new developments in wheelchair design are introduced. The popular use of chairs in basketball, track, tennis and other sports has promoted the growth of a new generation of wheelchairs for the active user.

"Other forms of sports equipment are being developed by the rehabilitation engineering community. Bicycles and ski equipment are two areas undergoing current research and development. Camping and wilderness activities are also becoming more accessible as national parks and local camping areas begin to make provisions to include persons with disabilities.

"As persons with disabilities continue to make their recreation and leisure needs known, advances in technology will continue in this important area. As disabled and non-disabled people continue to play together, technology for recreation will expand and increase access to this life area.

Addresses of Organizations Referred to in This Excerpt

Mission Bay Aquatic Center
1001 Santa Clara Point
San Diego, CA 92109

Phil Wood & Company
153 West Julian
San Jose, CA 95110
408/298-1540

Sports 'n' Spoken Magazine
5201 North 19th Avenue, Suite 111
Phoenix, AZ 85015
602/246-9426

Vinland National Center
3675 Ihduapi Road
P.O. Box 308
Loretto, MN 55357
“There is hardly any sport in which persons with disabilities do not take part, nor any disability for which there are no special organized games or olympiads. The opportunities range from local sports (school, community center, etc) up to state, regional, national, and international competitions.

“During and immediately following World War I, interest developed in sports for those persons with amputations and visual impairments. Then, in 1944, the Spinal Injuries Centre at Stoke-Mandeville Hospital in Aylesbury, England, initiated wheelchair sports. In 1962, the British Commonwealth Paraplegic Games were founded and held in Perth, Western Australia. The Pan-American Wheelchair Games were held for the first time in 1967 in Winnipeg, Canada, and have continued successfully in various countries every fourth year. In the 1960's, the World Zone Games were initiated, and in 1975, the first Far Eastern and South Pacific Games for disabled persons were held in Oita, Japan. In 1976, the United States Association of Blind Athletes was founded. Also in 1976, the Olympiad for Disabled People was initiated and almost 1,700 athletes with varied disabilities competed. The Annual International Cerebral Palsy Games were started in 1979, and the list of sporting events goes on.

“Sports programs enable disabled persons to develop physical skills and fitness, experience the challenges of competition and the thrills of victory, and be provided with opportunities to help organize and operate sophisticated national and international programs.

“For disabled persons to participate fully in a sport, however, equipment, performance technique, and game rules may need to be modified.”

Sports for Disabled Individuals, Rehab Brief, Vol IV No 3, Jan 26, 1981

DISABILITY-RELATED SPORTS ASSOCIATIONS

These groups may be able to provide information on useful applications of technical aids.

American Athletic Association of the Deaf
3916 Lantern Drive
Silver Spring, MD 20902

Amputee Sports Association
George C Beckmann, Jr, President
11705 Mercy Blvd
Savannah, GA 31406
919/297-5408

Blind Outdoor Leisure Development (BOLD)
533 E Main Street
Aspen, CO 81611

Canadian Wheelchair Sports Association
33 River Road
Ottawa, Ontario
CANADA K1L 8B9

Disabled Sportsmen of America
P O Box 26
Vinton, VA 24179

International Committee of Silent Sports
Gaillard College
800 Florida Avenue, N.E.
Washington, DC 20002
202/651-5114 (voice or TDD)

International Games for the Disabled
Eisenhower Park
East Meadow, NY 11554
516/542-4493

International Sports Organization for the Disabled
International Stoke Mandeville Games Federation
Stoke Mandeville Spinal Injury Center
Aylesbury, England

McLively International USA
P O Box 3551
Eugene, OR 97403
503/343-1284

National Association of Sports for Cerebral Palsy
United Cerebral Palsy Associations
66 E 34th Street
New York, NY 10016
212/481-6359

National Handicapped Sports & Recreation Association
Capital Hill Station
P O Box 18664
Denver, CO 80218
303/978-0564

National Inconvenienced Sportsman's Association
3738 Walnut Avenue
Carmichael, CA 95608
916/484-2153

National Inconvenienced Sportsman Association
2215 Allegheny Road
El Dorado Hills, CA 95630

National Wheelchair Athletic Association
2107 Templeton Gap Road, Suite C
Colorado Springs, CO 80907
303/632-0698

Outdoor Experimental Education for the Hearing Impaired
National Technical Institute for the Deaf
Rochester Institute of Technology
1 Lomb Memorial Drive
Rochester, NY 14623

Paralyzed Veterans of America
801 18th Street NW
Washington, DC 20006
202/872-1300

Special Olympics
Joseph P Kennedy Foundation
1701 K Street NW, Suite 203
Washington, DC 20006
202/331-1346
Sports for the Physically Disabled
333 River Road
Ottawa K1L 8B9
CANADA

United States Amputee Athletic Association
Route 2, County Line
Fairview, TN 37062
615/670-5453

U.S. Association of Blind Athletes
55 West California Avenue
Beach Haven, NJ 08008
609/492-1017

United States Wheelchair Sports Fund
c/o Nassau Community College
Garden City, NY 11530
516/222-1246

Vinland National Center
3674 Ihduapi Road
Loretto, MN 55357

These national organizations and agencies have shown an active interest in the development of recreation programs for people with disabilities.

American Alliance for Health, Physical Education, Recreation and Dance
1900 Association Drive
Reston, VA 22091

American Camping Association
Bradford Woods
Martinsville, IN 46151

American Corrective Therapy Association
4910 Bayou Vista
Houston, TX 77091

Boy Scouts of America
P.O Box 61030
Dallas/Ft Worth Airport, TX 75261

Camp Fire, Inc
4601 Madison Avenue
Kansas City, MO 64112

Girl Scouts of the USA
830 Third Avenue
New York, NY 10022

Information and Research Utilization Center (IRUC)
American Alliance for Health, Physical Education and Recreation (AAHPER)
1201 16th Street, N W
Washington, D.C. 20036
(202) 833-5541

National Park Service
Division of Special Programs and Populations
U.S. Department of the Interior
Washington, DC 20240

National Recreation and Park Association
1601 N. Kent Street
Arlington, VA 22209
703/525-0606

National Therapeutic Recreation Society
1601 N Kent Street
Arlington VA 22209
703/525-0606

Outdoor Recreation Technical Assistance Clearinghouse
Heritage Conservation and Recreation Service
Department of the Interior
Washington, D.C. 20240
(202) 343-7962

Also see organizations listed under each activity.

Vinland National Center
3675 Ihduapi Road
P.O Box 308
Loretto, MN 55357

The Vinland National Center is a health education/sports center for persons with disabilities. It is located twenty-three miles west of Minneapolis. The Vinland National Center was started in 1976 with a Bicentennial gift of one million kroner from Norway to the American people. Modeled after the Norwegian health sports center, Beltostolen, Vinland promotes healthy lifestyle changes, as well as a high quality of life and better health through health sports training. The "Vinland Concept" represents a holistic approach to rehabilitation. Vinland provides a national outreach follow-up and support programs for its graduates when they leave the center and return to their home communities. In addition, training manuals and curriculum guides are available for sale to disabled persons, family members, and health care, rehabilitation and education professionals on physical fitness training, sports and recreation skills, personal development and health promotion topics. For further information on courses, applications and financial aid, contact The Vinland National Center directly, the phone is 612/479-3555, voice or TTY.
SPORTS WHEELCHAIRS

The first edition of this guide reprinted part of an article "Scoring in the Sports Wheelchair Market" from Rx HomeCare, May 1982, by Richard Salzberg. The directory was felt to be a representative guide to major manufacturers of wheelchairs and other recreational transport. Because of the many exciting developments in this area within the past two years, this article is now out of date; a more recent survey is...

"Survey of 1983 Sport Wheelchair Manufacturers," written by the editors of Sports n' Spokes magazine, in Paraplegia News, September 1983. This article is the first in what is planned to be an annual feature comparing manufacturers and their products.

The field is changing so fast that the Guide is already somewhat out of date. For the most current information, contact the manufacturers listed, or your local sales representative. Many of the companies have wheelchair athletes on staff. For comparative information, get in touch with wheelchair athletes in your area.

For a different point of view, see "Tackling the Sports Wheelchair" by Debra Zauzmer, in RxHomeCare, November, 1983. This article provides the dealer's perspective on the sports wheelchair market. It includes a section, "Getting in on the Action," which suggests ways dealer support can be shown.

The new developments in sports wheelchairs are profoundly influencing wheelchair developments. Expect to see a lot of advertising about new products, and many articles written in both trade journals and consumer-oriented publications.

SOME MANUFACTURERS OF SPORTS WHEELCHAIRS

Bair Chair
6 Seco Court
Sacramento, CA 95823
916/427-1035

Canadian Wheelchair Manufacturing
1312 Blundell Road
Mississauga, Ontario CANADA L4Y 1M5
416/275-3960

Equalizer
274 Buchon St
P.O. Box 1296
San Luis Obispo, CA 93401

Everest & Jennings, Inc.
3233 East Mission Oaks Blvd
Camarillo, CA 93010
805/987-8911

Hall's Wheels
15 Marlboro Street
Belmont, MA 02178
617/489-3246

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035
800/321-5715

Mastercraft Metal Products
P.O. Box 591
Santa Cruz, CA 95061
408/426-3313

Moion Designs, Inc
1075 Cole
Clovis, CA 93612
209/298-1718

Orthopaedia GMBH (Germany)
U.S. Distributor
International Medical Equipment
11000 Rush Street #20
South El Monte, CA 91733

Ortop Technical Medical Aids (Israel)
U.S. Distributor
Meditech
544 10th Street
Palisades Park, NJ 07650
201/974-0500

Poirier Wheelchair (France)
U.S. Distributor
Magnum International
2930 West Central
Santa Ana, CA 92704
714/641-9696

Production Research Corporation
10217 Southard Drive
Beltsville, MD 20705
301/937-9633

Quadra Wheelchairs, Inc
31117 Via Colinas
Westlake Village, CA 91362
213/931-6302
800/324-1068

Spinner Internationalab
Box 69, S-197 00 BRO Sweden
Telephone +46 758 42200
Telex 11370 SPIN S

Sports Chairs
3673 Procyon Avenue
Las Vegas, NE 89103
702/873-6493

Stainless Medical Products
9385 Dowdy Drive
San Diego, CA 92126
619/578-6820

Theradyne Corporation
21730 Hanover Street
Lakeville, MN 55044
612/469-4404
300/323-4014

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RECREATIONAL AND LEISURE TECHNOLOGY

Wheeler Dealers
P.O. Box 656
Avondale, AZ 95323

X-L Enterprises
2003 Palm Avenue
Chico, CA 95926
916/891-3535

PUBLICATIONS


National Wheelchair Athletic Association 2107 Templeton Gap Road, Suite C Colorado Springs, CO 80907 303/632-0698


Sports’n Spokes, 5201 N 19th Ave, Suite 111, Phoenix, AZ 85015, (602) 246-9426, Magazine published bi-monthly on wheelchair competitive sports & recreation

Wheelchair III — Report of a Workshop on Special- ly Adapted Wheelchairs and Sports Wheelchairs. The report was developed out of the third in a series of workshops sponsored by RESNA and the Veterans Administration Rehabilitation Research and Development Service. Available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20844 $10.00

FOR MORE INFORMATION ON WHEELCHAIR SPORTS

National Wheelchair Athletic Association 2107 Templeton Gap Road, Suite C Colorado Springs, CO 80907 303/632-0698

Basketball
National Wheelchair Basketball Association 110 Seaton Bldg University of Kentucky Louisville, KY 40506 606/257-1673

Playing and Coaching Wheelchair Basketball E Owen, University of Illinois Press, Champaign, IL 400 pages 1979

Football
Rehabilitation-Education Center University of Illinois Oak Street at Stadium Drive Champaign, IL 61820

The Silver Wheels Wheelchair Football 109 Florence Avenue Buffalo, NY 14114

Marathon Racing
International Wheelchair Road Racers Club 12710 N 30th Street Tampa, FL 33612 8 3/77-8824

National Spinal Cord Injury Foundation 369 Elliot Street Upper Newton Falls, MA 02164

National Wheelchair Marathon Paul DePace 380 Diamond Hill Road Warwick, RI 02886

Motorcycling
Wheelchair Motorcycle Association Dr Eli Factor 101 Torrey Street Brockton, MA 02401 617/583-8614

Softball
National Wheelchair Softball Association P.O. Box 737 Sioux Falls, SD 57101

Tennis
National Foundation for Wheelchair Tennis 3857 Birch Street Box 411 Newport Beach, CA 92650

International Foundation for Wheelchair Tennis 2203 Timberloch Place, Suite 126 The Woodlands, TX 77380 713/363-4707

Baseball
National Wheelchair Softball Association P.O. Box 737 Sioux Falls, SD 57101

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WATER SPORTS

Boating

"Although boat modifications and adaptations cover a wide range, handholds and handrails are the most common additions. However many disabled people do not need to make any significant modifications to their craft.

"There is a risk involved in boating (as in all sports), but safety regulations and procedures are designed to minimize this risk, even if all of it cannot be eliminated. However, since part of the challenge of boating is its risk, many of the benefits for the disabled persons would be lost if all the challenges of the sport were removed. Even so, every boater should wear, or have immediate access to, a properly fitted Personal Flotation Device. Aboard a small craft, the device should be worn at all times."


Disabled boaters have formed their own organization, the Handicapped Boaters Association, which seeks to further the safe participation of disabled people in recreational boating and related activities throughout the country. The association publishes a bimonthly magazine, Boating World Unlimited.

These programs have information on equipment selection and adapting equipment for boating.

Handicapped Boaters Association
PO Box 1134
Ansonia Station
New York, NY 10023

Wilderness Inquiry
2929 4th Avenue South
Minneapolis, MN 55408
612/827-4001

Mission Bay Aquatic Center
1001 Santa Clara Point
San Diego, CA 92129

Adapted Boating Program
Office of Parks and Recreation
Sailboat House
1520 Lakeside Drive
Oakland, CA 94612
415/444-3807

Publications


American Red Cross. Adapted Aquatics. Swimming for Persons with Physical or Mental Impairments. American Red Cross, Garden City, NY 1977


Camp Confidence. Waterfront Program—Summer The Camp, Box 349, Brainerd, Minnesota 56401 1973


Diane Durylea. "Another Kind of Handicap." Yachting, October 1976, 86-87


Eugene Hedley, PhD. Boating for the Handicapped. Guideline for the Physically Disabled Human Resources Center, Albertson, NY 1978


Syd Jacobs. Information on Whitewater Kayaking for the Handicapped. 209 Columbus, Port Angeles, WA 98362, 206/452-4253


Oral O. Miller. Four Years at the Oars. 3701
Connecticut Avenue, NW, Washington, DC.


Oakland Office of Parks and Recreation. Open Boating. Oakland Office of Parks and Recreation, Water Safety and Boating Program for the Disabled. 1520 Lakeside Drive, Oakland, CA 94612. 1982. A handbook about Lake Merritt's Adapted Boating Program for the Disabled. Chapter 4 has a description of facilities, equipment considerations and categories, building and stocking a work space. Chapter 5 describes a team approach to teaching, designing and making adaptive equipment and devices. An award-winning documentary, "Open Boating," is also available in either 16 mm film or videotape formats.


Scuba Articles on divers' nutrition, physical fitness and beach accessibility are the fare in a new publication for physically handicapped people who scuba dive or who would like to learn how to scuba dive. Scuba Quarterly Undersea International Digest (SQUID), published by the Handicapped Scuba Association, offers diving advice and information from experts in underwater education. SQUID also sponsors a national form where diving instructors discuss scuba teaching tips, results, and suggestions. Subscriptions cost $18.00 per year, and are available from:


Another organization with information on this area is:

Professional Association of Diving Instructors, 2064 N. Bush Street, Santa Ana, CA 92706

Some publications are:


Water Skiing

Water skiing can be a new and exciting recreational experience for many disabled people. The American Water Ski Association has indicated its interest in working with groups to help introduce the sport to people with disabilities.

American Water Ski Association, Attention Bruce Kister, P.O. Box 191, Winter Haven, FL 33880.

Waterskiing for the Physically Disabled Mission Bay Aquatic Center, 1001 Santa Clara Point, San Diego, CA 92109. This manual is a guide for the summer camp, school, recreation department or any other group that wishes to institute a disabled waterski program. It includes instructions for adapting a monoski and one skisuit.

Water Sports

WINTER SPORTS

“Many disabled people can now enjoy skiing and skating. In 1971, the Winter Park Handicap Recreational Program in Winter Park, Colorado, began to teach people with amputations how to ski. Now, people with 29 different types of disabilities are also taught to how to ski. At some winter resorts, a blind skier may take to the slopes in tandem with a sighted companion who provides directions by verbal command or by means of a light harness. One-legged skiers are equipped with two arm-braced outrigger skis to give them a three-pronged balance.

“Beginning ice skaters who lack muscle strength, coordination, or who are overanxious may use a skate aid for support until they gain confidence. The collapsible aid is used much as a chair is used for support, but the aid is more stable and evenly balanced. Although blind and deaf people need no special equipment for skating, blind skaters would probably feel more secure with sighted partners, and a source of music centrally located may be helpful for orientation.”

From "Sports for Disabled Individuals," Rehab Brief Vol IV, No 3, Jan 26, 1981

Skiing


Colorado Outdoor Education Center, P O Box 897, Breckenridge, CO 80424, (303) 453-6422.


Pulk Skiing: Sled skiing and ice sledding for persons with mobility impairments. Orr, Loretta National Center, P O Box 308, Loretta, Minnesota 55357

The Winter Park Amputee Ski Teaching System, O’Leary. Available from Winter Park Ski School, P O Box 313, Winter Park, CO 80482, (303) 726-5514 x179

INTEGRATED SKIING. In an effort to facilitate integrative recreational sporting activities, a downhill skiing system called the ARROYA was introduced in 1979 at the National Handicapped Skiing Championships. Development of the ARROYA downhill skiing concept was funded by the Rehabilitative Research and Development Center at the Palo Alto Veterans Administration Medical Center.

The ARROYA is a simple sled-like device with no moving parts. The skier learns to control the direction and speed of the ARROYA by developing various downhill skiing skills. The ARROYA consists of four stainless steel edges that face inward beneath a composite shell. The skier sits in a molded seating system that links the user to the sled; much like the traditional downhill skiers foot is secured within a ski boot. The ARROYA is currently being manufactured by Beneficial Designs, 5858 Empire Grade, Santa Cruz, CA 95060 A list of skiing programs that use Arroya can be obtained from Beneficial designs. A cross-country sled is available from Mountain Smith, Inc, 12790 W 6th Place, Golden, CO 80401, (303) 238-5823

For more information on training programs and events related to pulk skiing, sled skiing, ice sledding and dog sledding.

Alaska

Alpine Alternatives 1634 W 13th Anchorage, Alaska 99501 (907) 275-7526 Marty Decker, Director

Arizona

Handicapped Unbound, Inc P O Box 1044 Prescott, AZ 86302

California

Environmental Traveling Companions Fort Mason, Bldg C Room 3B San Francisco, CA 94123

NHYSRA Lake Tahoe Chapter Larry Young Box 1636 Truckee, CA 95734 (Incline Village, Lake Tahoe) (916) 587-3911 (Alpine)

Tahoe Handicapped Ski School P O Box 2633 Olympic Valley, CA 95730 (916) 583-7584 Katherine Hayes, Director

Colorado

Colorado Outdoor Education Center P O Box 697 Breckenridge, CO 80424 (303) 453-6422 Bruce Werber, Director

Ed Luchs P O Box 5429 Snowmass Village, CO 81617 (303) 923-3294 (Alpine)
Horizons for the Handicapped
P.O. Box 2143
Steamboat Springs, CO 80477
(303) 879-4466

Horizons for the Handicapped
Laura Canfield
P.O. Box 2143
Steamboat Springs, CO 80477
(303) 879-4466
(Alpine)

Winter Park Recreational Association
Box 36
Winter Park, CO 80482
(303) 726-5514, ext 179
(Alpine)
Hal O'Leary, Director

United Deaf Skiers Association
Attention Mr Gutfran
Two Sunset Hill Road
Simsbury, CT 06070
(203) 244-3070

Minnesota

Courage Alpine Skiers
c/o Courage Center - Duluth
Duluth, MN 55802
(218) 727-6817
(Alpine skiing)

Lynx Track - Will Steger
P.O. Box 785
Ely, MN 55731
(Interdisciplinary programs in dog-sledding and winter travel)

Minnesota Outward Bound School
308 Walker Avenue South
Wayzata, MN 55391

Ski for Light - HEALTHsports, Inc
1455 W Lake Street
Minneapolis, MN 55408
(612) 927-3611
(Annual February week-long X-C Ski event with blind/sighted/mobility impaired also regional events)

Winland National Center
3675 Induscap Road
Loretto, Minnesota 55357
(612) 479-3555
Larry Orr/DOirector

Wilderness Inquiry II
2929 4th Avenue South
Minneapolis, MN 55408
612/827-4001
(Summer and winter travel programs)

New Hampshire

Outdoor Wilderness Program
Crotched Mountain Center
Greenfield, NH 03047

New York

Outdoor Experimental Ed for the Hearing Impaired
National Technical Institute for the Deaf
Rochester Institute of Technology
1 Lomb Memorial Drive
Rochester, NY 14623

Utah

Adaptive Outdoor Recreation
Ken Sleight Expeditions
349 S. 600 East
Salt Lake City, UT 84103

Peter Mandler
2273 Aubur Lane, Apt 6
Salt Lake City, UT 84117
(Snowbird, Alpine)
(801) 272-7420

Washington

Ski for All Foundation
521 Wall Street, Suite 326A
Seattle, WA 98121 (Snoqualmie Ski Summit)
(206) 623-2714
(Alpine)
Chris Colb, Executive Director

International

Track Three Ski
Box 1260
Station Q
Toronto, Ontario
CANADA M4T 2P4

Karsten Inde
Maraton Produkter
Eksbacka 197008RO
Sweden 0758140522
Postgro 878391-2
Barkgrio 289-8500

New Zealand Assoc for Disabled Skiers
P.O. Box 241?
Christchurch New Zealand
Gillian Hall/DOirector

SKATING

International Council on Therapeutic Ice Skating
P.O. Box 13
State College, PA 16801
OTHER SPORTS

Bowling

American Blind Bowling Association
15 N Bellaire Avenue
Louisville, KY 40206

American Wheelchair Bow Association
Robert Moran, Executive Secretary
6718 Pinewurst Drive
Evansville, IN 47711
812/862-6503

Wheelchair Bowling, Jim Lane and Dick Schaaf (eds.) Available from Wheelchair Bowlers of Southern California, 6512 Cadiz Circle, Huntington Beach, CA 92647 Softcover 96 pages $7.95 plus $1 shipping

Golf

The Amputee Golfers Association
Lakeview Terrace Watchung, NJ 07060

Dennis Walters, Jr
8952 NW 10th Street
Pembroke Pines, FL 33024

John Klein
1016 Cliff Drive
Santa Barbara, CA 93109

National Amputee Golf Foundation
George C. Beckman, Trustee
Warm Springs, GA 31830

Peter Longo Golf Show
P.O. Box 27283
Temple, AZ 85282

Western Amputee Golf Association
Ed Bryant, Sec Treasurer
118 W Swain Road
Stockton, CA 95207

Flying

Flying has attracted increasing numbers of disabled people with the availability of FAA-approved portable hand controls. Boarding seats and/or door modifications are helpful in improving accessibility for some types of aircraft. There are several wheelchair pilot groups around the country that encourage and support private flying and help steer disabled participants through the licensing bureaucracy.

American Wheelchair Pilots Association
Dave Graham
P.O. Box 1181
Mesa, AZ 85201
(602) 831-4262

RECREATIONAL AND LEISURE TECHNOLOGY

California Wheelchair Aviators
Bill Blackwood
1117 Rising Hill Way
Escondido, CA 92025
(Paraplegia flight instructor, information on planes, instruction, hand controls, cockpit accessible wheelchairs)

Soaring Society of America Inc
Box 66071
Los Angeles, CA 90066
(213) 390-4448

Ed Stadleman
P.O. Box 207
Sturgis, Kentucky 42459
(Aircraft hand controls)

Union Aviation Inc
Sturgis Airport - G
Sturgis, KY 42459
(In residence pilot training for disabled people, portable aircraft hand controls)

Wheelchair Pilots Association
11018 102nd Avenue, N
Largo, FL 33730
(813) 393-3131

Some publications on flying are:

"Flying Beyond the Handicap," Kenneth W Smith
AOPA Pilot, October 1982, pages 68-73


Horseback Riding

North American Riding for the Handicapped Association (NARHA)
Box 100
Ashburn, VA 22011

National Foundation for Horsemanship for the Handicapped
Box 462
Malvern, PA 19355

Hunting & Fishing

Disabled Sportsmen of America
P.O. Box 26
Vinton, VA 24179
ADDITIONAL PUBLICATIONS: SPORTS AND RECREATION


Bibliography on Recreation, Play and Sports Rehabilitation International Postfach 101 409, 6900 Heidelberg, Federal Republic of Germany, 1975


Directory of Recreation & Leisure Services - For the physically handicapped in the Los Angeles area. 132 page directory $7.95 + tax & mailing


"Familiar Sports and Activities Adapted for Multiply Impaired Persons": PAM Repeater, No 22, February, 1984 Published by the PAM Assistance Centre, 601 Maple, Lansing, MI


Recreation: A Bibliography National Easter Seal Society, 2023 West Ogden Avenue, Chicago IL 60612 Revised annually


Sports and Recreational Programs for the Child and Young Adult with Physical Disability. Proceedings of the Winter Park Seminar, Winter Park, CO, April 11-13, 1983, $10 prepaid from the American Academy of Orthopaedic Surgeons, PO Box 7195, Chicago, IL 60680 How to assess the orthopaedically disabled child's activity, possible adaptations for various sports and recreational activities available program resources, competition classifications, and bibliography


"Teacher-made Adaptive Devices for Archery, Badminton, and Table Tennis" J Cowart Practical Pointers, May 1978, (13), 1-16 Contains guidelines for making a adaptations of physical education equipment for students with disabilities Adaptations are suggested for archery, badminton, and table tennis equipment. Each idea is designed to compensate for a specific functional limitation Construction steps are described and drawings are provided


Therapeutic Recreation and Adapted Physical Education Within Rehabilitation Collingwood, Thomas R. Hot Springs, Ark, Arkansas Rehabilitation Research and Training Center, 1971, 44 pp

Vin-Line Quarterly newsletter from VinLand National Center, 3675 Indiana Road, P.O. Box 308, Loretto, MN 55357

AUDIVISUALS


A Closer Look. Barbara J. Maresca. Available from Film Arts, P.O. Box 468, Graton, CA 95444 16mm, color, 15 mins. 1981 Explores wheelchair experiences, focusing on wheelchair basketball, hiking, other activities, and design and maintenance of the chair. Phillip Morgan shows his design and construction of a lightweight wheelchair. Stresses mobility and independence

Crystal Productions Catalog. Box 12317, Aspen, CO 81612 (303) 925-8160 List of sports & rehabilitation films about amputee, CP & blind skiing, spinal cord injuries

It's Ability That Counts. Rehabilitation, 20 West
Ludwig Guttman introduces this film which so effectively illustrates the results of his life work, interspersing competition at the Stoke-Mandeville Games with leisure activities.

Sir Ludwig Guttman introduces this film which so effectively illustrates the results of his life work, interspersing competition at the Stoke-Mandeville Games with leisure activities.

Not Just A Spectator Rehabfilm/RFRL, 7J West 40th Street, New York, NY 10018 16 mm, color, 35 minutes Sale $350.00, rental $25.00 A colorful and exciting film that covers a wide variety of leisure activities for the disabled, including spelunking, rock-climbing, sailing and water-skiing.

Riding Towards Freedom Rehabfilm/RFRL, 20 West 40th Street, New York, NY 10018 16 mm, color, 32 minute Sale $365.00, rental $25.00 Horseback riding for the disabled has come into its own, and Riding Towards Freedom shows all aspects of the activity from the organization of riding classes to mounting methods and games. The great value of the sport to all those involved is clearly demonstrated.

Water Free Rehabfilm/RFRL 20 West 40th Street New York, NY 10018 16 mm, color, 35 minutes Sale $350.00, rental $25.00 The first in a series of specialized offshoots from Not Just A Spectator, Water Free explores swim-training for all ages and levels of skill in detail. It includes survival training and a swim in the English Channel.

**SOME LOCAL RECREATIONAL PROGRAMS**

**Arizona**

Handicapped Unbound, Inc
P O 1044
Prescott, AZ  86302
602/445-5076

**California**

Adaptive Physical Education
College of Marin
Sir Francis Drake Highway
Kentfield, CA  94904
Laurie Lenham, RPT
415/487-9654

Disabled Student’s Office
415/486-5406

Adaptive Recreation Program
Andy Fleming, Coordinator
City of Santa Barbara
620 Laguna Street
Santa Barbara, CA  93102
Scuba diving for paraplegics

Adaptive Rehabilitation Physical Education
De Anza Junior College
21250 Stevens Creek Blvd
Cupertino, CA  95014
408/996-6873

**Colorado**

Colorado Outdoor Education Center for the Handicapped
207 Skyline Blvd
San Francisco, CA  94123

Orange County Riding Center, Inc
Therapeutic Riding Program
Stables
Lake Forest Riding Club
25201 Trabuco Road
El Toro, CA

Office
23011 Moulton Parkway, Suite C-6
Laguna Hills, CA  92653
714/837-8224 (office)
714/728-3669

Recreation Center for the Handicapped
207 Skyline Blvd
San Francisco, CA
415/665-4100

Programs for children and adults
Santa Barbara Community Golf Course
John Klein
3500 McCaw Avenue
Santa Barbara, CA  93105

**Michigan**

Adapted Sports Association, Inc
Communications Center
3883 Marlette Road
Marlette, MI  48453
Minneapolis

Courage Center
3915 Golden Valley Road
Golden Valley, MN  55422
612/588-0811

HEALTHsports, Inc
Leslee Lana
1455 W. Lake Street
Minneapolis, MN  55408
612/827-3611

Wilderness Inquiry II
2929 4th Avenue South, Suite O
Minneapolis, MN  55408
612/827-4001

New Hampshire

Outdoor Wilderness Program
Crotched Mountain Center
Greenfield, NH  03047

Ohio

Adaptive Sports Program
Kinesiotherapy Clinic
University of Toledo
2801 West Bancroft Street
Toledo, OH  43606

Indoor Sports Club
1145 Highland Street
Napoleon, OH  43545
419/482-5756

Canada

Toronto Bulldogs Wheelchair Sports Club
c/o Lyndhurst Hospital
520 Sutherland Drive
Toronto, Ontario M4G 3V9  CANADA
LEISURE ACTIVITIES

For information, see also National Organizations listed under SPORTS.

GARDENING

One of my favorite equipment catalogs is Smith & Hawken Catalog for Gardeners (25 Corte Madera, Mill Valley, California 94941, (415)383-4415)

It's always a joy to read -- beautiful photos and/or drawings, lively text, and a strong emphasis on quality products. Until the Spring '84 issue, my catalog always stayed at home. It now joins my "Technology for Independent Living" files, because Smith & Hawken has begun a section called "Enabling Tools".

"We are proud to offer a selection of tools we call 'Enabling Tools'. This covers a broad area, and includes implements for older and younger people, for those whose limbs and muscles are not as strong as they once were, for the handicapped, or simply for people who want lighter and handier tools... they include carts, kneelers, special grips and a wonderful selection of modular tools from Gardena in Germany. Although Dave and I are still reasonably young and hearty, these tools will certainly find a place in our toolshed as they offer superior value and flexibility."

This integrated marketing approach is especially obvious in two of the entries.

"CHILDREN'S TOOLS"

"These are scaled down versions of our regular tools for those with less muscle, less space or fewer years. They are built to the same quality specifications as all Smith & Hawken tools. One of the frustrations for children in beginning gardening is that no one has taken seriously the making of children's tools. These down-scale tools give the child an immediate sense of the purpose and effect of a normal tool, and are perfect teaching aids for classroom use. The T-handles permit small hands a good two-handed grip. Their durability allows years of use and wear. All of these tools are suitable for senior citizens or the handicapped, as well as for those who garden on balconies, rooftops, or patios."

"SUPERLIGHT TOOLS"

"I discovered these on a recent trip to England, and almost overlooked them as they were being produced and sold by a company known solely for its excellent boat fittings. At first glance, I thought them to be aesthetically beautiful, but could not see their utility -- that is, until I picked one up. They are extremely light, and despite that, they are very strong. It would take a company making yacht fittings to realize the need for both strength and lightness. Each tool is made of aluminum alloy that is anodized so that it will not oxidize and turn black as cast aluminum tools do. The Hoes and Edger weight just 24 oz., the Rake only 32 oz. They are perfect tools for everyone, but are ideal for those who cannot lift a heavier tool. Whether young or old, or simply disposed to the ease and convenience of a light tool, these will please all."

With this approach in mind, it becomes easier to evaluate other products in regular gardening catalogs to determine if they will meet your special needs (editor).


Leisure and Gardening has recently been updated. It is one in a series of volumes dedicated to presenting equipment related information to "those professionally concerned with the care of physically handicapped people of all ages... These books provide guidelines to help in the selection of equipment and suggest ways of overcoming different problems." They can also be used directly by disabled people. The materials are useful and detailed, unfortunately, the fact that the volumes are compiled in England can be a limiting factor: in using some of the material presented.

The section on gardening, however, is quite universal. Most of the equipment is available for export, or can be closely approximated in the U.S.

There are tips on setting up an accessible greenhouse, pruning one's trees with ease, and laying out an accessible and easy upkeep patio garden that can be used by persons anywhere.

One reviewer's comment was "Where else in the world can one go to locate comparative information on garden hoes for persons with disabilities?"

Greenhouse Design for the Handicapped University of Nebraska, Lincoln, NE 18 pp 1967 Available from NARIC NARIC Accession #E1 7701-002977

MUSIC

Settlement Music School's Programs for the Handicapped, S Archibald Leacock, Director

These programs began in 1976 as a pilot program with 30 students. Today these programs provide a creative and stimulating musical experience to almost 500 people, and visually disabled children and adults throughout the Delaware Valley, and have attracted both local and international attention. Distinguished violinist Itzhak Perlman is honorary chairman of The Therapeutic Music Program, jazz great George Shearing is honorary chairman of The Visually Handicapped Program.

The Settlement Music School plans to expand these programs to include a National Music Information..."
All disabled individuals are invited to share in these innovative and unique programs. For further information, contact Settlement Music School, Post Office Box 25120, Philadelphia, Pennsylvania, 19147; telephone (215)336-0400.

The National Technical Institute for the Deaf has adapted musical equipment for more than 500 deaf musicians by using amplification and equalization techniques. NTID uses the latest technical equipment to teach deaf students to check their pitch visually. Light emitting diodes indicate to deaf musicians the accuracy of their pitch. If the line of dots moves up, the pitch is sharp, if it moves down, the pitch is flat, and if the line of lights is stable, the musicians have the correct pitch. For more information, contact Bruce Halverson at 716/475-6253.

NOTEABLE

A newsletter on music for persons with physical limitations. The emphasis is on adapted musical instruments and methods which can be used by disabled people.

The newsletter is written by Paige Finnerty, a musician and vocational rehab counselor. To receive the next issue, send a self-addressed stamped envelope to NOTEABLE, c/o Rancho Los Amigos Hospital, 7601 E Imperial Highway, 500 Hut, Downey, CA 90242.

Clinically Adapted Instruments for the Multiply Handicapped

Cynthia Clark and Donna Chadwick. Magnamusic-Baton, 10370 Page Industrial Blvd., St Louis, Missouri 63132. Phone 314/427-5660. 192 pages. 1980. This book describes adaptations which can be made to a variety of melody and rhythm instruments (some of original design) used in music therapy. Photographs or drawings are included with each description.

Guide to the Selection of Musical Instruments with Respect to Physical Ability and Disability

Magnamusic-Baton, 10370 Page Industrial Blvd., St Louis, Missouri 63132. 197 pages. 1982. This book describes in detail the physical mobility necessary to play most band and orchestral instruments. Each instrument is discussed in terms of range of motion, strength, dexterity, etc.

Make Your Own Musical Instruments


Treatment with Music: A Manual for Allied Health Professionals

Karen J Miller, RMT, MOT, OTR/L. Techniques manual containing basic music activities, techniques, and equipment appropriate for use in the treatment of physical dysfunction.

Barbara A. Rider, Chairperson, Occupational Therapy Department, Western Michigan University, Kalamazoo, Michigan 49008.

RECREATIONAL AND LEISURE TECHNOLOGY

NEEDLEWORK

Creative Crochet. L. Cadon, $7.95 plus $1.00 postage. Penguin Books, 625 Madison Avenue, New York, New York 10022. For those with the use of only one hand, the detailed design instructions and special basic technique make crocheting surprisingly simple. Illustrated in full color throughout. Paperback also available.

The Not-So-Nimble Needlework Book


Aids to Make You Able


The Source Book for the Disabled


"Sewing Machines." The English journal of the Consumers' Association, which, joined with consumer organizations in nine other countries in a report on "electronic" sewing machines. As part of this international test, three sewing machines emerged which can be specially adapted for use by disabled people. These are Bernina 830H (Handicap), Switzerland; Husqvarna Viking 6270, Sweden, and the Husqvarna Viking 6590, Sweden. The Bernina comes fitted with aids to make it more suitable for people with physical and sight disabilities. The Husqvarna machines can be supplied with kits, one for the physically handicapped and a second for the blind and partially sighted. In the report, the point was made that no sewing machine -- not even one specially adapted -- will suit everybody. The advice is, try out a variety of sewing machines before buying.

See also CLOTHING, page 62.
RECREATIONAL AND LEISURE TECHNOLOGY

FITNESS


American Alliance for Health, Physical Education and Recreation Testing for Impaired, Disabled and Handicapped Individuals. Washington, D.C.

Collingwood, Tom and Robert Carkhuff. Get Fit for Living. Human Resource Development Press, 22 Amherst Road, Amherst, MA 01002. 1976

Dance Slimnastics Ltd. "Armchair Aerobics." Armchair Aerobics is a special exercise program developed by Dance Slimnastics. Designed for the physically limited person, all of its exercises can be done while seated. Dane Slimnastics Ltd., P.O. Box 367, Port Washington, WI 53074. 414/375-2502

Iron Athlete Training Center, Mark Lescoa, Manager. 1940 E. University Avenue, Tempe, AZ 85281. Write for information about a personalized weight lifting program


Wheelchair Workout is $13.50 plus $1.00 postage. Write 12275 Greenleaf Avenue, Potomac, MD 20854

TRAILS

There is a national network of special recreational facilities and "barrier-free" trails designed especially for people with disabilities. For more information on barrier-free trails and facilities in your area, contact the Forest Service Field Office nearest you. A complete list can be obtained free of charge by writing to Recreational Staff, USDA Forest Service, PO Box 2417, Washington, DC 20013. Request Forest Service Publication No. 13.
TOYS AND GAMES

THE VALUE OF TOYS

Howard C. Shane
The Children's Hospital Medical Center
Boston, Massachusetts

"There seems to be a growing realization that toys should be an intimate part of childhood regardless of the presence of a handicapping condition. This becomes apparent if one talks with distributors of communication aids, visits evaluation centers for nonspeaking children, reads Communication Outlook or talks with persons interested in biomedical technology. There are countless numbers of children's toys marketed. Some require activation by another person through winding, cranking, blowing or puppeting which creates a relatively passive participation on the part of the child. Yet children generally attain skill levels requisite for independent interaction with these same activation mechanisms. In contrast, handicapped children have extremely limited opportunities to engage in independent toy manipulation. Irrespective of cost, the modified toys are simply fewer in number. On a more promising note, toy modification is experiencing a tremendous boom. Often a simple modification can be performed on any battery operated toy. (For specifics refer to C. Wethered in Communication Outlook, Vol 2, No 2) One possible explanation for the growing popularity of adapted toys is the growing number of children fitted with switches for the purpose of controlling an automated communication aid. These control switches can in fact provide a secondary function when interfaced with a toy. For some children additional skill training is required before they can actually control a communication aid effectively. Highly reinforcing and motivating toys allow for enjoyable experiences while training for reliable switch control.

"We recognize the importance of toys for children in that they provide endless hours of entertainment. In addition to enjoyment, toys foster the development of pre-linguistic and cognitive skills, such as attending, motor coordination, sorting, matching and categorization, schemas for causality, object permanence, etc. I emphasize that accessible toys have been particularly unavailable until recently. Toy adaptation has gained popularity for children with cognitive and/or physical limitations. Since federal legislation mandates equal educational opportunities for all children, educational facilities are required to design programs to promote development in all the prelinguistic and cognitive areas just mentioned for which toys are so important. Thus, more widespread availability and utilization of modified toys should ensure more stimulating and challenging learning environments for all children."

Reprinted from "Communication Outlook", Vol 3, #1, April 1981

TOY SELECTION

Exceptional Equipment for Exceptional Children

"Good playthings should have these characteristics:

- Free of detail as possible
- Versatile in use
- Easily comprehended
- Large, easily manipulated parts
- Involve child in play, including large muscles
- Encourage cooperative play
- Material that is warm and pleasant to touch
- Durable
- Work as intended
- Safe
- Generous in proportions and quantity
- Price based on durability and design

"The special child needs special equipment, but that is not all. It is the purpose of therapeutic equipment to enable the child as far as possible to participate in normal life and in normal play. This calls for an integrated approach to equipment, providing special equipment to allow the child to play and standard equipment to play with..

"The integration of special and standard equipment is especially important when mainstreaming requires that every child be educated in the least restrictive environment. A swing with interchangeable standard and special seats can be a real asset, or a rocking boat which accepts a special vestibular board which any child would enjoy.

"The possibilities are endless. With a little imagination you can find the perfect combination of special and standard equipment."

Choosing the Right Toy

"It is quite an art to choose the right toy at the right level for a handicapped child. Normal children are more accommodating and active in searching out a suitable toy and finding an appropriate way of playing with it.

"Our problem with the handicapped child is not that there are too many toys for them but that there are too few toys of the right sort. The main purpose of this book is to help you choose the right toy for your child. "It is very difficult to achieve a careful match between commercially available toys and your child's present abilities. At this point you will begin to appreciate the need for special toys. One of the features of the toys that we will be describing is that you can adjust their level to suit your child. A simple idea, but as yet, a novel one in the world of toys."

"Making Toys for Handicapped Children"
The Concept of Control

"Toys modified for the handicapped may represent a child's first understanding of cause and effect. The operation of a control interface connected to a toy is an excellent way of introducing control of an object in the environment as well as providing an early, simplistic association with a technical device which may be a forerunner for future, more complex aids. Many electronic and electrical toys can be modified for control by an interface using a battery interface. This device serves as an interface between the batteries of the toy and the control interface."

A listing of appropriate battery-operated toys is available from the Prentke Romich Company, Shreve, Ohio.

Battery interfaces are available commercially from companies such as Prentke Romich and ZYGO, or you can make them yourself (see D-I-Y, below).

A Note on Safety

Though disabled children may have some special needs to consider when selecting toys, the need for safety is the same as for any other child.


DO-IT-YOURSELF (D-I-Y)

You can make adapted toys, there are instructions in several of the books and pamphlets listed in the publication section. Also see the section on CONTROL, page 201.


Guidelines for Adapting Battery Operated Toys
Revised 1982. Jayne Higgins. The 25 page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch. Toy in-line jack procedures are also given which permits easy and immediate interchange of different switches to the toy. Step-by-step illustrated instructions are included as well as information on common pitfalls and problems. Information on where to obtain materials and toys through nationwide sources is included (e.g., Sears catalog, Radio Shack catalog). All switches are relatively inexpensive to make ($2.00-$5.00). Available from California Avenue School, Jayne Higgins, Speech Pathologist, 215 W California Avenue, Vista, CA 92083. $3.00.

Toy Modification Note. Build It Yourself Battery Interrupter, Gregg Vanderheiden, Trace Center, Madison, Wisconsin.

PEOPLE AND ORGANIZATIONS WITH A SPECIAL INTEREST IN TOYS AND GAMES

Linda Barr, Technical Resource Centre, Alberta Children's Hospital, Child Health Centre, 1820 Richmond Road, S W, Calgary, Alberta T2T 5C7

Linda J Burkhart, 8315 Potomac Avenue, College Park, MD 20740

Rehabilitation Engineering Center, University of Tennessee, 562 Court Avenue, Memphis, TN

Trace Center, University of Wisconsin-Madison, 314 Waismann Center, 1500 Highland Avenue, Madison, WI 53706

Margrit Beesley, Augmentative Communication Service, Ontario Crippled Children's Centre, 50 Rumsey Road, Toronto, Ontario M4G 1R8

Arselia Ensign, Director, PAM Assistance Centre, 110 Marshall Street, Lansing, MI 48912

Howard C. Shane, Ph.D., Director, Communication Enhancement Clinic, Children's Hospital Medical Center, 300 Longwood Avenue, Boston, MA 02215

Peggy Tyler, 528 1/2 N Buckeye, Wooster, OH 44691

Peggy Barker, Rehabilitation Engineering Center, Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304 415/327-4800


Steven Kanor, Ph.D, 10 Lefurgy Avenue, Hastings-on-Hudson, NY 10706
### SOME MANUFACTURERS AND DISTRIBUTORS OF SPECIAL TOYS

You can obtain toys from:

<table>
<thead>
<tr>
<th>Company</th>
<th>Address</th>
<th>Phone</th>
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<tr>
<td>Abbey Medical</td>
<td>3216 El Segundo Blvd</td>
<td></td>
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<tr>
<td>AbleChild</td>
<td>154 Chambers Street</td>
<td></td>
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<tr>
<td>The AIDS Trust to Aid Disabled &amp; Elderly People</td>
<td>4 Stour Close Shillingstone, Blandford Dorset, England</td>
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<tr>
<td>Behavioraids</td>
<td>1210 West Alameda Drive</td>
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<tr>
<td>Brad's Toys</td>
<td>P.O. Box 12 Prospect Heights, PA</td>
<td>60070</td>
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<tr>
<td>Discovery Toys</td>
<td>Paula Fogleman, OTR</td>
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<tr>
<td>Education Technology Center</td>
<td>Box 64 Foster, Rhode Island</td>
<td>02825 401/822-4622</td>
</tr>
<tr>
<td>Electronic Handicapped Equipment, Ltd</td>
<td>1165 Portland Avenue</td>
<td>Rochester, NY 14621 716/544-9060</td>
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<tr>
<td>Equipment Shop</td>
<td>P.O. Box 33 Bedford, MA</td>
<td>01730</td>
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<tr>
<td>Exceptional Play, Inc</td>
<td>P.O. Box 1015 Lawrence, Kansas</td>
<td>E6044</td>
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<tr>
<td>G.E. Miller, Inc</td>
<td>484 S Broadway Yonkers, NY</td>
<td>10705</td>
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<td>H &amp; H Hagland &amp; Hanses HB</td>
<td>Borganassagen 20 Borlange, Sweden</td>
<td>2-781 31</td>
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<tr>
<td>Handicapped Children's Tech Services</td>
<td>RFD 2, Box 60B Foster, Rhode Island 02825</td>
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<td>The Handlers</td>
<td>P.O. Box 13178 Tucson, Arizona</td>
<td>85732</td>
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<tr>
<td>Huntercraft</td>
<td>Special Toys for Special Children</td>
<td>Sherborne, Dorset England</td>
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<tr>
<td>Steven Kanor, PhD</td>
<td>101 Lefurgy Avenue</td>
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<tr>
<td>Mid-Canada Medical</td>
<td>1230 Crestlawn Drive Mississauga, Ontario Canada</td>
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<tr>
<td>Kurt Naef</td>
<td>CH-4314 Zeiningen, Switzerland</td>
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<tr>
<td>P.wittke-Romich Co</td>
<td>8755 Township Road 513 Shreve, Ohio</td>
<td>44576</td>
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<tr>
<td>J.A. Preston Corporation</td>
<td>60 Page Road Clifton, NJ 07012</td>
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<tr>
<td>Rifton Equipment</td>
<td>Rifton, NY 12471</td>
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<tr>
<td>Special Friends</td>
<td>P.O. Box 1262 Lowell, MA</td>
<td>01853</td>
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<tr>
<td>Telegraphics</td>
<td>P.O. Box 1061 Carrollton, Texas</td>
<td>75006</td>
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<tr>
<td>Touch Toys, Inc</td>
<td>303 Ritchie Highway Rockville, MD</td>
<td>20852</td>
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<tr>
<td>Toys for Special Children</td>
<td>101 Lefurgy Avenue Hastings-on-Hudson, NY 10706</td>
<td>914/478-0960</td>
</tr>
<tr>
<td>Zygo Industries</td>
<td>P.O. Box 1008 Portland, Oregon</td>
<td>92707</td>
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Toys and games for blind children are available from these sources:

- **American Foundation for the Blind (AFB)**
  - Customer Service Division
  - 15 W 16th Street
  - New York, NY 10011

- **American Printing House for the Blind Incorporated (AMPHB)**
  - 1839 Frankfort Avenue
  - P.O. Box 6085
  - Louisville, KY 40206

- **Science Products (for the Blind) (SFB)**
  - Wayne Box A
  - Southeastern, PA 19087
Children with special needs often do not have the same access to toys as other children. One solution to this problem is to start a Toy Library which makes toys available to children in the same way that regular libraries make books available to people. A toy library provides access to a wide variety of high quality playthings for children, and especially for infants and pre-school children.

Children respond best to novelty and frequent change in their playthings. The variety of various toys required to supply this diversity of play experiences are, unfortunately, beyond the means of most households. What better solution than to have a whole range of developmental toys to borrow?

Some toy libraries, such as The Daisy Toy Lending Library exists as a support service and resource for the handicapped child’s parents, his prime teachers. When parents can play with a child in a relaxed fashion, yet still promote the sequence of learning through informed choice and use of toys, the child may progress faster and farther, building up confidence in his own abilities, and have fun in the process. The library is designed to strengthen parental competence in stimulating the developmentally delayed child.

Some toy libraries also have TOYMOBILES, mobile vans that bring the collection to the community.

For further information, contact ACTIVE, Seabrook House, Darkest Lane, Potters Bar, Herts EN6 2HL, ENGLAND.

TOY LIBRARIES ASSOCIATION

ARK, a publication of the Toy Libraries Association, is concerned with the establishment and upkeep of toy libraries. The journal lists new toy libraries and contains information on building and buying toys. ARK also contains a section entitled “Activity” which reviews various programs sponsored by local ACTIVE groups throughout the United Kingdom. ACTIVE members develop communication aids, education aids and play aids for both children and adults who experience handicaps.

“Activity” also includes news about groups with subscriptions to ARK, a review of reference books and news of radio and television shows concerning persons who experience handicaps.

For further information, write ARK, The Journal of The Toy Libraries Association, Seabrook House, Darkest Lane, Potters Bar, Herts EN6 2HL, ENGLAND.

ACTIVE

The stated aim of ACTIVE, with groups located in Britain, Australia, New Zealand, Canada and throughout Europe, is to help children and adults who experience handicaps to lead more independent lives. ACTIVE is affiliated with the Toy Libraries Association. Membership of TLA/ACTIVE totals 800 persons. These individuals come from a variety of backgrounds, including those who experience handicaps, their friends and relatives.
A directory of toy libraries (not specific to, but including libraries with toys for disabled children) has been published by Toys N Things Press, 906 N Dale Street, St Paul, MN 55103, 612/488-7284. Contact Jean Nicol for more information.

Hidden in Play Lekotek is a documentary film that shows children in Scandinavia and the United States using Lekoteks -- toy libraries for children who experience handicaps. The libraries' trained staff members choose toys for the child's particular developmental needs and help parents guide their child's development through play.

The film follows the real experiences of eight children discovering their local Lekotek. Two centers are featured, one in Baerum, Norway, and the other, the first American Lekotek, in Evanston, Illinois.

The 28-minute film won the Blue Ribbon in Child Development Films at the 1982 American Film Festival, a Golden Eagle from CINE, and second place in the Programs and Facilities category at the Sixth International Rehabilitation Film Festival. Distributed by Filmedia Limited, the color film is available in 16mm or videocassette for sale or rental. For further information, contact Filmedia Limited, 1201 W Chase Avenue, Chicago, IL 60626.

The address for the Lekotek in Evanston is Lekotek, 613 Dempster Street, Evanston, IL 60201. 312/328-0007.

Although it is not a lending library, The Able Child (154 Chambers Street, New York NY 10007) has a wheelchair-accessible play area and professional advisors to select toys and play equipment. TAC is a resource center with aids for all ages. Free catalog.
"Adapted Games and Developmental Motor Activities for Children" Michael Marsallo, MA, and Dennis Vacante, MA, 4608 Exeter Street, Annandale, VA 22003. $8.50

"Adapting Audio/Video Games for Handicapped Learners" Teaching Exceptional Children Part I V, 14, #2, November 1981 Part II Vol 14, #3, December 1981 Single copy available from Council for Exceptional Children, 1920 Association Drive, Reston, VA 22091 $3.50 The material for these articles is excerpted from Audio/Visual Games for Severely Handicapped Learners Possibilities and Simple Adaptations by Karen Hughes, produced by the National Media Materials Center for Severely Handicapped Persons Part II features special adaptive equipment checklists for adaptations that need to be made, suggestions for do-it-yourself projects, and more profiles of toys and games

"Adapting Toys for Children with Disabilities" The Exceptional Parent Celia Schoeffler with Sandra Brooks August, 1982


Choosing Toys and Activities for Handicapped Children Jill Norris Toy Libraries Association, Seabrook House, Wylyotts Manor, Darke's Lane, Pottery Bar, Herts, England ENC 2AB 1974

Communication Outlook - Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, Michigan 48824 Communication Outlook is a quarterly newsletter addressed to the community of individuals interested in the application of technology to the needs of persons who experience communication handicaps due to neurological or neuromuscular conditions Communication Outlook is edited and published jointly by the Artificial Language Laboratory, Michigan State University and the TRACE Center for the Severely Communicatively Handicapped, University of Wisconsin It is the principal publication of ISAAC Subscriptions are $10 ($12 outside North America) Subscriptions are for whole volumes (4 issues) Single copies are available for $3.00

"Instructions for Constructing a Large Area Flap Switch (LAFS) to Allow Disabled Children to Control Battery Operated Toys" G Fraser Shea Biofeedback Research Project, Rehabilitation Engineering Department, Ontario Crippled Children's Centre, 350 Rumsey Road, Toronto, Ontario M4G 1R8 Canada, November 1980

Educational Games for Physically Handicapped Children Cratty and Breen Available from Fred Sammons, Inc, Box 32, Brookfield, IL 60513

Guidelines for Adapting Battery Operated Toys Revised 1982 Jayne Higgins The 25 page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch Toy to in-line jack procedures are also given which permits easy and immediate interchange of different switches to the toy Step-by-step illustrated instructions are included as well as information on common pitfalls and problems Information on where to obtain materials and toys through nation wide stores is included (ie Sears catalog, Radio Shack catalog) All switches are relatively inexpensive to make ($2.00-$5.00) Available from California Avenue School, Jayne Higgins, Speech Pathologist, 215 W California Avenue, Vista, CA 92083 $3.00

Homemade Innovative Play Equipment for Activities in Physical Education and Recreation for Impaired, Disabled and Handicapped Participants 1973 Available from Council on Exceptional Children, 1920 Association Drive, Reston, Virginia

Guide to Mattel Toys for Parents of the Visually Handicapped Child Write to Toys for Special Children, Mattel Toys Division of Mattel, 5150 Rosecrans Avenue MS504, Hawthorn, CA 90250


Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, Second edition Linda Burkhart. 8315 Potomac Avenue, College Park, MD 20740 50 pages $5.00 plus $1.00 postage and handling 1982 This book gives simple directions for constructing toys and switches that can be easily operated by severely and profoundly handicapped children. No special skills are needed to make them All supplies can be found around the house or purchased inexpensively at local stores One example is a head control switch. The materials cost about $2.50 and takes about half an hour to construct. The switch is attached to the child's head with a barrette and plugged into a toy or tape recorder When the child lifts his or her head, the music or toy turns on, thus giving the child a reason to lift their head This book has a wide range of applications and should be useful to parents, teachers, specialists of vision, hearing, speech, physical and occupational therapists and other friends of the handicapped


larger muscle groups Games can be played with a minimum of equipment Activities are grouped in order of difficulty and include learning games Excellent drawings supplement the text Extensive bibliography


RECREATIONAL AND LEISURE TECHNOLOGY

SELETED PUBLICATIONS TOYS AND GAMES
and teachers with simple instruction on how to make toys especially designed to stimulate the development of mentally and physically handicapped children. Photographs and drawings illustrate the construction of each toy, and accompanying suggestions show how to use each toy for maximum benefit to the child. This is an excellent book on making and using low-cost toys.


More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities Linda Burkhard, 8315 Potomac Avenue, College Park, MD 20740  $12.50 1982 A continuation of the first book. Includes a section on suggested activities for incorporating these devices into the child’s program.

No Cost, Low Cost Playthings: Toys for Fun and Learning Demonstration and Research Center for Early Education, John F Kennedy Center for Research on Human Development, George Peabody College, Nashville, TN 37203

PAM Repeater “Toys-Toys-Toys and Learning” Maurine Onais, State Coordinator of Deaf-Blind Services, Oregon School for the Blind. PAM Repeater is published by the PAM Assistance Centre, 601 Maple, Lansing, Michigan

Title unknown, “A publication with directions for making simple toys from scrap and recycled items” Touch Toys, Inc, 303 Ritchie Highway, Rockville, MD 20862  $3.00

Toy Adaptation Chris Wethered Available from Canadian Association of Toy Libraries, 50 Quebec Avenue, Suite 1207, Toronto, Ontario M6P 4B4 Canada 14 pages June 1979 Basic information needed to adapt battery-operated toys for activation by disabled children.


Prattle and Play: Equipment Recipes for Nonspeech Communication Faith Carlson Media Resource Center, Meyer Children’s Rehabilitation Institute, 444 South 44th Street, Omaha, NE 68131  $5.00 The book is aimed toward both professionals and parents who are interested in building toys or communication devices for nonverbal children. The book is arranged in “recipe format,” like a cookbook, making it suitable for the novice.
Access to Play - A Design Criteria for Adaptation of Existing Playground Equipment for Use by Handicapped Children. Contact Pittsburgh Architects Workshop, Inc, 237 Oakland Avenue, Pittsburgh, PA 15213. 102 pages. 1979. The ideas presented emphasize adaptation of existing equipment to make public playgrounds safer and more accessible for both normal and handicapped children. Dimensions, diagrams, and detailed descriptions are provided, as well as a fine bibliography.

The Design of a Pre-School Therapeutic Playground
An Outdoor Learning Laboratory
Ronnie Gordon
Institute of Rehabilitation Medicine, 400 East 34th Street, New York, NY 10016. 52 pages. 1972. Describes the design and development of an outdoor therapeutic playground area for disabled children in which space, equipment and activity areas are consistent with the education goals of the IRM. The equipment shown has been custom built, but could be adapted using less expensive materials.

An Instructional Playground for the Handicapped Using Tires as Inexpensive Playground Equipment
Activity and Construction Manual
The University of the State of New York, The State Education Department, Division for Handicapped Children, Special Education Instructional Materials Center, 55 Elk Street, Albany, NY 12234. 50 pages. 1975.

Playground for all Children Book I, User Groups and Site Selection, 52 pp, ($3.30) Book II, Design Competition Program, 49 pp, ($1.60) Book III, Resource Volume, 153 pp, ($3.50) U.S. Department of Housing and Urban Development, Government Printing Office. These three booklets deal with the construction of public playgrounds designed for integrated play between handicapped and able-bodied children. Booklet I describes the children who are expected to use it and the background research studies for the project. Booklet II deals with the design competition devised for the city of New York to encourage the widest variety of approaches and solutions. Volume III documents the development of the playgrounds and deals with process and product.

Playgrounds For Free: The Utilization of Used and Surplus Materials in Playground Construction
Paul Hogan
MIT Press, Massachusetts Institute of Technology, Cambridge, MA 02142. 252 pages. 1974. Shows how to obtain discarded materials, such as tires, telephone poles, and cables, and how to construct playgrounds out of them. The emphasis is on involving community residents in building their own playgrounds.
Technology for Personal Mobility
TECHNOLOGY FOR PERSONAL MOBILITY

MOBILITY DEVICES

SEATED WHEELED SYSTEMS
MOBILITY DEVICE EVALUATION GUIDE
WHEELCHAIR CONTROL SYSTEMS
BATTERIES FOR WHEELCHAIRS
INFORMATION RESOURCES ON WHEELCHAIRS
SOME COMMERCIAL SOURCES OF WHEELCHAIRS
R&D ORGANIZATIONS
WHEELCHAIR STANDARDS
MOBILITY--BEYOND SEATED WHEELED SYSTEMS
CHOOSING & USING OTHER TYPES OF MOBILITY EQUIPMENT (WALKING AIDS, LIFTS, ETC.)
PROTECTIVE AIDS
MOBILITY FOR BLIND PEOPLE

SEATING AND POSITIONING TECHNOLOGY

INTRODUCTION
THE FUNCTION OF A WHEELCHAIR CUSHION
PRESSURE RELIEF
POSTURAL SEATING
A BRIEF GUIDE TO POSTURAL SEATING TECHNOLOGY
SEATING SERVICE PROGRAMS
COMMERCIAL SOURCES
SIDE-BY-SIDE TRIALS
PUBLICATIONS
BIBLIOGRAPHY
AUDIOVISUALS

PERSONAL VEHICLES

INTRODUCTION
HINTS ON OPERATING A SUCCESSFUL DRIVER EDUCATION PROGRAM
ASSOCIATION OF DRIVER EDUCATORS FOR THE DISABLED
DRIVING EVALUATION FORMS
EQUIPMENT RECOMMENDATION FORM
CAR SELECTION AND PURCHASE
GUIDE TO THE USE OF HAND CONTROLS AND ASSISTIVE DEVICES
OTHER RESOURCES, PUBLICATIONS AND AUDIOVISUALS
RESEARCH & DEVELOPMENT
MOBILITY DEVICES

MOBILITY DEVICE EVALUATION GUIDE

General

This guide is designed to provide a way to systematically compare different mobility aids or evaluate the appropriateness of a device for a specific mobility device rider. The form does not discuss how to fit a wheelchair but is more concerned with what the device is designed to do and how well it works. The items included have been compiled from criteria used by designers, therapists, and consumers to evaluate assistive equipment.

Rating System

The rating system allows for comparing performance in certain areas such as posture and mobility in a single product or comparing one area in many products in a quantitative manner. The novice may have difficulty rating certain items, such as maintenance or durability, but the form may be used as a guide to obtaining systematic information from experienced users.

The rating system is a sliding scale from 0 to 5. Give a 0 if the item does not function, is most unsatisfactory, or is unacceptable. A score of 5 indicates the item performs very well, is most satisfactory, or is the best. Gradations between the extremes are scored 1, 2, 3, or 4. A category I is provided for inapplicable functions, e.g., a manual wheelchair has no electrical system to critique.

In general, the comments section should explain why the rating was given, what equipment features or modifications affect the function, or conditions required for the device to work.

The instructions for the rating sheets explain each item and provide suggestions for comments. The user may choose to use or ignore these recommendations. However, the usefulness of the form depends on the quality of the comments made on the form by the evaluator.

This guide was developed by Helen Tsuda, MA Candidate, Division of Physical Therapy, Stanford University Medical School, April 1981, with the guidance of Sandi Enders, OTR and Kelly Flanagan, at Children's Hospital at Stanford, Rehabilitation Engineering Center. Special thanks to Sam McFarland, Southwest Research Institute, San Antonio, Texas, for editing assistance and to the Bay Area Pediatric Interest Group for identifying the need for such an evaluation guide.
Clearfield, D. Medical Devices and Equipment for the Disabled: An Examination. Disability Rights Center, Washington, D.C. 1976. This paper discussed the safety, cost, and consumer satisfaction of medical equipment. A case study of the wheelchair industry mentioned problems seen by users which includes durability, cost, fit, weight, and repairs.

Clinical Engineering and Work Related Evaluation of Stationary Stand-up Frames and Stand-up Frames and Stand-up Wheelchair for the Disabled. Research Project #R-115, New York University Research and Training Center Annual Report, pp 57-69, 1979-1980. This project examined the La Berne Gearlift Stand-In Table and LCV Stand-Up Wheelchair in terms of the assistance needed to use, pressure exerted by straps or structures, tolerance, and user reaction. Balance, stability, mobility, and adjustability were also considered.

Enders, S. "Draft Proposal for Wheelchair Evaluation for the Veterans Administration Prosthetic Center, New York." Center for Independent Living, Equipment Evaluation Program, Berkeley. This draft provided a list of characteristics of equipment to be examined. Points often overlooked in other critiques included restraints, transfer access, disengagement of the power source and drive, instructions provided, prescriptive indications, comparison to previous equipment, and how it is secured for transport.

Fenwick, D. Wheelchairs and Their Users. Her Majesty's Stationary Office, London, 1977. The National Health Service interviewed wheelchair users in England and Wales to determine user demographics, disabilities, equipment use, and satisfaction with the equipment and service. The interview questionnaire was included.

Grall, T. B. A Feasibility Study of Product Testing and Reporting for Handicapped Consumers. Consumers Union of the United States Inc., Mount Vernon, NY, March 1979. The study was designed to show the need and marketability of product evaluations for handicapped consumers. Some consumer concerns often overlooked by designers included durability, utility, ease of use, and repairs—cost, part availability, and service agent competence. Rehabilitation professionals also wanted safety information.

Hotchkiss, R. "Left To Your Own Devices: The State of the Art of Wheelchair Design." In Mobility for Spinal Cord Impaired People. Report for a Workshop Held at the Rancho Los Amigos Hospital, Downey, CA, on February 22-24, 1974, pp 45-59. National Research Council, Washington, DC, 1975. Available from the National Rehabilitation Information Center (NARIC), Catholic University, Washington, D.C. This presentation referred to current characteristics of wheelchair designs then discussed advantages and disadvantages of some designs proposed to solve frame, wheel, width, and stair-climbing problems.

Sheredos, S. J., Darlington, J. W., Lyles, M. Evaluation of Stand-Up Wheelchairs. Veterans Administration Prosthetics Center, Clinical Evaluation Service, Castle Point, New York. Undated copy. This article reviewed the design of six wheelchairs with respect to weight, controls, transfers, and user reactions. Pictures of all six chairs in use are included.

Stout, G. "Some Aspects of High Performance Indoor/Outdoor Wheelchairs." Bull Prosth Res. BPR-10-32, pp 135-175, Fall, 1979. This article studied the performance of electric wheelchairs in terms of stability, speed, wheel size, brakes, controls, height, and folding and reclining features.

Team Assessment of Device Effectiveness. A Retrospective Study. Children's Hospital at Stanford, Rehabilitation Engineering Center, Palo Alto, CA, October 1980. This evaluation considered changes in life style, daily use, life span, effectiveness, and cost of devices. Functional, psychosocial and environmental needs of the user are stressed. Fifteen aspects of good equipment are also included.

VPC Evaluations of Mobility Aids Past, Present and Future. Veterans Administration Prosthetics Center, New York, July 1978. Pictures, short descriptions, and findings concerning safety and merits of further examination of some mobility aids are included. No explanations of "standards of acceptability" were given.

Vash, C. L. "Psychosocial and Learning Consideration in using Mobility Systems." Mobility for Spinal Cord Impaired People, pp 136-145. (See Hotchkiss). National Research Council, Washington, DC, 1975. This speaker addressed mobility about the home, neighborhood, and beyond. Issues of cost, versatility, cosmesis, safety, and private and public transportation were considered.
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<td>Frame</td>
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<tr>
<td>Seat and Back</td>
</tr>
<tr>
<td>Wheels, Front</td>
</tr>
<tr>
<td>Back</td>
</tr>
<tr>
<td>Rims</td>
</tr>
<tr>
<td>Brakes</td>
</tr>
<tr>
<td>Arm rests</td>
</tr>
<tr>
<td>Foot rests</td>
</tr>
<tr>
<td>Power system Motor</td>
</tr>
<tr>
<td>Battery</td>
</tr>
<tr>
<td>Charger</td>
</tr>
<tr>
<td>Controls</td>
</tr>
<tr>
<td>Other equipment</td>
</tr>
<tr>
<td>Dimension in use</td>
</tr>
<tr>
<td>For transport or storage</td>
</tr>
<tr>
<td>Weight Total</td>
</tr>
<tr>
<td>Heaviest piece</td>
</tr>
<tr>
<td>Cost</td>
</tr>
<tr>
<td>Special functions</td>
</tr>
</tbody>
</table>
MOBILITY DEVICES

DESCRIPTION

Introduction

Fill in this form first.

The following suggestions are examples of the variety of styles and helpful information that may be considered in the description of a wheelchair.

This section will contain short phrases to describe important features such as materials used, actions, and whether it is standard or optional. The addition of a photograph is very helpful and highly recommended.

Frame: steel, chrome, plastic, aluminum, wood, paint, folding, non-folding, lightweight, heavyweight, narrow

Seat and Back: solid seat, sling seat, zippered back, detachable back, vinyl, cloth, contoured, modular, one piece, include type of cushion used

Arm Rests: part of frame, detachable, adjustable, flared, desk style, fold length, padded, skirt guards

Foot Rests: part of frame, detachable, swing away, elevating, telescoping, wood, metal, plastic, calf pads, heel loops

Wheels: front or back wheel drive, dimensions (width and diameter), solid pneumatic, semipneumatic tires, type of tread, free wheeling casters, spokes

Rims: chrome, plastic, wrapped, textured, with extensions, type of bracing

Brakes: Foot or hand control, powered, location, extensions, front or rear

Motor, Battery, Charger: Battery voltage, number of batteries, variable speeds, covers, plugs and connections, line voltage for charging, charging frequency

Controls: joy stick, pneumatic, proportional, switches, location

Other Equipment: list may include straps, pads, head rest, trays, crutch holders, other options

Dimensions: Height, length, width, or other useful measurements. If the item folds or dismantles for transport, include those measurements

Weight: Heaviest piece when dismantled should be considered. Even when dismantled, one piece may be too heavy for easy transport or mobility

Cost: Average cost and a range of costs may be useful or attach catalog and price list. Dating is important since changes occur over time

Special Functions: This space is for listing any special functions or purposes the item may have. Examples: sport model, stand-up, stair climbing
## MOBILITY DEVICES

### FUNCTION

<table>
<thead>
<tr>
<th>MOBILITY</th>
<th>Performance Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>low</td>
<td>high</td>
</tr>
<tr>
<td>Indoors</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Outdoors</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Uneven terrain</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Ramps</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Curbs</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Maneuverability</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

### POSTURAL SUPPORT

| Supports body and its parts | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Maintains posture          | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Controls abnormal tone     | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Prevents deformities       | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Prevents tissue trauma     | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Changes position           | NA   | 0   | 1   | 2   | 3   | 4   | 5   |

### DAILY USE

| Comfort                    | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Ease of use                | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Ease of transfers          | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Access to tables           | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Access to other equipment  | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Access to public places    | NA   | 0   | 1   | 2   | 3   | 4   | 5   |

### ADAPTABILITY

| Adjustable parts           | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Changing phys status       | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
| Different disabilities     | NA   | 0   | 1   | 2   | 3   | 4   | 5   |
MOBILITY DEVICES

MOBILITY

Indoors The device should be able to negotiate carpets, linoleum, and thresholds. Doorway width may need consideration with special width requirements getting lower scores.

Outdoors Concrete sidewalks, asphalt road, dirt, and grass are common surfaces that need to be accessible.

Uneven Terrain Consider uneven sidewalks, thick rugs, sand, gravel, hills, and small obstacles.

Ramps Limitations to the grade and length of incline should be noted. Energy requirements and the speed of ascent and descent may need attention.

Curbs Consider the height and assistance necessary to negotiate.

Distance Any limits and the limiting factor (user, battery, or terrain) should be noted. Example: goes from room to room, works on linoleum only.

POSTURAL SUPPORT

Support Body and Its Parts Support should be neither inadequate nor too restraining. Indicate whether special pads, straps, or shaping is necessary to achieve sufficient support.

Maintains Posture The device should not give way under pressure or need constant readjustments.

Control Abnormal Tone/Prevent Deformities/Prevent Tissue Breakdown Consider whether the equipment inhibits or facilitates abnormal patterns of movement or tone, scoliosis, changes of body position to relieve pressure. Any high pressure areas should have adequate padding to avoid tissue breakdown. (Some aids are designed specifically for these functions while others give postural support secondary importance.)

Changes Position If a device can change position (e.g., back reclines) consider if support or pressure is altered and describe changes if significant. The amount of assistance required to change should be examined.

DAILY USE

Comfort This function implies a good fit is possible. The device should not cause pain or discomfort.

Ease of Use This item must be qualified as to whether the user or an assistant finds the aid simple and smoothly operable.

Ease of Transfer Again, consider whether the user and/or any assistants find the device easy to get in and out of.

Access to Tables Tables should be within reach as the chair faces it. Special table height requirements should be noted.

Access to Other Equipment Other equipment may include kitchen appliances, bathroom fixtures, working area, or assistive devices (e.g., respirator).

Access to Public Places School, business and recreational facilities should be accessible. Any special needs, e.g., wide electric doors, ramps or assistance should be listed in the comments.

ADAPTABILITY

Adjustable Parts Parts that can be altered or change position should maintain positions set and change quickly and easily when desired.

Changing Physical Status The device should accommodate some growth changes or physical and mental deterioration due to disease processes.

Different Disabilities If the device is extremely specialized for a certain type of patient, give a low score. If the aid can be adapted for many people, score higher.

TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK RESNA 1984

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## Function

<table>
<thead>
<tr>
<th>Device</th>
<th>Performance Rating</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transport</strong></td>
<td>low 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Into car unassisted</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Into car w/ assistance</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Into van</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Use public transport</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Can be carried upstairs</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Stationary</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>In Motion</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Inclement Weather</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Electrical System</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Durability</strong></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Expected lifetime</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Upholstery</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Frame</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Attachments</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Power system</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Maintenance</strong></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Washable</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Repair frequency</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Repair costs</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Downtime</td>
<td>NA 0 1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Appearance</strong></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Special Features</strong></td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td><strong>Evaluated by</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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MOBILITY DEVICES

TRANSPORT

Into Car Unassisted  Higher score if a user can get the aid in and out with no help quickly and easily. Indicate the smallest car that will accommodate the user and device.

Into Car with Assistance  Indicate how much help is required and car size.

Into Van  Specify special tie-downs to secure device safely for transport and whether the user remains in or gets out of the chair while traveling. The height of the user in the chair may influence the head room required.

Use Public Transportation  Will equipment fit on bus, train, plane, etc.? What special equipment (e.g., lifts) will be needed?

Can Be Carried Upstairs  This item is included for devices which cannot climb or descend stairs or where no ramps or elevators are available. Consider the number of assistants required and whether the user is in or out of seat. (This characteristic may be important for safety in emergencies.)

SAFETY

Stationary  The device should not tip over, rock, or be easily pushed off balance. The brakes should hold well.

In Motion  Progress should be without jerks while going straight or turning. Control must be maintained constantly and easily.

Inclement Weather  Consider safety in wind, rain, snow, ice, heat, cold.

Electrical System  Connections should be good. Shock hazards reduced, and charging instructions clear. Watch out for loose wires and battery leaks.

DURABILITY

Expected Lifetime  A list of what component or factor determines the lifetime may be helpful. Example: child outgrows device in six months.

Upholstery  Indicate whether it tears or wears out. Specify if replacements or reinforcements are possible.

Frame  Although rating of this item is mainly concerned with it standing up to daily use, any rattling, bending, or scratching should be examined.

Attachments  Separate pieces should remain firmly attached throughout the life, be replaceable or last as long as the rest of the device.

Power System  Consider which parts last throughout the life, how often batteries need charging and replacement.

MAINTENANCE

Washable  Special cleaning needs should be listed. Rating also includes how often and how easy it is to clean.

Repair Frequency  Least often scores highest. Comments could indicate which parts require most care. (Repairs may also include routine maintenance.)

Repair Costs  The expense will also be affected by who is performing the repair -- user, friend, vendor, bicycle shop, distant manufacturer. Item which requires most repairs or most expensive repairs may be useful to note. Average annual costs may also be informative.

Downtime  This concept includes how long repairs take in which the aid is unavailable, and how often this occurs.

APPEARANCE  This category is one of the most subjective. Consider both the user's and the public's reaction to the device. One guide suggested is to ask "Would I want to be seen using this equipment?"

SPECIAL FEATURES  Space is allowed for listing any significant feature not previously mentioned. Remember to specify what is being rated.
MOBILITY DEVICES

SUMMARY

This section condenses the information obtained from the rating sheets and can be used for quick referencing of important features. A brief description may cover appearance and function of the device, e.g., "battery powered, contour customized wheelchair can mount most curbs." The overall impression should include whether the device works well or not and under what circumstances. The evaluator may find a listing of the device's performance for each broad function on the rating sheets helpful. Specific pleasures or aggravations can be listed under advantages and disadvantages.

The appropriate users section may list the types of disabilities or the functional abilities of people who may use this device. (Example: For users with good upper extremity and trunk strength and control.)

The section for availability allows space for information concerning the manufacturer, vendor, repair facilities, and the time for delivery.
MOBILITY DEVICES

WHEELCHAIR CONTROL SYSTEMS

What Controller Is Best?

Selection of a suitable controller is of major importance in achieving an effective wheelchair control system. Generally, efficient control of the wheelchair represents one of the more difficult tasks to accomplish (both from the standpoint of choice of controller and development of operator skills). Operation of communication aids and typing devices also represent difficult tasks. Most other functions are easily managed by whatever approach works for the wheelchair. Usually, coordinated, simultaneous, two-axis, proportional control (immediate-acting, continuously variable control of both speed and turns), when available, will achieve the best maneuverability. Compromising any of these characteristics will result in decreased precision or a slower rate for a given maneuver.

In order to select or devise the best controller for a given individual, one must weight the various trade-offs. The features generally considered are:

1) The operator's abilities
2) Effectiveness of control
3) Ease of learning and training requirements
4) Appearance (cosmetic and aesthetic)
5) Interference with other desirable functions
6) Medical considerations

What Can Be Used For Control?

By positioning a switch or sensing device at some anatomical location, signals can be derived which might be employed to operate a wheelchair. This listing represents potential control sources, letters refer to the anatomical sites indicated on the drawing:

A. Chin Control requires very small travel (1/4" or less) to produce proportional control

B. Head Rest Control. By pushing straight back against the headrest a forward signal is produced. By rocking your head to the left or right against the headrest, turn signals are generated. A separate switch needs to be activated to reverse the sense for backward motion

C. Joystick. Operates using standard joystick format

D. Arm/Elbow Control. Movement of the elbow outward and/or sliding of the arm forward and backward might be used for activation of switches or proportional signals.

E. Head Control. Direct use of forward/backward and left/right movement of head is employed

F. Shoulder Position. Here elevation and depression (or slump) provide forward/backward signals while protraction/retraction of the shoulder provide the left/right signals

G1. Pneumatic (puff/sip) Control. This system uses hard puffs and sips to control forward and backward velocities, while soft puffs and sips introduce proportional turns

G2. Spoken Control. A computer can analyze the words you speak and use them in the same way as you might speak to a blind-folded driver

G3. Mouth, Tongue, Lip Control. A head mounted chin controller element can make use of small movements to provide proportional control

H. Foot Control. A rocker plate could yield all four signals for wheelchair directions, or "gas pedal" type controls might be used

I. Knee Control. Thrusting the knee inward or outward can provide control signals

In order to select or devise the best controller for a given individual, one must weight the various trade-offs. The features generally considered are:

1) The operator's abilities
2) Effectiveness of control
3) Ease of learning and training requirements
4) Appearance (cosmetic and aesthetic)
5) Interference with other desirable functions
6) Medical considerations
MOBILITY DEVICES

BATTERIES FOR WHEELCHAIRS

For reasons of energy output and cost per unit weight, the lead-acid battery remains the battery of choice. According to David Bayer, at least 50% of all problems with powered wheelchairs are battery-related. He gives the following "dos and don'ts" of battery choice and care.

The Right Battery

1. If possible, use a rechargeable lead-acid battery designed for deep-cycling.
2. Avoid those batteries which are advertised as having these design features:
   - "Improved cold-start performance" (e.g., DIE-HARD and similarly advertised units).
   - "Maintenance-free," which generally lack filler caps to permit inspection and replenishing of electrolyte levels.
3. If you must use a gel-cell battery (because of air travel requirements) avoid continuous use on a regular basis. Use a charger designed specifically for the gel-cell.
4. In the instance where deep-cycle batteries are not available, use conventional automobile lead-acid batteries which have filler caps and long warranty periods (2-4 years). Even though it may not be honored, the longer warranty is indicative of larger capacity, i.e., a longer operating period before recharging is necessary, thus avoid deep cycling.
5. If possible, avoid frequent or deep cycling of your battery. Deep cycling occurs when you use most of your battery's capacity before recharging it.

Charging the Battery

1. Do not use automatic (so-called "smart") chargers for conventional auto-style or deep-cycle lead-acid batteries. The "smart" charger approach, though, is recommended in the case of gel-cell batteries.
2. Make a regular habit of recharging your battery nightly.
3. A rechargeable duration in proportion to the amount of driving during the day is appropriate. A charger with a timer shut-off is helpful. Since different chargers will charge at various rates and wheelchairs consumne power at differing rates, there is not a specific "charge to use" ratio which can be recommended for all wheelchairs.
4. Approximately once every 1-2 weeks, intentionally overcharge your battery for 6-12 hours beyond the normal charging time. The actual overcharging begins when the ammeter on the battery charger reads one-fourth (1/4) to one-tenth (1/10) of its initial charge rate, i.e., typically one ampere or less. During this time many battery cells will bubble vigorously and emit hydrogen and oxygen. Overcharging should take place in a well-ventilated area. Once the battery is overcharged, immediately fill the electrolyte level up to a little over the plate tops -- using DISTILLED WATER ONLY.

NOTE: Overcharging in a small, unventilated room may pose an explosion hazard.

Battery Connections

1. All battery connections should be inspected monthly and maintained in a corrosion-free state.
2. Clean up all wet spots or spills around the battery as they occur. Wash liberally with water and dry.
3. At least once every 6 months, remove the battery lug clamps and all connections at the battery terminals, thoroughly clean, and reassemble.
4. If connection hardware is damaged due to corrosion or physical abuse, replace it.

Batteries -- Handling and Your Health

1. Lead-acid batteries contain sulfuric acid which has damaging effects on metals, cloth, skin, muscle, and fatty tissue. When in contact with skin, it may cause a burning sensation (if sensory nerves are intact) Thus, it should be washed off skin and clothing immediately with liberal amounts of water.
2. After washing liberally with water, then taste (lick) affected skin or cloth surfaces in order to assure yourself of complete removal of the sulfuric acid. Diluted sulfuric acid will have a vinegar taste and is harmless internally.

NOTE: In the event of more than a minor burn especially in the case of a disabled individual, consult a doctor immediately.

3. Since individuals with spinal cord injuries may not have the benefit of sensation of pain to warn them of acid, take all necessary measures to keep it away from their presence, i.e., skin and clothing.
4. Baking soda is helpful in neutralizing acid in cases where you cannot be assured of washing it away entirely. However, do not use baking soda as a substitute for a thorough initial washing with water.

from "Batteries on Powered Wheelchairs -- The Do's and Don'ts of Battery Care" Reprinted from Current Expressions, Vol. 1, No 1, 1981, the newsletter of Prentke Romich Company, 8769 Township Road 513, Shreve OH 44676. Mr. Bayer can be contacted at Du-It Controls in Shreve, OH.
SOURCES OF MORE INFORMATION ON WHEELCHAIRS

The most current information about new wheelchair designs and prototypes is generally not in printed sources. Developmental information is exchanged informally through the "people network." Names and addresses of many of these people can be found in the Wheelchair I, II, and III reports. These publications also have information on such things as the history, development of wheelchairs, and the state-of-the-art information on wheelchair design and wheelchair surveys.


This selected list focuses on selecting, operating and maintaining a wheelchair.

The Care and Feeding of a Wheelchair. Medical Equipment Distributors, Inc (MED), 1215 So Harlem, Forest Park, IL. 60610. 1979. 15 pages. Has a section "Diagnosing Your Wheelchair's Ills."


Equipment for the Disabled Wheelchairs (Fifth Edition). Edited by G.M. Coghlan and E.R. Wilshire. Oxfordshire Health Authority, 2 Foredown Drive, Poole, Dorset, BH14 9PP, England. 1983. 103 pages, figures, photos. £7.50. The book provides worthwhile guidelines on wheelchair selection for anyone anywhere. In focusing on specific brands and listing wheelchair and accessory sources, the book becomes somewhat less useful to those outside of Britain. Lay-out is well done and the pictures/drawings are often helpful.

Functional Wheels. AG Garris Dept. of Rehabilitation, 830 K Street, Sacramento, CA 95814. 1980. 73 pages.


A Stitch in Time: Wheelchair Maintenance and Repair. Jere Gandolf Burns. Center for Occupational Curriculum Development, P.O. Box 7218. University of Texas at Austin, Austin, TX 78712. 1982. "No matter how we constructed and how carefully operated the wheelchair is, it still must be maintained or it will break down. This manual tells how to inspect for and recognize problems. It describes routine maintenance procedures, such as inspecting tires. The information can be used to detect problems while they are still small enough for simple repair.

"A Stitch in Time" is based on the idea that some simple inspection and maintenance tasks can reduce the number of repairs that must be done on a wheelchair. For that reason, certain chapters have two types of material called sections. The A section of a chapter covers inspection and maintenance. It tells how to recognize problems and what to do to correct them and prevent them from getting worse. Section B material is on repair, and tells what to do if conditions have become bad enough to require repair work.

"Most chapters are organized in terms of parts or groups of parts. For example, Chapter 5 is on bearings and Chapter 6 is on caster wheels.

"In addition, the book has five special-purpose chapters. The first, Chapter 1, Maintenance references, covers information which is necessary for using the other chapters. There are also chapters on fitting the wheelchair, rust, wheelchair safety, and skin maintenance. Special material on motorized wheelchairs is presented in an Appendix at the end of this manual.

"There is no 'typical' person who uses a wheelchair. Therefore, this manual is aimed at a wide group of potential users. This includes people in wheelchairs and their friends and relatives. It also includes people who might enter the occupation of wheelchair repairer. The manual and audiovisual material related to it, could be useful in a wheelchair repair course. It can also serve as a reference during maintenance. The material has been simply written, so it can be used by people with many different levels of education. It is well illustrated.

"Audiovisual materials have been developed to cover the inspection and maintenance aspects of wheelchair maintenance. The material includes tape cassettes, slide or videotape visuals, an instructor's guide, and a participant's manual. Although the material is for group presentation, it could also be helpful in an individual course. In particular, the Participant's Manual summarizes information presented by the A/Vs and is excellent for review. The A/V material is titled "Wheelchair Maintenance: A Stitch in Time. It is also available from the Center for Occupational Curriculum Development, Division of Continuing Education, Post Office Box 7218, The University of Texas at Austin, Austin, TX 78712.

Street Wheeling Ma Jol, Metropolitan CIL, 1728 University Avenue, St Paul, MN 55104.

Things to Consider When Buying or Renting a Wheelchair. Pocket Catalog No 3. Everest & Jennings.

[Image]
MOBILITY DEVICES


Wheelchair Maintenance and Simple Repair Carol Nordstrom, RPT Physical Therapy Department, Woodrow Wilson Rehabilitation Center, Fishersville, VA


"Wheelchair Management Developing a System for Long Term Care Facilities" The J Long Term Care Administration, Vol. VIII, #2, June, 1980

Wheelchair Management Guidelines C. Epstein Occupational Therapy Consultants, Inc., 19 South Bridge Street, Somerville, NJ 08876 This 40-page guide provides an overview and methodology for the systematic management of wheelchairs in an institutional setting. The author presents a rationale for developing the system, describes the implementation and presents specific policies and procedures to set the system in place. Forms and coding key are included


Wheelchair Scheduled Maintenance Program Everest & Jennings, Inc., East Mission Oaks Blvd., Camarillo, CA 93010 805/987-8911 Provides information on establishing a program for scheduled wheelchair maintenance in an institutional setting

Wheelchair Selection More Than Choosing a Chair with Wheels B. Fahland, 1976 J2.95 from the Sister Kenny Institute, 800 E 28th Street at Chicago Avenue, Minneapolis, MN 55404

Wheelchairs and Accessories, An Accent Guide B. Garee, Ed Accent Special Publications, Cheever Publishing, Inc., P.O. Box 700, Bloomington, IL 61701. 134 pp $7.50 (+ $0.50 shipping). This guide contains ideas on choosing the best wheelchair, accessories you can add for comfort, safety, convenience, and fun, how to keep your chair in top shape, and where to get the latest product information

"Wheelchairs: Aids for Participation and Discovery," "Wheelchairs: Guidelines for Selection," The Exceptional Parent, February, 1983, Volume 13, #1, pp 17-28. This article covers such areas of concern as the selection process, fitting, appearance, posture, bathrooms, transportation, types of chairs, accessories, cost, and maintenance and service


See also references in Mobility Device Evaluation Guide, and Sports Wheelchairs, SPORTS

AUDIOVISUALS

I've Got Wheels Brian Line and Nick Dance Available from Dance/Line Films, LeCourt, Liss, Hampshire, England 3/4" videocassette, color, 20 minutes 1979 Illustrates how correct equipment and environment can provide access to a wheelchair-bound person

A New Freedom: Amigo Sales, Inc., 5693 Dixie Highway, Bridgeport, MI 48722. Color, 10-1/2 minutes 1979 Demonstrates how the Amigo wheelchair is helping several individuals overcome their physical disabilities

SOME COMMERCIAL SOURCES OF WHEELCHAIRS

See Toll Free Numbers for phone numbers
MOBILITY DEVICES

POWERED WHEELCHAIRS

A-BEC
20450 Gramery Place
Torrance, CA 90501
800/421-2269
800/262-1331 (in California)

Colson Equipment
Harry S Truman Blvd
Caruthersville, MO 63830

Everest & Jennings, Inc
3233 E Mission Oak Blvd
Camarillo, CA 93010

Everest & Jennings, Inc
111 Snidcroft Road
Concord, Ontario M4T 2W1

FORTESS SCIENTIFIC
2110-C Northwest Parkway
Norcross, GA 30071
404/352-3792

Instrument Components
759 B Lakeshore Blvd
Painesville, OH 44077

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Mobility Engineering & Dev
7135 Hayvenhurst Avenue
Van Nuys, CA 91406

Mobility Plus (L Mullolland)
P.O. Box 391
215 N 12th Street
Santa Paula, CA 93060
805/525-7165
800/325-7397

National Welded Products
2900 Spring Street, #6
Redwood City, CA 94063

Newton Ains (England)
U.S. Distributor
Newton USA
469 Ridge Road
Rochester, NY 14615

Orthoped-ia GMBH (Germany)
U.S. Distributor
International Medical Equipment Corporation
11000 Rush Street, #20
South El Monte, CA 91733

Poirier Wheelchair (France)
U.S. Distributor
Majungh International
2930 West Central
Santa Ana, CA 92704
714/641-9696

Saab-Scania of America, Inc
Saab Drive, P.O. Box 697
Orange, CT 06477

Sears & Roebuck Co
1633 Broadway
New York, NY 10019

Steven Motor Chair Co
120 N Gunter
Siloam Springs, AZ 72761

Summit Services, Inc
535 Division Street
Campbell, CA 95008

Tunkers Industries Inc
1832 Star-Batt Drive
Rochester, MI 48063
313/852-5331

21st Century Scientific Inc
7135 Hayvenhurst Avenue
Van Nuys, CA 91406

Vessa
Paper Mill Lane
Alton Hampshire
GU34 2PY ENGLAND

POWER UNITS FOR WHEELCHAIRS

A-BEC
20893 Haggans Court
Torrance, CA 90501

DAMACO
9612 Lurine Avenue
Unit A
Chatsworth, CA 91311

Instrument Components
959 B Lakeshore Blvd
Painesville, OH 44077

Oxford Orthopaedic Engineering Ctr
Nuffield Orthopaedic Center
Headington, Oxford, England OX3 7L1

Rosenthal Manufacturing
5033 North Kedzie
Chicago, IL 60625

Mobility Plus (Solo Products)
P.O. Box 391
215 N 12th Street
Santa Paula, CA 93060
805/525-7165
800/325-7397

Solo Products
2435 Front Street
West Sacramento, CA 95691

21st Century Scientific Inc
6920 Hayvenhurst Avenue #205
Van Nuys, CA 91406

Zimmer Orthopaedic Ltd
Bridgend, Mid Glam
CF31 3PY

Great Britain
POWERED WHEELCHAIR ALTERNATIVES

A-BEC
1815 W 205th Street
Suite 206
Torrance, CA 90501

Abbey Medical
3216 El Segundo Blvd
Hawthorne, CA 90250

Alpha Unlimited, Inc
2315 Industrial Blvd
Sarasota, FL 33580
813/351-3488
800/237-6836

American Stair Glide
4001 E 13th Street
Grandview, MO 64030

Amigo Sales, Inc
6693 Dixie Highway
Bridgeport, MI 48722

Braun Corporation
1014 S Monticello
Winamac, IN 46696
219/346-6157
or
5751 Engineer Drive
Huntington Beach, CA 92649

E F Brewer Company
P O Box 159
Menominee Falls, WI 53051

Chair Lift of California
31220 La Baya Drive, Suite #113
Westlake Village, CA 91362

Electric Mobility Corporation
591 Mantua Blvd
Sewell, NJ 08080
800/257-7955
800/232-6550 (in New Jersey)

Everest & Jennings, Inc
3233 E Mission Oak Blvd
Camarillo, CA 93010

Independence Chair Company
W220 N507 Springdale Road
P O Box 436
Waukesha, WI 53187
414/542-6060

Instrument Components Co
7235 Industrial Park
Mentor, OH 44060

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Kimed Industries
11 Broadway
New York, NY 10004

Leisure Lift Chairs
P O Box 6176
Kansas City, KS 66106

Midon Engineered Products
P O Box 1031
Kitchener, Ontario N2G 4E3

Motovator
1722 Border Avenue
Torrance, CA 90501

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8

Ortho-Kinetics
P O Box 436
W220 N507 Springdale
Waukesha, WI 53187

Palmer Industries
P O Box 707, Union Station
Endicott, NY 13760

Sherry Products, Inc
1501 Pacific Coast Highway
Hermosa Beach, CA 90254

Small Electric Vehicles, Inc
56 E Walnut Street
Westerville, OH 43081

C F Struck Corp
WS1 N545 Struck Lane, Box 307
Cedarburg, WI 53012

Voyager Ltd
P O Box 1577
S Bend, IN 46634

Zimmer Orthopaedic Ltd
Bridgend, Mid Glam
CF31 3PY
Great Britain

See also SEATING Commercial Sources for Postural Seating Systems
THE DEVELOPMENT OF WHEELCHAIR STANDARDS

A recent development in the rehabilitation engineering field has been a concerted effort to develop voluntary standards for manual and powered wheelchairs. This development has occurred in response to several factors, including international cooperation on the development of wheelchair standards, U.S. government interest in the development of domestic standards, and consumer advocacy for the development of such standards.

RESNA currently serves as the official U.S. representative to the International Standards Organization's (ISO) Wheelchair Standards Subcommittee. The RESNA Subcommittee is also developing voluntary U.S. standards for wheelchairs in cooperation with the Veteran's Administration and the Food and Drug Administration.

The RESNA Subcommittee has established an ambitious work schedule for itself and is anticipating the completion of voluntary domestic standards for both manual and powered chairs by the close of 1986.

MOBILITY BEYOND SEATED WHEELED SYSTEMS

CHOOSING & USING OTHER TYPES OF MOBILITY EQUIPMENT

There are many publications that include information on walking aids. These are included because they are so clear visually and I like pictures. If you have favorites, please send information to the Sourcebook editor for inclusion in the next edition (editor).

This book was written for nurses who work with disabled persons. Its goal is to provide the nurse with the basic rehabilitation techniques to enable him/her to train disabled people in ordinary functional activities. This includes self-care activities, mobility, pressure relief, pain, etc. The techniques described are simple and utilize equipment that is readily available. The text is written in clear language. Excellent drawings and pictures add to comprehension of details of the technique. Because the techniques include training in the use of assistive devices, this book is also useful to more than just nurses as an introductory guide to the equipment most commonly used by the disabled. It discusses selection, use and training with the devices.

Physical Management for the Quadriplegic Patient J. Ford and B. Duckworth FA Davis Company, Philadelphia, PA (Out of print, look for it in an OT or PT dept. or a rehab dept.) 1974 $18.95
This textbook on the physical management of quadriplegic patients includes an appendix which describes do-it-yourself aids for these individuals.

Providing Early Mobility Intermed Communications, Inc., 132 Welsh Road, Horsham, PA 19044 1980
This book is part of a series of training manuals for nurses. This one is written to assist the nurse in taking a positive approach to the emotional and physical considerations in early mobility. It is included in this technology guide because it includes the detailed instruction needed to use the following pieces of transfer and positioning equipment: cradle boots, hand rolls, footboards, hand splints, transfer boards and mechanical lifters. In other sections of the book, concise captions and how-to-do-it photos show you how to safely transfer a patient with halo traction, how to select the proper crutches, cane, walker or wheelchair for your patient, and how to teach him to use the equipment correctly. It also includes step-by-step procedures and photos for turning and positioning, range-of-motion and isometric exercises, and transfer techniques. This is an excellent training manual for anyone, for instance, a disabled person could use it to train a personal care attendant. The photos are so explanatory, the text is almost unnecessary.

PROTECTIVE AIDS

Assistive and Protective Devices for the Handicapped M. J. Martin (editor) Georgia Retardation Center, 4770 North Peachtree Road, NE, Atlanta GA 30338 July 1981 This manual provides practical information on a selection of adaptive and protective devices such as helmets, eye protectors, mitts, protective gloves, elbow restraints, pelvic supports, etc.

Protective aids are listed according to the part of the body to be protected and the type of protection required. Includes helmets, restraints and supports, slings and splints, pressure relief and skin protection. Lists manufacturers and suppliers.
MOBILITY AIDS FOR THE BLIND

John A. Brahyn, Ph.D
Smith-Kettlewell Institute of Visual Sciences
San Francisco, California

"In the application of technology to aid the blind, one of the problems receiving a great deal of attention is mobility -- the ability to move safely and independently through the environment. The technology to assist blind individuals with solving mobility difficulties has been applied only recently, and efforts in this application of technology are still in their infancy.

Historical Overview

"Although sticks of various shapes and sizes probably have been used by blind people for a long time, specific mobility aids for the blind are relatively new. The large number of blind veterans in the United States after World War II prompted Dr. Richard Hoover to begin his classic studies within the Veterans Administration in the systematic use of a long, white cane to aid mobility. The techniques which he developed and refined have been adopted widely in mobility training programs around the world, and cane in the hands of a competent user, transform a simple, white stick into a remarkably effective tool. Indeed, the white cane is currently the most popular mobility aid.

"Another traditional mobility aid is the guide dog. However, guide dogs are used by only a small fraction of the blind community. This situation is unlikely to change for many reasons, primarily because of the substantial cost of training the dog and the limited number of individuals suited to or existence with a guide dog.

"World War II also prompted the development of radar and sonar technologies for remote sensing. In the 1950s and 60s, transistor technology made electronic devices more portable. Inventors began to see the potential for various obstacle-detection devices to aid blind people. Many devices have been developed, although only a fraction have found their way into practical use. The principal behind most of these obstacle-detection devices is the transmission of an energy wave, usually ultrasonic, but sometimes optical, and the reception of echoes from objects in or near the traveler's path. Once received, the signals must be decoded and displayed in some intelligible form, usually auditory or tactilely. Range usually is estimated by measuring the time taken for the wave to reach the target and return to the receiver.

"The maximum range of interest for sensing devices is usually no more than 20 feet, making the use of radar or light waves highly inconvenient and expensive since it involves measurement of extremely short time delays. Optical transmission has been used, however, where range measurement was not a design goal.

"The question of how much information should be presented to the user of a mobility aid and how that information should be displayed is probably the principal issue in mobility and design. Development has followed two schools of thought. One class of aids, known as obstacle detectors or clear-path indicators, warn only of the presence of and sometimes the approximate range of obstacles directly in the travel path, while generally not being concerned with identification of the obstacles detected. Such devices are relatively inexpensive and technically simple.

"A second category of aids, known as environmental sensors, attempts more than mere detection of obstacles.

"The dispute between proponents of obstacle detectors and environmental sensors -- between rich and sparse displays -- is still unresolved. More complex displays require more learning, and too much information can be confusing. There is no doubt that experienced users, however, benefit greatly from the extra input.

Current Status Problems

"Most of the aids described (in the full text of the paper, ed.) are commercially available, but have not achieved broad penetration of the market. All are relatively expensive, costing anywhere from $300 to $3,000. Most are designed to supplement, rather than replace, the long cane and there is disagreement over whether the additional information they provide is worth the very considerable extra cost and the effort of training. A skilled user of the long cane can use the sounds emitted by the cane tip for natural echolocation, providing him with a surprising amount of information about the immediate environment. This category of user, although not typical of the 5% population, would require substantial additional input from an electronic aid before its use becomes worthwhile. The sophisticated auditory display of such an aid may tend, however, to mask the subtle echolocation cues mentioned above. For those individuals who do not possess refined echolocation skills, however, this argument cannot be valid. Other reasons must be sought for the apparent lack of general acceptance of the existing electronic mobility aids.

"Mobility and navigation is so commonplace to sighted people that it has warranted very little study. As a result, researchers have little basic knowledge to use as a starting point when designing and evaluating mobility aids for the blind. What are the essential components of information needed for mobility? What spatial cues does a sighted person rely on for maintaining a safe course through the environment? Once these cues are identified, how can they best be coded and displayed to the user? If we do not really understand mobility, how can we measure it to ascertain whether an artificial aid is actually improving a blind individual's performance? Until now, the production of hardware has tended to precede and outstrip any progress in the basic knowledge of human goal-oriented locomotion. This.
lack of knowledge has begun to be addressed, and more basic research now underway into the problems of orientation and mobility should yield a more satisfactory theoretical basis for engineering design decisions.

Discussion

"None of the electronic travel aids developed so far has seriously challenged the supremacy of the long cane. There is little doubt, however, that such aids can be a valuable addition to a blind traveler's available tools, especially for travel in unfamiliar areas. If the true goals of mobility include traveling with "grace and independence," then clearly the long cane is insufficient. Whether using a long cane is graceful or not of course is debatable, but in practice it acts as a path clearer, causing other pedestrians to step out of the way. This is not independent travel, nor can independence be achieved while it is still necessary for the blind individual to ask questions of passersby on virtually every aspect of way-finding in unfamiliar areas.

"The need for aids which can give advance warning of obstacles and/or additional information about the immediate environment, not to mention assistance in global navigation, appears self-evident. The upcoming generation of mobility aids offers the possibility of achieving some of these goals at lower cost and greater convenience than possible before. Serious efforts are being made to improve upon past designs, while advances in knowledge of the mobility process are strengthening the framework within which these new devices can be evaluated and refined. There are good reasons for expecting steady improvements in technologically assisted travel for the blind."


SOME SOURCES OF INFORMATION


SEATING AND POSITIONING TECHNOLOGY

INTRODUCTION

Clinical application and research on seating technology is generally divided into two major areas: postural control and pressure relief. The bulk of the information on postural control relates to children with cerebral palsy, while the pressure relief field tends to focus on adults who have sustained a spinal cord injury. Much of what is written in both areas is much more broadly applicable, to wider age ranges and to other disability categories. If you are looking for information on seating, you may want to look beyond the "intended audience" label of the publication or product.

Many conferences and workshops held in recent years have demonstrated that seating, whether for pressure relief or for postural control, is not only an area of major concern but one of tremendous controversy. Everyone seems to have their own opinions about what works and what doesn't. Although there is a considerable body of research literature, very little exists in writing on useful clinical approaches and applications.

Paul Brand writes in the Journal of Rehabilitation R&D, July 1983, that:

"A major defect in the whole system whereby research projects are funded and articles are accepted for publication is that too many scientists are looking at Objectives and not enough at Goals."

The result, in major problems like pressure sores, is that the mass of knowledge about pressure on tissue grows and grows, and the actual management of the problem is almost unaffected, or may be getting worse, nationwide.

"Because of the multitude of uncontrollable variables in the life of a series of hospital patients, and because of the larger variety of variables in the home environment, most clinical scientists shy away from any attempt to evaluate total programs. They know they will be dissatisfied with the objectivity and validity of their findings -- and they know they will be torn to pieces by pure scientists and reviewers.

"...we need to look straight at the goal of prevention of pressure sores, and recognize that some of the most important objectives on the critical path towards that goal have escaped serious study because of the difficulty of analyzing the whole life of whole people in terms that fit the requirement of basic scientific research."


A bibliography of publications focused on postural seating is included in this section, for bibliographic references on pressure relief, see the bibliographies in Zacherow's book Wheelchair Posture and Pressure Sores, in Krook's paper in the Journal of R&D, and in Jay's new book, Choosing the Best Wheelchair Cushion.

THE FUNCTION OF A WHEELCHAIR CUSHION

"Most of the research into wheelchair cushions has been done with those people most at risk to pressure sores, such as paraplegics and quadriplegics, but they are minority users of wheelchairs. An English study found that 53% of wheelchair users were divided almost equally into people with osteoarthritis, rheumatoid arthritis, hemiplegia and multiple sclerosis (including those with closely related conditions); Among the remaining 37% only 5% were paraplegic or quadriplegic. Although one of the important functions of a wheelchair cushion is the prevention of pressure sores, there are other functions which, for some people, are more relevant. In our survey we asked people why they had been given wheelchair cushions. Forty-four percent replied that this was to make sitting more comfortable. Twenty-two percent said that it was to reduce the likelihood of tissue damage and the resultant pressure sores. Occasionally, and quite wrongly, a cushion was prescribed to compensate for a wheelchair which was the wrong size for the individual.

"Ferouson-Pell has written that 'the primary function of a wheelchair cushion is to provide an effective platform from which the patient may operate.' It is remarkably difficult for a patient to work at a table or bench, or for him to propel a wheelchair, if the sling seat normally supplied is his only support. In addition to providing a stable seat, the wheelchair cushion improves comfort, aids posture and reduces the transmission of shock during propulsion over uneven surfaces. Wheelchair cushions are also provided to aid the patient when transferring to other support surfaces, and for a relatively small proportion of wheelchair users, the wheelchair cushion provides a vital function by reducing local concentration of stress in tissues to prevent tissue ulceration."

"Not all these functions apply to every wheelchair user and not all cushions fulfill every function. Nevertheless, a sling seat would not normally be chosen for protracted sitting. It is probable that if all patients were properly assessed, cushions would be automatically prescribed with most wheelchairs -- unless there were definite contra-indications.

"People who sit for long periods of time may use wheelchair cushions on other seats. Elderly people who spend much of the day in an armchair may benefit from a wheelchair cushion, both to add to their comfort and to prevent tissue damage. Cusions are used by people with gynecological problems, prostate gland problems, post-hemorrhoidectomies and other lesions of this area particularly during travel and recreational
They are used by people who are unduly sensitive to pressure in the region of the sciatic nerve and by people who are underweight or have gluteal muscle wasting who find sitting without a suitable cushion too uncomfortable. They are also used by hemophiliacs to reduce the likelihood of duma from Choosing the Best Wheelchair Cushion for your needs, your chair, and your lifestyle. Peggy Jay, Dip COT, SROY. The Royal Association for Disability and Rehabilitation, 25 Mortimer Street, London W1N 8AB. Revised edition, 1984. Also available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814, 301/657-4142.

PRESSURE RELIEF

"At home or work, prevention of pressure sores and treatment of the early stages of pressure-induced tissue damage are extremely difficult for even conscientious patients. Our understanding of the sore's etiology is not complete and what understanding does exist has not been transferred widely to practical solutions that accommodate daily activity patterns. Similarly, technological aids that effectively reduce an individual's risk of developing a sore are not widely disseminated and utilized."

"Pressure sores are a severe and potentially life-threatening complication for many individuals with physical disabilities. In 1968 the Veterans Administration estimated that 50 percent of all quadriplegic veterans will require hospitalization because of pressure-related problems during their lifetime and more than 30 percent of the paraplegic population will have a similar fate. It was also estimated by the VA that approximately one-fourth of these persons will die as a direct consequence of pressure sores. The magnitude of the problem is further emphasized when an analysis similar to those done by Rolinson in Canada, Noble in Australia, and Motloch in California is performed on the problem in the U.S. Using the assumptions and data from these analyses, the medical costs associated with curing pressure sores in the U.S. are estimated to exceed $2,000,000,000 per year. This estimate is consistent with the information presented in the Technology Section of the NIH long range plan 1981-1986, which emphasized that the effects of pressure on tissue is a high priority area for research and demonstration activities.

"The social costs associated with pressure sores are even greater than the medical costs. These costs include (1) time lost from a productive vocation with its attendant economic impact on individual and family, (2) time lost from school, which has far-reaching and long-term impact because the disabled person's vocational potential is limited, which generates long-term dependency, (3) loss of time from the family which can have a significant psychological impact on the person's social development, and (4) loss of general personal independence and productivity that ultimately contributes to a serious loss of self-esteem and self-worth.

MOBILITY DEVICES

"The most commonly cited causes of pressure sores included:

1. Prolonged sitting during daily activities, activities such as card playing and video games.

2. Use of old deteriorated wheelchair cushions.

3. Activities that involve sitting on un cushioned areas such as a bathtub or sitting on a floor to play with young members of the family.

4. Falls while transferring from a wheelchair or bed.

5. Sitting too soon after a surgical procedure to correct a vertebral defect, or even during the comprehensive rehabilitation process.

6. Excessive sweating or irregular attention to skin condition.

7. Wearing clothing that has exaggerated seam lines (such as jeans), which can cause pressure to concentrate on areas that would normally not carry significant loads."

This article goes on to elaborate on a clinical program at TIRR, Houston, and to discuss the history of pressure management research.

Excerpted from the introduction of 'The Effectiveness of Preventive Management in Reducing the Occurrence of Pressure Sores", in Journal of Rehabilitation R&D, Vol 20, No 1, July 1983, pp 74-83, by Thomas A Krouskop, PE, PhD, Philip C. Noble, M.S., Susan L Garber, O.T.R., and William A. Siercer, M.D., at The Institute for Rehabilitation and Research in the Texas Medical Center, 1333 Moursund Avenue, Houston, Texas 77030.


For Commercial Sources of Cushions, contact the ABLEDATA system, which currently lists over 170 different types of wheelchair cushions.
Choosing the Best Wheelchair Cushion for your needs, your chair and your lifestyle  Peggy Jay
The Royal Association for Disability and Rehabilitation (RADAR), 25 Mortimer Street, London W1N 8AB, England 203 pages  £5 1984

"Peggy Jay, a British occupational therapist, has written an excellent book which brings some sense of organization to the information currently available in the wheelchair cushion area. The book was prepared as part of the Aids Assessment Programme which the English government finances in order to assess a range of aids in a practical way, as distinguished from the more scientific evaluation needed when undertaking a research project.

Information about wheelchair cushions was compiled from four different sources:

1. Experts in this field, including bioengineers, therapists and doctors, were asked for information about wheelchair cushioning.

2. Suppliers of cushions were invited to the hospital to demonstrate their cushions.

3. Gel, water, air and the more complicated foam cushions were purchased and tried out by a variety of wheelchair users.

4. A field study covering 45 people provided more information about cushion usage and spanned a longer cushion life than was possible on a cushion trial.

This book does have some minor drawbacks for North American readers. Since she is writing from a British perspective, price and availability information refer to British prices and British suppliers. However, with the information that is provided about each cushion, however -- dimensions, composition, advantages and disadvantages -- a North American reader would have little difficulty in locating a particular cushion. Even relatively recent additions to the marketplace, such as the VASIO-PARA cushion and the low profile Roho are included in this volume.

The Prevention of Pressure Sores in Persons with Spinal Cord Injuries  Philip C Noble  Monograph No 11  Available from World Rehabilitation Fund, Inc., International Exchange of Information in Rehabilitation Program 400 East 34th Street, New York, NY 10016

Although the subject of pressure sores has been well canvassed in the nursing and rehabilitation literature, in terms of techniques for management and resolution of established ulceration, the theme of pressure sore prevention has generally been neglected. This is particularly true in the case of the independent "rehabilitated" paraplegic or quadriplegic for whom pressure sores are a constant threat to continued independence in the home, workplace, and on the sports field. This monograph explains, with a practical inclination, the magnitude of the "pressure sore problems," the scientific basis of this form of skin ulceration, and in considerable detail, practical measures which may be undertaken by rehabilitation workers and disabled individuals to reduce the risk of this complication to an absolute minimum. The monograph concludes with an analysis of the clinical results of the prevention program advocated, drawing from the experience of Royal Perth Rehabilitation Hospital over the decade 1970-1979, complete with a detailed estimate of its cost effectiveness. An attempt is made throughout to base all discussion upon the pooled experience of many rehabilitation centers throughout the world through repeated reference to the published literature. However, the practical and statistical aspects of this work are essentially drawn from experiences in Western Australia. Contents include basic data on pressure sores as a complication of spinal cord injury, etiological factors associated with pressure sores, practical measures for the prevention of pressure sores, the costs and benefits of a clinical pressure management program, the need for research and service in pressure sore prevention.

Wheelchair Posture and Pressure Sores  Dennis Zacharkow, RPT  Charles C Thomas, Publisher, Springfield, IL 1984 98 pages

"The author of this book explores wheelchair sitting posture as a major etiologic factor in pressure sore formation. Following an introduction on the prevalence and medical expense of pressure sores among the spinal cord injured, chapters detail proper sitting posture for able-bodied individuals, inherent problems with the wheelchair as a seat, essential modifications for proper sitting posture, pelvic obliquity and pressure sores, wheelchair cushion selection, acute care considerations, and pressure sore recurrences. The application of posturing principles to other patient populations concludes the text."

Protective AIDS

Assistive and Protective Devices for the Handicapped  MJ Martin, Editor  Georgia Rehabilitation Center, 4770 North Peachtree Road, NE, Atlanta GA 30338  July 1981  This manual provides practical information on a selection of adaptive and protective devices such as helmets, eye protectors, mitts, protective gloves, elbow restraints, pelvic supports, etc.

A Resource Guide to Protective Aids  J Frank, K Malik, W Chu, and Lowry  Job Development Laboratory, The George Washington University, 2300 Eye Street NW Suite 420, Washington, DC 20037  Protective aids are listed according to the part of the body to be protected and the type of protection required. Includes helmets, restraints and supports, slings and splints, pressure relief and skin protection. Lists manufacturers and suppliers.

See also Beds, page 57
“Specialized seating and mobility services for children and adolescents has become a clinical reality in increasing numbers of facilities during the past decade. More and more professionals are recognizing the positive contributions that can be made to the lives of these individuals through the judicious provision of appropriate seating and mobility technology. Commercial suppliers are also responding to this awakening market. Particularly in the past five years the number of commercial options available to families and clinicians has drastically increased. Current research efforts suggest that this trend will continue, but with increased emphasis being focused on the needs of the more severely handicapped.”

—from Preface, Seating for Children with Cerebral Palsy: A Resource Manual, Elaine Trefler, Editor

A BRIEF GUIDE TO POSTURAL SEATING TECHNOLOGY

I CONVENTIONAL METHODS

A Traditional Insert Fabrication

1 Description. Usually using plywood, polyurethane foam and vinyl upholstery, an insert is made to suit an individual based on anatomic measurements. Depending on how it’s done, the insert may look like a foam-lined plywood shell (box insert) or a padded seat and separate back with lateral restrictions (bread-board insert).

2 Advantages. Low overhead and readily available technology are the chief assets of this technique. With a bit of skill and patience a wide variety of insert styles can be produced.

3 Limitations. Depending on the local labor rate, and degree of disability, this method may be more costly than similar inserts that are available commercially. Using this method, for example, it can be very difficult and costly to produce a total contact supportive back for someone with extreme scoliosis. Upholstery of an awkwardly shaped cushion can be a limitation.

B Commercial Pre-Made Inserts

1 Description. Increasing numbers of centers are substituting thermoplastics for plywood in their custom seating programs. Thermoplastics—usually ABS, Kydex polyethylene or polypropylene—can be thermoformed or bent to give contouring which is unavailable with plywood.

2 Advantages. More contouring means less padding. This new generation of conventional inserts is usually lighter and more streamlined than their plywood predecessors.

Additionally, thermoplastics do not splinter or absorb moisture. Finally, if molds are made, repeatable seating modules can be made. This has proven useful in speeding service and reducing costs, as noted in reports by Douglas Hobson (University of Tennessee Memphis—MPI System) and Richard Holte (Rehabilitation Centre for Children—another modular system). But we'll get to full blown modular systems in a minute.

3 Disadvantages. Some of the thermoplastics are susceptible to embrittlement in extremes of cold weather. Care must also be taken that parts which are vacuum-formed are not thinned out and greatly weakened.

C Modular Plastic Seating Systems

1 Description. A series of pre-fabricated seat and back modules is available, possibly in differ
ent sizes. These are selected by appropriate size (and style, if applicable) and usually positioned in a wheelchair on mounting hardware that is also part of the system. Thus a personalized custom insert is assembled from stock components, by careful selection and adjustment.

2 Advantages By utilizing the same modules in assessment phase as in the final insert, one has a fairly clear idea of the probable effect of the insert. Assessment is speeded and largely removed from the realm of conjecture. Prefabrication should allow central production reducing price per unit, and making the service more widely available by avoiding the necessity of involving very highly specialized people in the fabrication of all inserts.

In addition to this theory, three reports have emerged (Trefler, Tooms, and Hobson, 1978, Holte, 1980, Seeger and Sutherland, 1981) stating the success and wide applicability of their systems.

3 Disadvantages If you have to wait for parts, your program grinds to a halt. The alternative is to stockpile, which adds to your overhead.

This concept does not work for everyone. Persons having moderate to severe disabilities are not generally good candidates, nor are high tone, profoundly involved individuals with spasticity.

The comments above in Section IB3 on durability of plastics are germane.

4 More Information The Memphis Insert System (MPS) is available through MED dealers. For information on the Winnipeg work, contact: Mr. Michael Forbes, Director, Special Devices Department, at the Rehabilitation Centre for Children in Winnipeg. You can correspond with Dr. Barry Seager at the Regency Park Centre for Physically Handicapped Children in Kilkenny South Australia. A modular plastic system for young children is the Acheiver Seat, distributed by G E Miller of Yonkers, New York. Finally, the Gunnell Company of Vassar, Michigan, produces a series of fiberglass shells (and several other accessories) which can be padded and upholstered as needed.

D More Commercial Equipment

1 Adapted Wheelchairs. There are a number of wheelchairs which are manufactured with postural support in mind. Some have quite a few adaptations, others almost none. And, some manufacturers will custom-make parts to your specifications. Adapted wheelchairs include those manufactured by Gendron Archb of Ohio, the Avon Deluxe by Newton of England, the Postura by Everest and Jennings of Camarillo, California, the Multi Position Chair (more of a bed, really), also be Everest & Jennings, the original Mulholland chair, on its own base, and the Hogg Transportation Chair and the wooden relaxation chair, available through several catalog supply firms.

2 Transport Chairs. The original transport chair by OrthoKinetics of Wisconsin has been joined by the Safety Travel Company chair, produced in Elyria, Ohio, and several other brands.

The Pogon or MacLaren umbrella-style stroller should be familiar to most. Another fold-up stroller offering less support than a transport chair but more than a simple unmodified stroller is the Crusier stroller, made by Convid of Palos Verdes, California.

For children up to 100 lbs. the Britax car seat is said to meet British safety standards. It is available through Abbey Medical, or Childsafe Company (new name Columbia Medical Manufacturing) in Pacific Palisades California.

For automobile travel, infants could be seated in any number of safety-tested car seats. Larger children might use a trunk harness and lapbelt system offered by the Mothercare Company of England. Another system is manufactured by Safe 'n Sound Pty Ltd of Morphettville (Box 421), South Australia. Strolee of California also manufactures a booster seat, and a harness system.

3 Non-Insert Trunk Supports. The Burnett Body Support is a vest-like bag filled with polystyrene beads. When evacuated, the vest becomes nearly rigid. It can be molded to different shapes, and is manufactured by Innovation Products, Ltd of Eveshey, Hertfordshtre, England. They also produce a hand-operated pump for extracting the air.

Several companies offer adjustable lateral trunk supports which can be retrofitted to a wheelchair. The SIM pads are available through MED distributors, who also carry the MED trunk supports. Somedics Company of Santa Monica, California produces its own trunk pads. Major catalog supply houses offer different styles of adjustable lateral trunk pads.

II INDIRECT CUSHION FABRICATION TECHNIQUES

This section will include special fabrication techniques in which the insert component is not made directly on the patient's body, but remotely. Nearly all techniques start with a casting, then proceed to a plaster replica of the anatomy, on which is produced the final insert. This casting technique is a specialty unto itself, and will be presented as such.

Generally, custom fabrication techniques are not invoked unless standard approaches have been tried and assessed and rejected, usually for reasons of poor results, high cost, long delivery time, or all of the above. Custom fabrication techniques, direct or indirect, are thus a resource of last resort in many cases.

A Plywood Foam, Vinyl Custom Insert

1 Description. Technique is applied as described in Sections IA and IB, except that more emphasis must be put on grading out the foam to a suitable shape.

2 Advantages. As before, this can be the cheapest method, when it works. This is my preferred method for making unusual seat components.

It is possible to provide lateral bolsters to stabilize a drifting pelvis, allow for a leg-length discrepancy, produce a wedged or stepped anterior of seat for pelvic containment and hip...
flexion, or provide selecting padding build-up under an oblique pelvis. By upholstering components separately, and positioning them by bolting to a plastic external shell, one can remove, replace, or adjust the components more easily and less expensively than if a total seat replacement were needed.

3 Limitations It can be quite difficult to make a deep total contact support for the person with a significant pelvic tilt, rotation, rib hump, and so forth. But, it could be considered for a person with a slight deformity of the back, especially if lateral trunk bolsters are used in conjunction (they allow you to provide a shallower cutout by protruding forward to provide the support on the sides).

B Traditional Orthotics

An orthosis can be effective in a system for a wheelchair-using person. It can be combined with a simple insert, where the orthosis provides the structural support to the spine and the insert supplements the person's balance and secures him in the chair. An advantage of orthoses is that they can continue to provide support after the person has left the wheelchair, even to the point of being worn in bed or in the bath.

C The Gilette Seating Support Orthosis

1 Description The Gilette system borrows heavily from standard orthotics practice, and is literally a wheelchair-based orthosis. The patient is cast while prone with hips flexed. The insert is a combination seat and back support which stays in position with a front closing up and or a head support appended to it.

2 Advantages Borrowing from orthotics practice is a good idea, as this opens up a tremendous potential source of custom inserts. Minor adjustments for growth, etc. can be made simply by heating and flaring the shell. An integral seat/back shell made from the casting assures the relative positions are not lost. The system is light in weight.

3 Limitations As with many custom-made orthoses, this seat will have a limited lifespan, depending upon the growth pattern of the user. Orthotists providing the insert should be experienced in seating as well as orthotics. The casting method is effective, but it will evoke controversy in the NDT therapy community when used with cerebral palsied patients.

4 More Information More information can be found in the article entitled "The Gilette Seating Orthosis" by Martin Carlson and Robert Winter Orthotics and Prosthetics December 1978. You can write to the authors at Gilette Children's Hospital in St Paul, Minnesota. A central fabrication service is available through Symplex Orthotics Systems of W. ter Park, Florida.

D Thermoformed Shallow Back and Lateral Bolster

1 Description From a posterior positive, a shallow back is thermoformed and lateral trunk supports affixed to it. The back provides a solid place to anchor the side trunk pads, and must be thermoformed to accommodate severe spinal deformities. It is not necessary for the back to come forward on the sides of the trunk as the lateral pads fulfill the support function here.

2 Advantages The lateral trunk pads can be moved, or replaced, without rejecting the entire back. Thus, an element of modification is available. The lateral bolsters should allow the user better natural ventilation by providing less circumference containment than some other techniques.

3 Limitations The relative positions of seat back and bolsters must be noted carefully. The process is fairly time consuming.

4 Further Information Further information is available from Rick Holte at the Rehabilitation Engineering Center Children's Hospital at Stanford, Palo Alto, California.

E Vacuum Fixation (one piece)

1 Description Chailey Heritage, Surrey, England, was one of a few institutions who pioneered the vacuum fixation (vacuum bean bag) casting technique. After producing a plaster positive of the client from head to toe if necessary, a seat was thermoformed over the plaster model. A trial fitting established trim and attitude lines. A second sheet was thermoformed to produce a more regular seat. An appropriate socket or suitable base for interfacing. Variations on this large body cast from bean bag impression method have been reported by the University of Virginia, Thames New England Medical Center, the Institute of Medical Physics in Utrecht, Moss Rehabilitation Center, Derbyshire Royal Infirmary and Dundee Limb Fitting Center.

2 Advantages and Limitations As with many of the impression originated techniques, one trades off speed and low cost for predictability and process control with this method. As a one-piece assembled insert it has the advantage of preserving the relative seat/back orientation but lacks somewhat in adjustability. Large ones will be awkward to handle (and to make for that matter). One-piece inserts offer the hope of use in a non-wheelchair base which could be handy.

3 More Information Consult the following publications:


Proceedings International Conference on Rehabilitation 1980. Toronto - "Is it Real" Reusable Casting Technique for Customized Total Contact Seating, O'Reagan and Law. Individually Customized Postural

F Foam-in-Box (FIB) Method

1. **Description** A plaster positive of the client's back is prepared and placed into an adjustable mold box. Liquid foam components are mixed, poured into the mold box, and react chemically to produce a flexible urethane foam. The cushion is then molded around the plaster positive. Later, it is upholstered and mounted in the wheelchair for support.

2. **Advantages** Because a foam cushion is produced, it will "forgive" areas of high point contact better than a padded rigid shell. A high quality, custom-formed cushion can be made with anterior "wrap" of the lateral portions past the thoracic midline.

3. **Limitations** Foam is an insulator, and in hot climates this could be a very uncomfortable insert. Because of the relative compressibility of the foam, firm auxiliary lateral trunk supports should be added for someone with a collapsing scoliosis.

4. **More Information** See the 1980 Proceedings of the International Conference on Rehabilitation Engineering, Toronto, A Comparison of Three Custom Seating Techniques, by Forbes, Holte, and van Kampen. John Rodgers, of Scimedics in Anaheim, California, may be able to provide technical and/or product assistance. Pin Dot products of Noribrook, Illinois, offers a central fabrication FIB service, calling it Contour-IT. Their product is slightly different than that described above, and they can provide extra support for the trunk, head, feet and so on.

U Evacuable Bean Bag Casting Method

1. **Description** The patient is placed against a polymeric or latex bag filled with small poly-styrene beads. By drawing the air out of the bag, the beads push close together, becoming nearly rigid with high vacuum. Because the bag itself is supple, it conforms to the person's surface anatomy.

Often, the beanbag is used to approximate the final insert cushion. Modifications for improved patient comfort and/or posture can be made by allowing a bit of air back into the bag, working the beads into the new, desired position, then reevacuating the air. Using several bags for a "multiple compartment" bag allows a "stintment of part of the cushion while the rest of the position is retained.

2. **Advantages** This method of casting permits a well-controlled evaluation and impression-taking session. By using the bean bag to mock-up the final insert, the patient's reaction can be viewed.

3. **Limitations** The major drawbacks are the lengthy time required to produce an insert from the impression, and the investment in equipment that is necessary.

4. **More Information** A hand-operated vacuum pump and fairly small bean bags can be obtained from Invention Products, Ltd., 10 Coldharbour Lane, Bushey, Hertfordshire, United Kingdom. PRA Plastics and Developments, Ltd., of 21A Kingsland High Street, Dalston, London, United Kingdom, will custom make a set of evacuable bags to your specifications.

III DIRECT CASTING METHODS

A Foam-in-Place (FIP) Method

1. **Description** The patient is placed against a sheet of latex rubber draped over a closed box. Two-part liquid foam is mixed, poured into the mold box, and reacts chemically to produce a flexible polyurethane foam. The foam fills the cavity of the box, and forms an impression of the part of the patient pressed against and into the latex sheet. The cushion is then formed and removed from the mold box and installed in the wheelchair.

2. **Advantages** The greatest advantage of FIP over indirect methods is the immediacy of results. Delays to the patient are minimized. The final cushion is produced almost immediately, so there is no waiting to see if a useful cushion is produced from the casting impression.

3. **Limitations** Great caution should be exercised in handling and using the foam components. Misuse may result in quite unpleasant consequences.

Supporting the person in the desired position can be difficult. They should not be moved for three to five minutes while the foam "sets up," or it may collapse and one must start again.

The mold cannot be "packed" (overcharged) or the patient's position will be compromised. In the Foam-in-Box method (Section II-F), this "packing" produces a higher density, higher quality foam.

4. **Further Information** The FIP method has been described by Hobson, Driver, and Hanks in The Proceedings of the 5th Annual Conference on Systems and Devices for the Disabled (Houston, 1978) under the title "Foam-in-Place Seating for the Severely Disabled: Preliminary Results." Also worthy of note are the reports on toxicity (actually non-toxicity) and safe handling procedures prepared by Mr. Hobson, of the University of Tennessee, Memphis.

B Solidified Beanbag

1. **Description** The patient is placed against a flexible bag partly filled with small diameter poly-styrene beads. The bag is evacuated, and the beads form an impression of the occupant. Next, adhesive is injected into the bag. It adheres the individual beads together, forming a cushion directly against the patient's body. The patient is removed, and the cushion is smoothed and mounted in the wheelchair.

2. **Advantages** This is also a very rapid method of making an insert. Speed of the FIB is combined with the control of position afforded by the bean bag evacuation technique. The plaster
3 Limitations. This is one of the only methods where the patient interface material is the same as the structural body of the insert. Clearly, one may have problems balancing these, either producing an insert which is strong but too hard, or soft but not durable. The University of Tennessee Rehabilitation Engineering Center is considering this problem by investigating quick-cure flexible matrix materials. Alternatively, the insert could be supported in a rigid shell for strength and/or lined with a thin layer of compliant foam and upholstered.

The Orthopedic Research and Locomotion Assessment Unit (ORLAU) at Oswestry, Shropshire, United Kingdom, seems to have lost some of their enthusiasm for this method. Their 1981 report finds no problem with durability, but leaves the impression that smoothing the seats was provided to be more laborious than originally thought.


John Rodgers, of Scimedics Company, Anaheim, California, may be able to offer technical advice and/or product support.

C Shapable Matrix

1 Description. This system is unique in that it has an adjustable surface which can be shaped, adjusted, and enlarged to suit the client's needs. The surface is made up from literally hundreds of small interlocking plastic elements. Mechanical devices can be tightened to hold a shape, or loosened to permit local adjustments. The shapable surface is supported on a tubing frame, and covered by a layer of foam.

2 Advantages. The shapable quality allows minor and major adjustments, customizing extension for growth can be done. No intermediate plastic work is needed. An incidental benefit is the good natural ventilation with this approach.

3 Disadvantages. There may be a problem with hygiene, as there are literally hundreds of small places to clean. Some large, strong patients may be able to bend the matrix out of shape. The issue of upholstery is not yet entirely resolved.

4 More Information. Two prototype systems are under development. One is at the Medical Engineering Resource Center, University of British Columbia, Vancouver, Canada. The other is being done by Steven Counsell, at BRADU, Roehampton, London, United Kingdom. More than 1,000 units of the UK design have been marketed in Europe. USA distribution is being undertaken by MED Contact Jeff Olffner, REHAB Co, 2811 Zulette Avenue, Bronx, NY 10461. The early work on this concept is described in a paper by the MERU group that appeared in the 1980 Proceedings of the International Conference on Rehabilitation Engineering in Toronto.

Richard N. Holte, MSc, Rehabilitation Engineering Center, Children's Hospital, at Stanford 520 Willow Road, Palo Alto, CA 94304.

Complete references to papers cited can be found in the Postural Seating Bibliography, page 173.
The institutions listed represent those responding
to a request for information in the University of
Tennessee Rehabilitation Engineering Seating News-
letter. They are listed alphabetically by STATE.

Centers who provide seating services, but who did
not have access to an initial questionnaire, are
welcome to send information about their programs
to University of Tennessee, Rehabilitation Engi-
neering Program, 682 Court Avenue, Memphis, TN,
att. Elaine Trefler, OT, for inclusion in an
updated list.

No endorsements are implied by inclusion on this
list. If you have information to add to, change,
or delete from this list, please send it to the
RESNA Sourcebook editor.

USA

Rehabilitation Engineering Center
Children's Hospital at Stanford
520 Willow Road
Palo Alto, CA 94304
415/327-4800

Newington Children's Hospital
181 E Cedar Street
Newington, CT 06111
203/667-5260

University Hospital School
University of Iowa
Iowa City, IA 52242

Capper Foundation for Crippled Children
3500 W 10th Street
Topeka, KS 66604
913/272-4060

University of Kansas Medical Center
39th and Rainbow Driv
Kansas City, KS 66103
913/588-6898

Lakeville Hospital
Lakeville, MA 01753

Gillette Children's Hospital
200 E University Avenue
St. Paul, MN 55101
612/291-2448

University of Mississippi Medical Center
Orthopedic Division
2500 North State Street
Jackson, MS 30216
601/987-4557

Kessler Institute for Rehabilitation
Pleasant Valley Way
West Orange, NJ 07052
201/731-3600

Blythdale Children's Hospital
Bradhurst Avenue
Valhalla, NY 10595
914/592-7555

Case Western Reserve University
Rehabilitation Engineering Program
3335 Scranton Road
Cleveland, OH 44123
216/359-3480

Elizabethtown Hospital & Rehabilitation Center
Elizabethtown, PA 17022
717/367-1161

Shriners Hospital for Crippled Children
Greenville Unit
2100 N Pleasantburg Drive
Greenville, SC 29609
803/244-4530

University of Tennessee
Rehabilitation Engineering Program
682 Court Avenue
Memphis, TN 38163

Texas Scottish Rite Hospital for Crippled Children
2222 Welborn Avenue
Dallas, TX 75219
214/521-3168

University of Virginia
Rehabilitation Engineering Center
P. O. Box 3368
University Station
Charlottesville, VA 22903
434/977-6736

Department of Rehabilitation Engineering
University Hospital & Clinics
Room E3/711
600 N Highland Avenue
Madison, WI 53792
608/263-8060

Canada

Calgary General Hospital
Orthopedic Clinic
841 Centre Avenue NE
Calgary, Alberta T2E 0A1

Glenrose Hospital
Physical Rehabilitation Unit
10220-111 Avenue
Edmonton, Alberta T5G 0B7

Rehabilitation Center for Children
633 Welling Crescent
Winnipeg, Manitoba R2M 0A8
204/452-4311

Forest Hill Rehabilitation Centre
Woodridge Street
Fredericton, New Brunswick E3B 4R3
506/455-3309

Izaak Walton Killam Hospital for Children
5850 University Avenue
Halifax, Nova Scotia B3J 3G9
902/424-3025

C K.ER
MOBILITY DEVICES

Cerebral Palsy Centre
Chedoke-McMaster Hospital
Box 2000
Hamilton, Ontario
416/388-0240

A. W. Rotary Children's Centre
828 King Street W
Kitchener, Ontario W2G 1E8
519/579-3650

Ontario Crippled Children's Centre
350 Rumsey Road
Toronto, Ontario M4G 1R8
416/425-5220

Royal Ottawa Regional Centre
P&O Department
505 Smyth Road
Ottawa, Ontario K1H 8M2
613/737-7350

Hospital Marie Enfant
5200 est Belanger
Montreal, Quebec H1T 1C9
514/374-1710

Saskatchewan Council for Crippled Children & Adults
1410 Kilburn Avenue
Saskatoon, Saskatchewan S7M 0J8
306/652-1694

University Hospital Physical Medicine & Pediatrics
Saskatoon, Saskatchewan
306/343-3560
306/343-3560

Also see the list of service centers in the COMMUNICATION section. Since it is usually necessary to have the person properly seated before a communication aid can be recommended, most communication services have a source for seating nearby.
MOBILITY DEVICES

SOME COMMERCIAL SOURCES OF SEATING AND MOBILITY SYSTEMS

WHEELCHAIR POSITIONING SYSTEMS

Abbey Medical
3216 El Segundo Blvd
Hawthorne, CA 90252

Columbia Medical Manufacturing
(formerly Childsafe)
P.O. Box 633
Pacific Palisades, CA 90272
213/454-6612

ERAC - Creative Rehab Equipment
513 N.E. Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

Everest & Jennings, Inc
3233 East Mission Oaks Blvd
Camarillo, CA 93010
805/987-6911

Gendron, Inc
Lugbill Road
Archbold, Ohio 43502
419/445-6060
800/333-2521

Gunnell Manufacturing Company Inc
221 N. Water Street
P.O. Box 1694
Vassar, MI 48768
17/823-8557

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

J.A. Preston Corp
* Fifth Avenue
New York, NY 10003
800/221-2425

Mobility Plus
(formerly L. Mulholland Corp)
215 N 12th Street
P.O. Box 391
Santa Paula, CA 93060
805/525-7165

Newton Aids (England)
U.S. Distributor
Newton, USA
469 Ridge Road W
Rochester, NY 14615

Ortho-Kinetics
P.O. Box 435
W220 N507 Springdale
Waukesha, WI 53187

Palm Beach Medical
C/O Riomedics
P.O. Box 131, F.P.S
Springfield, MA 01188

Rifton Equipment for the Handicapped
Rifton, NY 12471
914/658-3141

Theradyne Corporation
21730 Hanover Street
Lakeville, MN 55044
612/469-4404

Also see WHEELCHAIR section, Commercial Sources of Wheelchairs

MODULAR SEATING SYSTEMS

Aames Rents & Sells
122 No. Glassell
Orange, CA 92666

Freedom Designs, Inc
800/221-2425

Kay Products, Inc
Adaptive Equipment for Children
1010 East Pettigrew Street
Durham, NC 27707
919/688-1601

Luxury Liners
18929 Norwalk Blvd
Suite 105
Artesia, CA 90701
213/926-4255

ERAC - Creative Rehab Equipment
513 N.E. Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

R. C. Hayes (Leicester) Ltd
Main Street
Kirby Muxloe
Leicester, England (0536)
394738

R.C. Hayes (Leicester) Ltd
Main Street
Kirby Muxloe
Leicester, England (0536)
394738

J.A. Preston Corp
71 Fifth Avenue
New York, NY 10003
800/221-2425

Kay Products, Inc
Adaptive Equipment for Children
1010 East Pettigrew Street
Durham, NC 27707
919/688-1601

Luxury Liners
18929 Norwalk Blvd
Suite 105
Artesia, CA 90701
213/926-4255
MOBILITY DEVICES

MOBILITY DEVICES

MEDICAL EQUIPMENT DISTRIBUTORS (MED)
1701 S First Avenue
Maywood, IL 60153
312/681-2828

Miller Rental & Sales
284 Market Street
Akron, OH 44308

Mobility Plus
(formerly L Mulholland Corp)
215 N 12th Street
P O Box 391
Santa Paula, CA 93060
805/525-7165

Modular Seating Components
19326 Woodward Avenue
Detroit, MI 48203
213/368-3516

Otto Bock U S
Orthopaedic Industry
4130 Ughway 55
Minneapolis, MN 55422
800/328-4058

Pin Dot Products
P O Box 642
Northbrook, IL 60062
21/368-3516

Rehab Equipment Systems
P O Box 21565
Seattle, WA 98111
206/285-1114

distributed for
Adaptive Engineering Lab
4403 Russell Road
Building 2A, Unit A
Lynwood, WA 98037
206/774-7993

Rifton Equipment for the Handicapped
Rifton, NY 12471
91/4/774-3141

Special Devices Department
Rehab Centre for Children
633 Wellington Crescent
Winnipeg, Manitoba R3M 0A8
CANADA
204/452-4311

Variety Village
3701 Danforth Avenue
Scarborough, Ontario M1N 2G2
CANADA

CONSTRUCT-A-FOAM SEATING

Admed Inc
68 Harrison Street
Boston, MA 02111
800/225-2611

Modular Medical Corp
1558 Hu Johnson River Parkway East
Bronx, NY 10458
212/829-2626

WOLFED BODY SUPPORT

DESEMO, Inc
P O Box 22309
Savannah, GA 31403
800/342-7661

Freedom Designs, Inc
1884 Eastmar Avenue, Suite 11
Ventura, CA 93003

Handicapped Educ Learning Products (HELP) Inc
P O Box 9763
Sacramento, CA 95823
916/421-1202

Innovation Products, Ltd
51 Coldharbour Lane
Bushey, Herts WD2 3NU
ENGLAND
01-950-3695

J A Preston Corp
71 Fifth Avenue
New York, NY 10017
212/889-347
800/233-1224

Kay Products, Inc
Adaptive Equipment for Children
1010 East Pettigrew Street
Durham, NC 27707
919/688-1601

McLaren, Inc
P O Box 2004
Department D
New York, NY 10017
212/889-347
800/233-1224

Nottingham Medical Equipment Company
Melton Road
W Bridgford
Nottingham NG2 6HO
ENGLAND
0802-23425

Ortho-Kinetiks
P O Box 436
W220 N507 Springdale
Waukesha, WI 53187

Pin Dot Products
P O Box 642
Northbrook, IL 60062

Rogers & Associates
700 N Valley St, #B
Anaheim, CA 92801
714/991-3880

Sympex Orthotic System
P O Box 2031
Winter Park, FL 32790
305/645-0414

CAR SEATS

Century Products, Inc
Stow, OH 44224
MOBILITY DEVICES

Columbia Medical Manufacturing (Britax)
(formerly Childsafe)
Box 833
Pacific Palisades, CA 90272
213/454-6812

CORAM-Paris
209, rue de Saint-Maur
75010 Paris, FRANCE
205-48-46

LIC-REHAB
Svetsarvagen 4
S-17183 Solna
SWEDEN
Stockholm 98-10-60
Telex 105-28-LICS

Questor Corporation (Bobby-Mac)
1801 Commerce Drive
Piqua, OH 45356
513/773-3971

RECARO Automobile Seating System
1152 E Dominguez Street
Carson, CA 90746

STROLLERS

Adaptive Therapeutic Systems, Inc
965 Dixwell Avenue
Hamden, CT 06514

The Bobby-Mac Co., Inc
P.O. Box 209
Scarsdale, NY 10583
914/723-3442

Childsafe (Britax)
Box 833
Pacific Palisades, CA 90272

Convaid Products, Inc
P.O. Box 2731
Palos Verdes, CA 90274
213/377-0016

Credesign AB
Bergsunds Strand 31
S-11738
Stockholm, Sweden

Equipment Shop
P.O. Box 33
Bedford, MA 01730
617/275-7681

Handicapped Educ Learning Products (HELP), Inc
P.O. Box 9763
Sacramento, CA 95823
916/421-1202

LIC-REHAB
Svetsarvagen 4
S-17183 Solna
SWEDEN
Stockholm 98-10-60
Telex 105-28-LICS

MacLaren, Inc
P.O. Box 2004
New York, NY 10017
212/689-7747

Newton, USA
469 Ridge Road W
Rochester, NY 14615

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Rifton Equipment for the Handicapped
Rifton, NY 12471
914/658-3141

Theradyne Corporation - Genac/Pogon
21730 Hanover Street
Lakeville, MN 55044
612/469-4404

TRAVEL CHAIRS

CORAM-Paris
209, rue de Saint-Maur
75010 Paris, FRANCE
205-48-46

Freedom Designs, Inc
1884 Eastmar Avenue, Suite 11
Ventura, CA 93003

Handicapped Educ Learning Products (HELP), Inc
P.O. Box 9763
Sacramento, CA 95823
916/421-1202

Medical Equipment Distributors (MED)
1701 S. First Avenue
Maywood, IL 60153
312/631-2828

G.E. Miller, Inc
484 South Broadway
Yonkers, NY 10705
800/431-294

Modular Medical Co
1558 Hutchinson River Parkway, E
Bronx, NY 10461

Ortho-Kinetics
P.O. Box 436
W220 N507 Springdale
Waukesha, WI 53187

Palmco Engineering
12005 Rivera Road
Santa Fe Springs, CA 90670
213/696-5235

J.A. Preston Corp
71 Fifth Avenue
New York, NY 10003
800/221-2425
MOBILITY DEVICES

Safety Travel Chairs, Inc
147 Eady Court
Elyria, OH 44035
216/365-7593

Stainless Medical Products
9389 Dowdy Drive
San Diego, CA 92126
714/578-6920

SEATING SYSTEMS FOR TRAVEL CHAIRS

aptive Engineering Lab
J3 Russell Road
Building 2A, Unit A
Lynwood, WA 98037
206/774-7993

ERAC - Creative Rehab Equipment
513 NE, Schuyler Street
Portland, OR 97212
503/288-8179
800/547-4611

Freedom Designs
1884 Eastmar Avenue, Suite 111
Ventura, CA 93003
At the 6th Annual Conference on Rehabilitation Engineering, held in San Diego, California, in 1983, this paper was presented by Susan P. Schaezlem, OTR, and Richard N. Holt, MSc, of the Children's Hospital at Stanford Rehabilitation Engineering Center, Palo Alto, California.

These are some excerpts from the paper, which was written in January, 1983. The findings presented at the conference were essentially the same as the preliminary findings noted in the report.

"Over the past five years a number of wheelchair-based modular seating systems have been developed and marketed to provide postural control for individuals with cerebral palsy. Theories have been advanced to explain how seating systems should be configured for an individual. The characteristics and components of these seating systems have been designed to provide a means of orientation in space, providing support or exertion on the body to improve anatomical alignment and stabilization and influence muscle tone to improve seating posture. A method of comparing the relative merits between these systems has not yet been formalized.

"Side-by-Side Trial methodology was developed at the Rehabilitation Engineering Center, Children's Hospital at Stanford, as a process to evaluate functional and technical features of the four commercially available modular wheelchair seating systems and to determine 1) the specific features and components of a modular seating system which improve or decrease user function, 2) technical modifications which could be made on existing seating systems to better meet functional needs of users, and 3) necessity for the development of a new modular seating system. Using a side-by-side evaluation methodology, child subjects with the diagnosis of cerebral palsy are fitted in each of the four seating systems and perform specific functional activities. Each seating system is ranked in ability to provide postural control, effects on certain functional activities manageability by a parent, and technical characteristics.

"At this publication, 4 out of 10 subjects have participated in the Side-by-Side trials of modular wheelchair insert systems. Preliminary impressions of the four systems under evaluation are:

**Britax Seat**

"The Britax is not felt to be appropriate as a definitive wheelchair insert system for the subject population in its present form. Its size and shape were limiting factors in user function. It is best used as a car seat, as recommended by the manufacturer.

"Positive Features: The seat feels secure in the seat. Mid-line manual hand use is facilitated by blocking excessive horizontal abduction at the shoulders. The harness system secures the pelvis. It can be adjusted without too much effort.

"Negative Features: Elbows can get caught between body and side structure of seat during activities. The harness system cuts into the user's shoulders. Wheelchair wheels cannot be reached because of the side structure. Shell structure limits the user's visual field.

**Mulholland Adaptive Positioning System**

"This is an appropriate insert system for the subject population. It provided better postural control for the more severely involved subjects.

"Positive Features: Provides good postural control and has a wide range of adjustability to meet user needs. Functional activities were improved with the exception of transfers.

"Negative Features: Appearance is very contraption-like. Technical knowledge and a variety of tools are needed to assemble and adjust the system. Shoulder pads lateral trunk supports and pelvic stabilizers are not user operable, preventing independence in transfers. Attaching the assembled seat base and seat back onto the wheelchair frame is relatively difficult.

**Winnipeg Modular System**

"The system is appropriate for this subject population. It can be easily managed by parents and was favored for its appearance.

"Positive Features: Overall appearance is good. It is easily removed and inserted to wheelchair base, functional activities were improved. It provided good control for moderately involved subjects.

"Negative Features: Tools, machinery and technical knowledge are needed to assemble the system. It is not available on the commercial market in the United States.

**MPI**

"This is appropriate seating for this subject group. It provided postural control for the less involved subjects, but not quite enough for more severely involved subjects.

"Positive Features: Seat depth, back height, and seat angle adjustments are versatile. It has the appearance of a child's chair.

"Negative Features: Material is perceived as breakable and uncomfortable. Footrest and headrest hardware needed to be modified before they would fit into brackets. Independent or standing transfers were limited by the footrest component. Handles for the angle adjustment clamps broke off.
CONCLUSIONS

"The modular seating system which effectively positioned a child had a positive effect on performance of most functional activities. Components of the systems, however, can restrict user functions. Fixed footrests and abduction units which were not user operable decreased performance in transfers. The relationship between the modular seating system and its wheelchair base influenced effectiveness of the system. The relationship of the footrests to the seating system influenced mobility. Appearance was important to therapists and parents and was generally the first feature considered when assessing a system. Although manageability of a system by a parent was considered important, the parents tended to place the child's needs first. They indicated a willingness to put up with a cumbersome system if it helped improve posture and function of their child.

The Side-by-Side Trials have been a useful method of gathering comparative information about modular seating systems. The methodology developed for this project could be useful in the comparative evaluation of other seating systems and other assistive devices.

For the entire paper, see Proceedings, 6th Annual Conference on Rehabilitation Engineering, San Diego, 1983.

or contact the authors at

Children's Hospital at Stanford, Rehabilitation Engineering Center, 520 Willow Road, Palo Alto, CA 94304. 415/327-4800, x 345

More information on guidelines for evaluating the usefulness of mobility devices can be found in the section on Wheelchair Mobility Device Evaluation Guide."
SOME PUBLICATIONS ON POSTURAL SEATING AND POSITIONING

**Functional Aids for the Multiply Handicapped**

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**Handling the Young Cerebral Palsied Child at Home**

**Positioning the Client with Central Nervous System Deficits; Wheelchair and Other Adaptive Equipment**
A. F. Bergen and C. Colangelo. Valhalla Rehabilitation Products Publications, Ltd., P.O. Box 195, Valhalla, NY 10595. 1982. 191 pages. This manual is a guide for prescribing positioning devices which will allow maximum function with minimal pathology for the person who has abnormal muscle tone due to CNS dysfunction. It presents guidelines and principles for evaluation, problem solving, and constructing or ordering equipment.

---

"The text initially concentrates on the sitting posture -- adjusting the client's position to prevent deformity and to improve his or her capacity to work, learn, and recreate. The section on sitting also explains how to best achieve that goal when ordering commercially available wheelchairs. Wheelchair features are explained in a specific sequence to assist the reader in problem solving in an orderly, logical fashion. A sample prescription blank is provided for use when ordering traditional wheelchairs.

"Since human achievement is often related to eye-hand function, problem solving for head and upper extremity positioning is dealt with at length. A separate section on lapboards includes a discussion on when they should be provided, how to measure, and what materials might be used, in relation to specific client problems.

"The last section of the text includes alternate positioning devices (such as for prone, sideline standing and mobility). Many items are from Selected Equipment for Pediatric Rehabilitation, and are described in a problem/solution format using photographs and construction suggestions. New pieces have been added and old ones updated.

"The text includes over 400 illustrations and photographs, a list of addresses for further information, and a bibliography."

**Positioning the Handicapped Child for Function: A Guide to Evaluate and Prescribe Equipment for the Child with Central Nervous System Dysfunction**
Diane E. Ward, M.Ed., OTR. 316 Carmel Drive, St. Louis, MO 63119. March, 1983. 115 pages. $20.00. This manual discusses the current and popular practices used in positioning the severely handicapped child. In addition, it presents a systematic approach to evaluating posture from a posture-mobility context. It analyzes the variables of posture that observably affect performance.

"This manual is written for occupational and physical therapists who serve severely handicapped children, though it may also be of assistance for parents, teachers, and nurses. It intends to guide the therapist in optimizing posture so that it can best serve movement. Facilitating this interplay between posture and movement will allow the child to be more functional and to find more satisfaction through participation."

**Seating for Children with Cerebral Palsy: A Resource Manual**
Elaine Trefill, Ph.D., M.Ed., editor. The University of Tennessee Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163. 1981. 200 pages. "The manual is intended to provide guidelines and decision-making information in each of the critical aspects of the seating provision process. It is meant to supplement the UT-REC annual educational workshops, outreach presentations, as well as provide reference material and guidelines for clinicians seeking decision-making criteria. The emphasis of the manual is on the needs of the cerebral palsied child; however, many of the principles, service delivery processes, and funding considerations apply equally to other populations of non-ambulatory individuals requiring seating and mobility.

"The manual begins with an overview of both normal and abnormal child development, followed by their implications relative to therapeutic decision making. This is followed by medical considerations first, from the total perspective of the needs of the child and the family, and secondly, with specific concerns related to orthopedic management. An overview of basic biomechanical principles and their implications related to providing body positioning and support is then given. With us as background and rationale, the remaining sections focus on specific guidelines related to therapy decision making, technical options, material selection, and characteristics of a working delivery system process, concluded by an overview of the exigencies associated with securing the necessary funding. The appendices provide resource material related to existing clinical facilities, commercial sources, and published literature."
POSTURAL SEATING BIBLIOGRAPHY


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Levy, R, and Waksyv K. Handout accompanying the presentation Workshop on Seating for the Cerebral Palsied University of Tennessee Rehabilitation Engineering Center, 683 Court, Memphis, TN, 38163, January and October, 1980.


Mazzo, M J, Baer, M B. Therapeutic Positioning Equipment for the Multiply Handicapped. Patricia Burnett, OTR, 18 S. Leving Road, Rochester, NY, 14610, 144 pages. This book contains the designs and rationale for the pieces of therapeutic positioning equipment which the authors have found to be the most beneficial to their resident population. It includes the individual’s total needs and abilities in therapeutic programming recognizing and considering every aspect of normal growth and development.


Rice, A.L. "Orthotics The Specialized Wheelchair." Anne Rice, RPT, Flowers Hospital, 1249 Fifth Ave, New York, NY, 10029.


Tooms, R.E. and Hobson, D.A. Preliminary Report on Foam-in-Place Seating for the Severely Disabled. Rehabilitation Engineering Program, University of Tennessee Center for the Health

1976 TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK RESNA 1984 175


Wat, L. "Mobility Module Counteracting the Tonic Labyrinthine Reflex in a Cerebral Palsied Child."
MOBILITY DEVICES

AUDIOVISUALS

Choose Them Chairfully -- Adaptive Chairs for Handicapped Children Media Resource Center, Meyer Children's Rehabilitation Institute, University of Nebraska Medical Center, 444 South 44th Street, Omaha, NE 68131 slide/tape, color, 13 minutes 1979 Presents a variety of specially adapted chairs, ranging from those that can be purchased to those that are easily adapted from other household chairs or ordinary building materials. Although the chairs discussed are best suited for children with cerebral palsy, many can accommodate children with any neuromuscular or other handicapping condition.

Evaluating the Environment: A Key to Function Bergen and Colangelo Everest & Jennings, 3233 E Mission Oaks Blvd, Camarillo, CA 93010, 805/987-8911 Call your Everest & Jennings representative for a free screening at your facility. Facility screenings include information booklets.

Handling and Positioning of the Child with Central Nervous System Dysfunction Bergen, Colan, and Gottlieb Blythedale Children's Hospital, Valhalla, NY Slide/tape 1977


Positioning and Adaptive Equipment with CNS Deficit Educational Media, Blythedale Children's Hospital, Valhalla, NY 10595 Slide/cassette 1976


Special Magic Equipment for Handicapped Children University of Tennessee Rehabilitation Engineering Program, 682 Court, Memphis, TN 38163 Rental $25.00

Wheels University of Kansas, Bureau of Child Research Available from University of Kansas, Film Rental Service 745 Massachusetts Street, Lawrence KS 66044 16 mm, color, 13 minutes 1974 Demonstrates how the wheelchair modification team, working with a physician reconstructs and modifies standard wheelchairs to meet the needs of multiply handicapped children. The chair serves as transportation and has prosthetic and therapeutic purposes.
INTRODUCTION

"One of life's activities often affected by motor or sensory impairment is the ability to operate a motor vehicle. Due to the resulting lack of mobility, persons with disabilities are often deprived of meaningful vocational opportunities, participation in community and cultural events, and recreational activities. Being able to drive offers the homebound person independence and greater self-sufficiency. However, if these potential drivers are to operate their vehicles safely, not only is adequate equipment necessary but also proper training.

"Much attention is now focused on mass transit for handicapped persons and on various para-transit and taxi transportation schemes. However, these alternatives only partially meet the transportation needs of disabled people. In addition, they need a convenient and economical means of getting to work and performing the many functions associated with daily living. A practical solution is to have many of these disabled persons operate motor vehicles independently.

"Some of the difficulty encountered by disabled drivers can be overcome by providing information on opportunities already available. For example:
- Selecting the type of vehicle most appropriate for their functioning capabilities,
- Purchasing the most appropriate options and adaptive devices,
- Arranging for installation of special devices,
- Locating training facilities,
- Evaluating driving tasks,
- Employing appropriate operating procedures,
- Assuring proper maintenance of equipment, particularly adaptive equipment, and
- Taking precautions against problems encountered outside the car."

HINTS ON OPERATING A SUCCESSFUL DRIVER EDUCATION PROGRAM

In general, the driver educational program for the physically disabled student follows the same steps and procedures as the one for the able bodied student. However, equipment and methodology must be tailored to the student's functional capabilities.

Be patient; let the students do things for themselves in a safe and confidence-building environment. They must become independent.

Try to know as much about the students and their functional capabilities as possible.

Be consistent -- keep your commands simple and consistent throughout the training period.

Keep in mind, to handicapped students driving is not a luxury, it is often a necessity.

Do not assume students can do something because others with similar disabilities can. Each student is an individual.

You, as the instructor, must be fully acquainted with and able to operate all the assistive devices. It will make you a better teacher.

Always check all assistive devices before you begin a lesson.

Learn how to handle a wheelchair.

Be firm -- disablel students must be able to control the vehicle with the same efficiency and safety as able-bodied students.

Try not to recommend more assistive devices than necessary.

Encourage the students to be totally independent -- they must do everything without your help.

Ask the students for their recommendations and comments -- after all, they are doing the driving.

Try to be available when your students purchase cars. Make suggestions and recommendations based on their capabilities and needs.

Know all about the different disabilities you will encounter and the functional limitations they impose. Apply the knowledge in relation to the driving task.

Good Luck -- you've entered a very important and rewarding career. Remember, "mobility is the final step in total rehabilitation of the disabled individual." You have opened a whole new world to your students by providing them with mobility.
What is ADED?
ADED is an association of professionals interested in driver education for disabled people, professionals who want to stay current in a rapidly changing field, people who get involved.

Who benefits from ADED membership?
ADED members represent a cross-section of professionals from various parts of our country. Some of the groups interested in and directly affected by ADED members' activities include:

- Medical community
- Rehabilitation community
- Educational community
  - local and national
  - high school and college
  - guidance counselors, special educators, driver educators, administrators
- Engineers
- Equipment designers, manufacturers, and vendors
- Government agencies
  - Vocational rehabilitation personnel
  - Motor vehicle licensing personnel
  - Legislators
- Enforcement agencies
- Insurance industry
- Individuals, companies, and associations with an interest in SAFETY
- General population

What are the advantages of ADED membership?
Basically, ADED offers an opportunity for professional growth by:

1. Facilitating an exchange of ideas between members
   a. Sharing research and innovations in adaptive equipment
   b. Sharing methods of evaluation
   c. Sharing teaching techniques
2. Publishing "The ADED Newsletter"
3. Referring resource people to present workshops or courses on disabled driver education and related subjects
4. Maintaining a library for members' use
5. Sharing a common interest and therefore an opportunity for unique professional friendships
6. Surveying the membership to provide information on program development, program improvement, and national trends
7. Holding a yearly conference

The benefits of the association are many and the cost is small so you are invited to join ADED by filling out and sending in the attached membership application along with your dues of only $25.00.
**DRIVING SKILLS EVALUATION**

<table>
<thead>
<tr>
<th>Area of Discussion</th>
<th>I Residential area</th>
<th>II Light Traffic</th>
<th>III Heavy Traffic</th>
<th>IV Advanced Driving</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A Entering &amp; exiting the vehicle</td>
<td>B Lane changing</td>
<td>C Defensive driving</td>
<td>D Adverse weather driving</td>
</tr>
<tr>
<td></td>
<td>B Miscellaneous controls operation</td>
<td>C Mountain driving</td>
<td>D Speed control</td>
<td>E Night driving</td>
</tr>
<tr>
<td></td>
<td>C Physical limitations</td>
<td>D Emergency situations</td>
<td>E Perceptual skills</td>
<td>F Insurance requirements</td>
</tr>
<tr>
<td></td>
<td>D Attitude</td>
<td>F Road traffic</td>
<td>G Defensive driving</td>
<td>H Licensing requirements</td>
</tr>
<tr>
<td></td>
<td>E Perceptual skills</td>
<td>G Equipment operation</td>
<td>H Parking</td>
<td>I Vehicle maintenance</td>
</tr>
<tr>
<td></td>
<td>F Equipment operation</td>
<td></td>
<td>I Stopping</td>
<td>J Mechanics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>K Other</td>
</tr>
</tbody>
</table>

**TRAINING RECOMMENDATION:**

- **Independent driving without adaptive equipment:** Proceed to licensing.
- **Independent driving with required adaptive equipment:** Refer to training program.
- **Further evaluation necessary:** Time suggestion. Reason.
- **Further evaluation necessary:** Further evaluation necessary. Reason.

**GENERAL COMMENTS:**

**EQUIPMENT RECOMMENDATION**

Driving a car for attached sheet:

**Driving a car:**

A. Vehicle limitations:
- [ ] None
- [ ] Power steering and/or power brakes and automatic transmission
- [ ] Air bags
- [ ] Other

B. Hand controls:
- [ ] Left side mirror
- [ ] Left side mirrors
- [ ] Wheelchair style (both hands on hand control and全是 wheel)
- [ ] Other

C. Safety features:
- [ ] Park brake extension
- [ ] Right hand lever for balance
- [ ] Left hand lever for balance
- [ ] Other

D. Other equipment:
- [ ] Other equipment
- [ ] Left foot gas pedal
- [ ] Right hand turn signal lever
- [ ] Other

**Note:**

- No change
- Left
- Right
- Both
- Other
Limited Evaluation

Name: ______________________________ ______________________________
Address: ______________________________ ______________________________

Referred By: ______________________________

Evaluation Limitation: ______________________________
Stationary parking lot limited time other

Reports to: Student: ______________________________
Referring agent: ______________________________
Funding source: ______________________________
Other: ______________________________

DRIVING EVALUATION PROCEDURE:

EVALUATION RECOMMENDATION:
Proceed to licensing
Independent driving without adaptive equipment
Independent driving with required adaptive equipment
(see equipment recommendations)
Further evaluation necessary
Reason

Time suggestion

EQUIPMENT RECOMMENDATION
Driving a van (see attached sheet)
Driving a car

A Vehicle limitations
1 None
2 Power steering, power brakes, automatic transmission, 2-door, air conditioning
3 Other

B Hand controls
1 Right side mount
2 Left side mount
3 Paraplegic style (with horn button, and dimmer switch)
4 Quadriplegic style (with horn button, dimmer button, and arm rest)

C Steering device
1 None
2 Steering knob
3 Trip
4 Position notation
5 Other

D Safety features
1 Park brake extension
2 Upper body belt for balance
3 CB radio
4 Right and left outside mirrors
5 Other

E Other accessories
1 Left foot gas pedal
2 Left hand shift lever extension
3 Right hand turn signal lever
4 Headlight dimmer switch
5 Horn button
6 6-way power seat
7 Other

Driving restrictions recommendations Explain
Terminate from driving program Reason

Date(s) ______________________________
Total Evaluation Time ______________________________
Evaluator: ______________________________

Paperwork, Pre-Driving information sheet ______________________________
Prescription ______________________________
Contract ______________________________
Evaluation Completed ______________________________
Billing ______________________________
# Pre-Driving Evaluation

**Name**

**Date of Birth**

**State**

**License/Permit #**

**Evaluation Date**

**Refered by**

**Date of Birth**

**Age**

**Restrictions**

**Disability Caused by**

**Pre-Onset Disability**

**Pre-Onset Dominance**

**Past Driving Experience**

**Present Driving Experience**

**Driver Education Plan**

**Pre-Onset Driving Record**

**Need for Driving**

**MOTOR STATUS**

**Upper extremity function**

F Reflex patterns

- present
- absent

Comments (how affects function)

**Lower extremity function**

F Reflex patterns

- present
- absent

Comments (how affects function)

**Coordination**

- normal
- slowed
- tremors
- spastics

Comments (how affects function)

**Reaction time**

- normal
- slowed

Comments (how affects function)

**Balance**

- normal
- decreased

Comments (how affects function)

**Equipment indicator**

- independent
- requires assistance

Comments (how affects function)

**Mobility**

- transfers
- independent

Comments (how affects function)

**Electronic Devices**

- independent

Comments (how affects function)

**Overall Assessment**

- independent

Comments (how affects function)

**Equipment indicator**

- independent

Comments (how affects function)

**MOTOR STATUS**

**Upper extremity function**

A. Muscle picture

- bilateral function
- unilateral function
- right
- left

Comments (how affects function)

B. Strength

- right
- left

Functional limitations

- shoulder
- elbow
- wrist
- hand

Comments (how affects function)

C. Range of motion

- right
- left

Functional limitations

- shoulder
- elbow
- wrist
- hand

Comments (how affects function)

D. Sensory

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

E. Tactile

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

F. Temperature

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

G. Vibration

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

**Lower extremity function**

A. Muscle picture

- bilateral function
- unilateral function
- right
- left

Comments (how affects function)

B. Strength

- right
- left

Functional limitations

- knee
- ankle

Comments (how affects function)

C. Range of motion

- right
- left

Functional limitations

- knee
- ankle

Comments (how affects function)

D. Sensory

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

E. Tactile

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

F. Temperature

- right
- left

Functional limitations

- right
- left

Comments (how affects function)

G. Vibration

- right
- left

Functional limitations

- right
- left

Comments (how affects function)
MOBILITY DEVICES

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Colorado Driving School
P.O. BOX 393
Englewood, Colorado 80151

EQUIPMENT RECOMMENDATIONS
Driving A Van

Name
Date
Evaluator:

Original Vehicle Equipment: Power steering, power brakes, automatic transmission, air conditioning, large outside mirrors, ¾ ton, heavy duty cooling, heavy duty alternator

Vehicle Modifications:

A Hand controls
   1 Right side mount
   2 Left side mount
   3 Paraplegic style (with horn button and dimmer switch)
   4 Quadriplegic style (with wrist rest, horn button and dimmer switch)
   5 Lever type (push-pull)
   6 Brake bracket to mount the hand controls
   7 Other.

B Steering device
   1 Steering knob
   2 T-n-pin
   3 Position notation
   4 Other

C Fully automatic lift
   1 Door actuators
   2 Outside access door for switches
   3 Position notation
   4 Other

D Vehicle body modifications
   1 Raised roof (17” or 24”)
   2 Raised doors (57”)
   3 Vehicle body stabilizers
   4 Heavy duty suspension
   5 Smooth floor
   6 Other

E Steering wheel modifications
   1 Extended steering column length notation
   2 Tilting/telescoping steering
   3 Steering wheel size variance explanation
   4 Sensitized steering
   5 Other

F Steering wheel access modifications
   1 Swivel-base driver’s seat
   2 Power seat base for driver’s seat
   3 Floor channels
      a. 2” standard
      b. 5” electric
   4 Elevator floor
   5 Quick release alternate driver’s seat
   6 Other

G Control modifications
   1 Relocate ignition switch
   2 Transmission selector extension
   3 Turn signal extension
   4 Dash mounted control extensions
      Special notations.
   5 Power windows
   6 Power door lock
   7 Elbow turn signal, horn, and wiper controls
   8 Control console
   9 Electric emergency brake
   10 Emergency brake switch
   11 Other:

H Safety features
   1 Upper body belt for balance
      a. To wheelchair
      b. Shoulder belts-underarm support
   2 Electric lock down for driver’s wheelchair
   3 Manual lock down for passenger’s wheelchair
   4 Dual battery system
   5 CB radio
   6 Orthotic device explanation
   7 Other.
CAR SELECTION AND PURCHASE

General Requirements

The automobile to be utilized by the disabled driver may include all or some of the following factory equipment in addition to the hand controls and assistive devices that must be installed to compensate for functional limitations:

1) 8 Cylinder Car – to accommodate all the power devices
2) 2-Door Sedan – to permit easier entry of wheelchair to car
3) Automatic Transmission – to reduce vehicle operation efforts
4) Power Steering – to facilitate one-hand steering for individuals with upper extremity weakness
5) Power Brakes – to facilitate braking by use of hand controls for individuals with limited ranges of motion and/or concurrent weakness
6) Power Windows – to permit individuals who lack hand and wrist dexterity to pay tolls, ask directions, etc.
7) 6-way Power Seat – to aid in transfer and seating position adjustments, as well as to compensate for some functional limitations
8) Air Conditioning – to assist individuals with low respiratory levels and those who have skin problems
9) Bench Seat (Vinyl) – to allow for ease and safety while transferring
10) Tilt Steering Wheel – to facilitate steering for individuals utilizing a quad cuff and to allow for ease of transfer by the disabled individual. A telescopic steering wheel can also be helpful in certain disabilities
11) Power Door Locks – to permit the disabled individual to unlock and lock the doors independently
12) Fold-down Arm Rest – to aid in hip stability for certain disabilities
13) Inside Adjustable Side View Mirror – to enable the disabled individual to operate right and left side view mirrors. If there is an absence of a functional grip or finger dexterity, a toggle switch is recommended for ease of operation
14) CB Radio – to assist the disabled individual in case of vehicle breakdown and when there is a need for emergency assistance
15) Rear Window Defroster – mandatory on all cars since 1978
16) Cruise Control – to reduce the fatigue when driving for long distances on highways
17) Available Space – to permit transfer of the wheelchair into the back seat of the car. Available space for the wheelchair and the height of the car floor from the ground should be measured to determine if the disabled individual has sufficient strength to pull the wheelchair into the car

Car Purchase

Car purchase should be done with much attention to ensure that the disabled individual will have the functional capabilities to drive the particular car he or she wishes to buy. Items that should be investigated are cost, steering effort required, braking effort required, available space for wheelchair, height of stepwell, visibility accessibility of dashboard controls, efficiency and reliability of vehicle (as the disabled individual cannot afford a breakdown), and insurance rates.

Car purchase is extremely difficult for individuals who utilize hand controls and assistive devices because they cannot test-drive the vehicle but rather must rely on the judgment of others.

Not all the vehicle requirements mentioned are necessary for all disabled drivers. Decisions as to what is needed depend on functional limitations and capabilities. The driver educator must impress upon the disabled trainee the importance of regular car maintenance and checkups in order to minimize the chance of failure of any kind. Tires, engine, hand controls and assistive devices should be maintained in as nearly perfect conditions as possible.

After the proper vehicle has been selected, optimal assistive devices should be installed to compensate for functional limitations. They should be safe and provide the most efficient compensation for functional limitations. It is important that these assistive devices be installed so that they do not interfere with the able-bodied driver when operating the vehicle.

For names and addresses of manufacturers of adapted driving aids, contact the ABLEDATA system.
GUIDE TO THE USE OF HAND CONTROLS AND ASSISTIVE DEVICES

<table>
<thead>
<tr>
<th>Hand Controls</th>
<th>Foot Controls</th>
<th>Steering</th>
<th>Throttle</th>
<th>Brakes</th>
<th>Clutch</th>
<th>Gear Shift</th>
<th>Accelerator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete Hand Controls</td>
<td>Complete Foot Controls</td>
<td>Brakes</td>
<td>Throttle</td>
<td>Handbrakes</td>
<td>Throttle</td>
<td>Left/Right Shift</td>
<td>Accelerator</td>
</tr>
<tr>
<td>Hand Controls Extension</td>
<td>Foot Controls Extension</td>
<td>Brakes</td>
<td>Throttle</td>
<td>Handbrakes</td>
<td>Throttle</td>
<td>Left/Right Shift</td>
<td>Accelerator</td>
</tr>
</tbody>
</table>

Reprinted with permission from Hand Controls and Assistive Devices for the Physically Disabled Driver, Human Resources Center, Albertson, New York.
RESOURCES PERSONAL VEHICLES

PUBLICATIONS

Driver Education Curriculum Guide for the Physically Handicapped. Des Moines Public Schools, 1800 Grand Avenue, Des Moines, IA 50307

Driver Education for the Handicapped: A Driving Guide. Dearborn, Chicago, IL 60610

Driving for the Physically Handicapped. Proceedings of a National Symposium 1981. Education and Training Center, Rehabilitation Institute of Chicago, 345 E Superior Street, Chicago, IL 60611 $10.00

"Driving Systems for Independent Mobility." ADL, Inc., 6 Hurley Court, Rockville, Maryland 20850 Attn: Elise Brown $25.00

Evaluating Driving Potential of Persons with Physical Disabilities. Menahem Less, Edward C. Colver, Gerald E. DeMauro, and Judy Young. Human Resources Center, Albertson, New York 11507. 1978. 36 pages. Evaluation of potential must be the starting point in any driver education program designed for the physically disabled. The program must be adapted to the needs of each student. This manual brings together assessment expertise in the areas of driver education and muscle testing. It presents contributions of experts and resources in both these fields as well as the experiences of the Human Resources Center adaptive driver education program. Particular attention is given to those muscle movements that are most directly involved in driving.

The evaluation process, which is described here, is divided into two main areas: functional and in-car. Both are concerned with strength, range of motion, coordination, reach, and speed and reaction time of those muscles involved in driving. The functional test is an in-depth evaluation of the general performance of the muscles while the in-car evaluation assesses muscle performance specific to driving. The use of these tests provides the basis for determining whether the disabled individual can drive and for recommending assistive devices.


The Handicapped Driver's Mobility Guide, 3rd edition. Traffic Engineering and Safety Department, American Automobile Association, Falls Church, VA 22047. 1981. 75 p. Contact your local AAA club regarding the availability of this publication. Information on equipment, selection, training, and a national license plate—blue curb law survey contains a 54 page state by state annotated list of organizations providing services such as driver training, evaluation, and van modification.

A Manual on the Driver Training Programme for the Physically Handicapped: Driver Training, Evaluation, Van Modification. Driving the Handicapped Driver's Mobility Guide. 3rd edition. Traffic Engineering and Safety Department, American Automobile Association, Falls Church, VA 22047. 1981. 75 p. Contact your local AAA club regarding the availability of this publication. Information on equipment, selection, training, and a national license plate—blue curb law survey contains a 54 page state by state annotated list of organizations providing services such as driver training, evaluation, and van modification.


Preliminary Testing of Techniques to Improve Driving Performance of Persons with Brain Damage via Perceptual/Cognitive Training. Lisa V. Olson, Henson University of Michigan, Rehab Engineering Center, Highway Safety Research Institute, Ann Arbor, Michigan 48109

Teaching Driver Education to the Disabled. Teaching Driver Education to the Hearing Impaired.
MOBILITY DEVICES

Memphis City School, 2687 Avery, Memphis, TN 38112

Teaching Driver Education to the Physically Disabled
Menahem Less et al. Human Resources Center, Albertson, NY 11507 1978 64 pages
$5.00. The driver education instructor will find in this manual the information necessary to provide an efficient driver training program for physically disabled students. The adapted teaching methodology presented here provides detailed information on special driving techniques for the disabled, including the use of driving aids in training, functions of hand controls and assistive devices, transfer methods, use of simulators, use of vans, and preparation for the road test.

Teaching the Handicapped to Drive - Resource Manual
Marvin Mills, principal author, editor
Murray State University Printing Services, Murray, Kentucky 1980

Teacher's Preparation Course in Driver Education for the Physically Disabled
A Sample Course Edward Colverd, et al. Human Resources Center, Albertson, New York 1978 40 pp. $4.25 This is a course outline for teaching driver educators the art of teaching adapted driver education. It presents le- on plans to provide guidelines and suggests a general sequence of progress for the knowledgeable instructor.

The manual also includes listings of available training films, manufacturers of hand and foot controls and assistive devices, companies that specialize in van modifications, as well as a bibliography, a sample final examination, and a course evaluation form.

SELECTED ARTICLES

Andrews, Paul, Erickson, John, Vision Beyond Compare, Paraplegic News—November 1979

Bardach, Joan, Ph.D., Psychological Factors in the Handicapped Driver, Archives of Phys Med & Rehab Vol 52 July 1971

Clack, T.D., Olsen, D.J., The Hearing Handicapped in Automobile Operations, Tresag Hearing Institute, University of Michigan Medical School, Ann Arbor, Michigan 48109


Handicapped Drivers Education and Training American Rehabilitation, Jan/Feb 1982

Jacobs, Stanley, M.D., Reporting the Handicapped Driver, Archives of Phys Med & Rehab Vol 59 August 1978


Kopas, Rodger, M.A., McDermott, Make, Jr., Ph.D., Handicapped Driver Controls Operability - A Device

for Clinical Evaluation of Patients, Archives of Phys Med & Rehab Vol 59 May 1978


Negr, Barry, Iribon, Richard, Ph.D., Accidents Involving Handicapped Drivers, Rehab Literature May - June 1979 Vol 40


Zider, Steven, J., Gold, Marc W., Behind the Wheel Training for Individuals Labeled Moderately Retarded, Exceptional Children’ May 1981

NEWSLETTERS

ADED Newsletter
Carmello Strano, Editor
Moss Rehabilitation Hospital Transportation Center
12th Street and Tabor Road
Philadelphia, PA 19141
Official publication of the Association of Educators for the Disabled. Published quarterly and distributed to ADED members.

Driver Education Digest
Virginia Anderson, Staff Editor
P.O. Box 5038
Southfield, MI 48037
Publication of the Chevrolet Motor Division

AUDIOVISUALS

“On Par,” 28 minute color film/video describing the Driver Education Program. Available from Coordinator, Driver Education Programme, Rehabilitation Medicine, Glenrose Hospital, 10220 111th Avenue, Edmonton, Alberta T5G 0B7, Canada

“Driver Education for the Handicapped,” 21 minutes “Vehicle Selection for the Disabled Driver” Available from Supervisor of Physical Education, Health and Safety, Des Moines Public Schools, 1800 Grand Ave, Des Moines, IA 50307

Special Equipment for Handicapped Drivers”, 21 minutes “Vehicle Selection for the Disabled Driver”. Available from Supervisor of Physical Education, Health and Safety, Des Moines Public Schools, 1800 Grand Ave, Des Moines, IA 50307
MOBILITY DEVICES

“Right of Way” 25 minutes Available from Margaret Young, O.C.C.C., Toronto, Canada, also Canadian Filmmakers Distribution Centre, 144 Front Street W, Toronto, Ontario M5J 2L7, (416) 593-1808 (rental or purchase), and COE Film Associates, 55 E 96th Street, New York, NY 10028, (212) 831-5355

“Physically Disabled Drivers”: Part I “Assistive Devices (28 30 minutes, 3/4” video), Part II “Applicants” (30 15 minutes). Available from Mr. Michael Bloom, A/V Department, New York University Medical Center, 550 1st Avenue, New York, NY 10016, (212) 340-5449, and Mr. Bernie Macklin, Sales Department, Movielab Incorp, 619 W 54th Street, New York, NY 10019. Training films produced for New York State Motor Vehicle License Inspectors, by NYU Medical Center.

RESEARCH

NIHR-funded research in this area is being done by

Louisiana Tech University
P.O. Box 10348
Ruston, LA 71272
318/257-4562
Duane F. Bruley, Ph.D., director
Core area: Transportation of the handicapped -- personal licensed vehicles

The Emergency Reaction Driver Training Program (ERD), taught at Liberty Mutual Research Center in Hopkinton, Massachusetts, has trained licensed drivers in improvement of skills necessary to handle typical highway emergency situations for a number of years. The center conducted a pilot program to investigate the feasibility of improving, through instruction and practice, the capability of physically handicapped licensed drivers to handle emergency driving situations. The center offered 2-day classes in 1982. Eleven physically disabled drivers took part in the pilot program and each driver felt he benefited from the training and recommended that ERD training be included as part of rehabilitation training.

For organizations that provide driver evaluation and training, see The Handicapped Driver’s Mobility Guide or contact ADE.

For more information, contact

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For organizations that provide driver evaluation and training, see The Handicapped Driver’s Mobility Guide or contact ADE.
Control, Communication and Sensory Aids
“Access to the present day world of technological aids to mobility, communication, environmental control and computer use for people with physical limitations is frequently dependent upon a rather commonplace device—the switch. One or more switches are used to create controls. A control is defined as ‘a mechanism used to regulate or guide the operations of a machine, apparatus, or system,’ and, more philosophically, as ‘power or authority to guide or manage’ (Webster’s New Collegiate Dictionary, 1973) ‘The most wondrous device or the simplest toy will be useless or underused if the user cannot make it work’

from the introduction to A Guide to Controls Selection, Mounting, Applications

A Guide to Controls Selection, Mounting, Applications has been compiled to help users select and locate the most useful switches and controls for operating assistive devices. Included in the guide are illustrations and descriptions of the most frequently used commercially available controls, information on matching controls to devices and users, examples of methods used to effectively mount and stabilize controls, and applications of systems with controls in use.

The resource section refers users to manufacturers, research organizations, service/assessment centers and selection publications concerning controls, and directs users to information on controls not included in the guide. References are included on communication aids, using devices in the classroom, microcomputer applications, funding sources and do-it-yourself projects.

Rehabilitation Engineering Center, Children’s Hospital at Stanford, December 1982. Available from RESNA, Suite 402, 4405 East-West Highway, Bethesda, MD 20814, 301/657-4142 $15.00

Selecting a Control

People use controls such as steering wheels, knobs, levers, pushbuttons and toggle switches to interact with systems. Controls usually enable a user to make a change in the system, and are often used with displays. A system is a machine designed to carry out a purpose, such as communicating with a telephone and/or speech synthesizer, getting around in an automobile and/or wheelchair, or controlling the environment by turning on lights and opening doors.

The controls which a person is able to use must be determined before making decisions regarding the selection of assistive devices. A systematic approach can be used to select an appropriate control that can be used by an individual to interact with a device. There are three major steps in selection of a control: (1) control site selection, (2) control selection and (3) comparative testing of the control site/control combination.

The chart on the next page summarizes control approaches.

Service Centers

For a list of agencies that can provide assessment and other services in the area of communication and control, see the list in the Communication section.
**CONTROLLER CHARACTERISTICS**

The following table summarizes what might be expected for various controller approaches. All but the last two entries are for proportional controllers. Any controller type can be implemented as a four switch solution, but one should expect a reduction in rate of maneuverability.

<table>
<thead>
<tr>
<th>Type</th>
<th>Control Scheme</th>
<th>Potential Effectiveness of Control</th>
<th>Special Requirements</th>
<th>Major Advantages</th>
<th>Major Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIN (normal mystic-Id)</td>
<td>push in corresponding directions</td>
<td>good, Proportional</td>
<td>large range of motion of head needed</td>
<td>can be attached to wheelchair mast frame</td>
<td>large and bulky, range of motion appearance interference with face oriented tasks</td>
</tr>
<tr>
<td>CHIN (short throw)</td>
<td>push in corresponding directions</td>
<td>good, Proportional</td>
<td>worn as collar which should be fitted</td>
<td>requires very small range of motion, not tiring</td>
<td>cosmetics, might interfere with face oriented tasks</td>
</tr>
<tr>
<td>HEAD REST CONTROL</td>
<td>see opposite page</td>
<td>good, Proportional</td>
<td>control for reverse is not continuous (extra switch)</td>
<td>good appearance slight interference with face oriented moves</td>
<td>during control phases the head rest is not a resting place</td>
</tr>
<tr>
<td>JOYSTICK</td>
<td>push in corresponding directions</td>
<td>good, Proportional</td>
<td>&quot;functional&quot; head or arm</td>
<td>good appearance</td>
<td>requires some remaining arm/hand function</td>
</tr>
<tr>
<td>ARM/ELBOW</td>
<td>arm for back = velocity, elbow in/out = turn</td>
<td>fair to good, Proportional</td>
<td>reasonably strong movements needed</td>
<td>good appearance</td>
<td>arm movements must be able to reach arm and other inertial inputs</td>
</tr>
<tr>
<td>HEAD CONTROL</td>
<td>push in corresponding direction</td>
<td>fair to good, proportional</td>
<td>must maintain head position</td>
<td>inertially induced movements of head can interfere</td>
<td></td>
</tr>
<tr>
<td>SHOULDER POSITION</td>
<td>elev/depress = velocity, protect/retract = turn</td>
<td>good, Proportional</td>
<td>adhesive or harness for attachment to chest and shoulder</td>
<td>worn under clothing, little interference, extremely cosmetic</td>
<td>may involve extensive training requirements, allergic reaction to adhesives, mounting requirements.</td>
</tr>
<tr>
<td>FOOT/LEG KNEE/</td>
<td>many possible configurations</td>
<td>fair to good Proportional</td>
<td>accommodation of entrance and exit from wheelchair</td>
<td>in CP, may be whites available</td>
<td>potential interference whenever leg hits anything</td>
</tr>
<tr>
<td>PNEUMATIC (infl/def)</td>
<td>hard puff/up = slow, time = speed, soft puff/up = turn rate</td>
<td>slow to med maneuvering, good straightaways</td>
<td>p. +/ breathing capabilities</td>
<td>good appearance — may be among the few possible solutions</td>
<td>does not provide continuous proportional control, save</td>
</tr>
<tr>
<td>SWITCH SOLUTIONS</td>
<td>e1 lev = low, e2 lev = right, e3 lev = left, e4 lev = left</td>
<td>slow and hard to maneuver, awkward on straightaways</td>
<td>can be least demanding solution for the operator</td>
<td>most tolerant to severe disability</td>
<td>difficult to maneuver</td>
</tr>
</tbody>
</table>
GUIDELINES FOR SWITCHES

"Switch Rules and Considerations for Communicator Use" in Communication Outlook, Volume 5, No. 3, Winter 1984, page 7, was written by William F Tracy and Debra Bevans, of the Department of Psychology, Clover Bottom Developmental Center, 275 Stewarts Ferry Pike, Nashville, Tennessee 37214. This article is applicable for people putting switches on devices for severely motor impaired persons. Besides listing the 10 factors (see below) which should be considered, they also explain some safety procedures to be followed.

1) Any switch must be safe for the user

2) The switch must be operated with a minimum of user effort and maximum user comfort

3) The switch must be reliable

4) Switches must be minimally noticeable and, if possible, cosmetically pleasing

5) If possible, the switch should move with the user, who must be able to activate the switch without the need to "find" it

6) Switches must permit disassembly for cleaning and maintenance

7) Switches should use standard components which are readily available and replaceable whenever possible

8) The switch should be the simplest to serve its purpose -- do not overdesign

9) The switch must be sturdy

10) All switches should be duplicable and duplicated

SOME GUIDELINES FOR GOOD INTERFACES

These guidelines for mass market products appeared in the April 1980 issue of High Technology magazine. They can and perhaps should be used by people working with technology for special needs, too. (Editor)

1) The device should provide what the user wants, needs, and expects. If it requires the user to adapt (and every product will do this to some extent), the initial changes should be as small as possible, and in a direction that the user will perceive in advance as positive.

2) The user -- not the product -- should be in command. Users should never feel that the product is arbitrarily dictating how they must interact with it, but should feel that the product is adapting to their individual requirements.

3) The user should feel confident in the product -- its usefulness and reliability -- right from the start. The new user should view the product as friendly and helpful, and a sophisticated user should be able to operate it without unnecessary constraint. As the user progresses, he should be able to speed up his interaction, increasingly viewing the device as an extension of himself.

4) The product should provide unambiguous feedback to the user. Alternatives should be clearly spelled out and easy to execute.

5) Ideally, the product should require no instruction manual. The user should feel that he and the product are a self-sufficient whole. If some guidance must be provided, the simpler the better.
CONTROL, COMMUNICATION AND SENSORY AIDS

INTERNATIONAL STANDARDIZED INTERCONNECTION PROJECT

There has been a very rapid increase in electronic communication and control aids for individuals having severe and multiple physical disabilities within the last few years. A large variety of different aids, interfaces, and accessories has been developed to meet the very diverse needs and capabilities of the different disabled individuals. As might be expected, nearly every researcher and manufacturer chose a slightly different connector, pin-out, voltage convention, or format for their aids, interfaces, and accessories. The restrictions brought on by incompatibility of different systems has created severe (and unnecessary) problems. The end result can be that the handicapped individual is fitted with an aid, interface, and accessories which do not adequately meet his/her needs.

A group of manufacturers, clinicians, and researchers are working on the development of a set of proposed compatibility standards for electrical communication aid devices for conversation, writing, and computer access. Developing a common format will allow easier identification of interfaces, aids, and accessories which can work together, and will ensure that such aids can, in fact, be connected. The objectives of the project are:

1. To develop common technical formats for aids and interfaces. This includes factors related to voltage, writing, etc.
2. The designation of an agreed-upon common connector's naming or labeling format which will enable non-technical people to mix and match aids, interfaces, and accessories which are electronically and mechanically compatible to meet the needs of the handicapped individual.
3. To develop a simple, straightforward format for their aids, interfaces, and accessories which can work together, and will ensure that such aids can, in fact, be connected. This objectives of the project are:

- The SET Compatibility Standard (SET) is meant to cover the connection between simple electrical transducer (switches, potentiometers, and rheostats) and communication aid devices such as EMG transducers that can be used with the SET Compatibility Standard if they emulate one of the set standards.

SET Serial Conversion Compatibility Standard (SETSC)

The SETSC Compatibility Standard proposal allows information from switches and pots to be transmitted on a single RS-232C serial channel simultaneously. This standard is also used for sending position information from long range light pens, and other devices that send X and Y coordinates.

Input Selection Array Compatibility Standard (ISA)

The ISA Compatibility Standard is meant to cover separate Input Selection Array devices that can be plugged into a communication aid or computer. These include touch panels, special keyboards (keyboards that are meant for one-at-a-time selection by location), scanning panels that can output discrete selection after interacting with the user through a simple switch, and other devices that allow the user to make a single selection at a time from a displayed array of selections.

Keyboard Emulator Input Compatibility Standard (KEI)

The KEI Compatibility Standard proposal is meant to cover the connection between a communication aid and the keyboard emulator for a computer running standard software. Keyboard emulators are devices designed to accept electronic data input and to introduce data into a computer running standard software in such a way that it is indistinguishable from data input on the keyboard. The form of the data input to the keyboard emulator is therefore not standardized.

Keyboard Emulator Input Morse Code Compatibility Standard (KEIMC)

The KEIMC Compatibility Standard is a superset of international Morse code. Using a three-state sequential code, it will produce the complete ASCII character set, common non-ASCII keys such as arrow keys, and the special KEI functions such as "HOLD" for emulating key combinations.

Subsystem Bidirectional Communication Compatibility Standard (SBC)

The SBC Compatibility Standard is meant to cover bidirectional communications between communication aid subsystems such as a portable main processor, input display, output display, printer, voice output subsystem, environmental controller, modem, and wheelchair controller.

The International Standard Interconnection Project began with finding by the National Science Foundation, and is currently being supported by the National Institute of Handicapped Research. For more information about the current status of the project, please contact RESNA 1984.

RESNA 1984

TECHNOLOGY FOR INDEPENDENT LIVING SOURCEBOOK

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SELECTED PUBLICATIONS RELATED TO CONTROLS AND ASSESSMENT


A Comparative Study of Control and Display Design Principles Which Affect Efficient Use of Communication Aids by the Severely Disabled. Final Report, Rehabilitation Engineering Center, Children's Hospital at Stanford, 520 Willow Road, Palo Alto, CA 94304


Enhancing the Educational Potential of Non-Oral Children Through Matching Communication Device Capabilities to Children's Needs. Final Report submitted to Department of Education for Field Initiated Research Project: Colette L Coleman, PhD, Albert M. Fink, PhD, and Lawrence Meyers, PhD. Grant #G00-2261. CFDA #13,443c, 1982


Guide to Controls Selection, Mounting Applications Rehabilitation Engineering Center. Children's Hospital at Stanford, 520 Willow Road. Palo Alto, CA 94304. $10.00 prepaid

"Human-Controlled Electric Wheelchair," by J H Aylor, B W Johnson, R L Ramsey, and C T Swanson. Medical and Biological Engineering and Computer Journal. 17 6, 776-778, Nov 1979


Some Manufacturers and Distributors of Controls

Abbey Medical
Catalog Sales
13782 Crenshaw Blvd
Garden, CA 90249
(800) 421-5126 - national
(800) 262-1294 - California
Distributes some controls for communication aids, environmental control and mobility systems. Durable medical goods, therapy equipment.

Allied Business Machines
9281 Earl Street
La Mesa, CA 92041
(714) 461-6361
Distributes control switches and telephone devices.

Arizona State Division of Developmental Disabilities
Adaptive Aids Program
P.O. Box 13178
Tucson, AZ 85732
(602) 745-5588
Has available therapist-developed, client-manufactured switches and systems for cognition and motor training, communication and environmental control.

Basic Telecommunications Corporation
4414 E Harmony Road
Ft Collins, CO 80525
(303) 226-4688
Designs, manufactures and/or distributes technical aids, with emphasis on environmental control, telephone and telecommunications, bed control, and switch interface equipment. Will do private label manufacturing.

BSR
Route 303
Blauvelt, NY 10913
(914) 358-6060
Manufacture control switches for use with their environmental control systems.

Linda L. Burkhart
8315 Potomac Avenue
College Park, MD 20740
Designs and manufactures switches and adaptations for controls of toys, provides how-to books for toy adaptation.

Computers for the Physically Handicapped
7602 Talbert Ave., Unit 4
Huntington Beach, CA 92647
(714) 848-1122
Design, manufacture, and distribute controls for access to computers, environmental control, and communication systems.

Contemporary Artistic Tech
Station L
P.O. Box 58430
Vancouver, B.C. V6P RK2 Canada
(604) 324-8119
Distributes controls, switches, expanded keyboard systems, communication systems, electronic reading and speech synthesizer systems.

Dickey Engineering
3 Angel Road
North Reading, MA 01864
(617) 664-2010
Design, manufacture and distribute control switches for use with call systems, environmental control, and page turning systems.

Dufco
901 Iva Court
Cambria, CA 93428
(805) 927-4392
Designs and manufactures communication aids, wheelchair control systems, Borg Warner System 80 teaching system interfaces.

Du-It Control Systems Group, Inc
8765 Township Road 513
Shreve, OH 44676-9421
(216) 567-2906
Designs and distributes wheelchair control systems for the severely disabled, including same-switch access to environmental control, typing and computer.

EKEG Electronics Co., Ltd
P.O. Box 46199
Station 'G'
Vancouver, B.C., Canada
Distributes expanded keyboard control switches' lever.

FashionABLE
15 Crescent Avenue
Rocky Hill, NJ 08553
(609) 921-2563
Distributes devices and gadgets, some of which are controls, addressed to the rehabilitation area.

General Teleoperators, Inc
15118 Downey Ave
Paramount, CA 90723
(213) 634-6531
Distributes switches (body contact, tongue, lever, remote control, pneumatic) for use with their environmental control systems.

Hammacher Schlemmer
147 East 57th Street
New York, NY 10021
Distributes remote control on/off for appliance control, other devices and gadgets targeted to the general consumer.

Hammatt and Sons
1721 South 2nd Street
Mt Vernon, WA 98273-5299
Distributes gadgets and devices of general and consumer interest, some of which are of interest to the rehabilitation market (i.e., small headset microphone).
CONTROL, COMMUNICATION, AND SENSORY AIDS

Prentke Romich Company
8769 Township Road 513
Shreve, OH 44676-9421
(216) 567-2907
Design, manufacture and/or distribute switches and technical aids for communication, environmental control, computer access

Pop Air Trol Corp
895 Mamaroneck Avenue
Mamaroneck, NY 10543
(914) 689-9332
Distribute switches, pneumatic, pendant, soft button, handle grip, foot pedal, etc.

Quadra Productions, Inc
13 East 3rd Street
New York, NY 10003
(212) 673-7810
Design, manufacture and distribute control switches for use with their emergency call systems

R/M Systems, Inc
22903 Fern Avenue
Torrance, CA 90504
(213) 534-1880
Design, manufacture and distribute control switches and computer access systems

SciTronics, Inc
523 S Clewell Street
Bethlehem, PA 18015
(215) 868-7220
Distribute encoding control switches for their communication and environmental control systems

Simon Associates
1019 Trillium Lane
Mill Valley, CA 94941
(415) 381-0835
Distribute Audiolite, a sound-activated light switch

Tapeswitch of America
100 Schmitt Blvd
Farmingdale, NY 11735
(516) 694-6312
Distribute tape and leaf switches for touch or foot control

TASH, Inc
100 Sunnybrook Medical Centre
3 Bayview Avenue
Toronto, Ontario, M4N 3M5, Canada
(416) 486-3568
Develop and distribute switches and systems (either simple or sophisticated) for communication, typing, and computer access

Technical Aids to Independence, Inc
18 Histle Road
Bloomfield, NJ 07003
(201) 38-8826
Distribute remote control, pneumatic, touch and cushion systems for use with their telephone and environmental control systems

Tellagraphics
401-DN Interurban St
Richardson, TX 75080
(214) 238-9297
Distribute foot, lever and position control switches, for use with their communication systems and adapted toys
CONTROL COMMUNICATION AND SENSORY AIDS

Trujillo Industries
5040 Firestone Boulevard
South Gate CA 90280
(213) 564-7943
Distribute body contact switches. Also, devices and systems related to mobility aids and vehicles.

Universal Controls Corp
10825 Wilshire Blvd
Los Angeles, CA 90024
(213) 208-4509
Distribute control switches, remote controls for appliances.

Zygo Industries, Inc
P.O. Box 1008
Portland, OR 97207-1008
(503) 297-1724
Design and/or distribute switches and systems for wheelchair control, communication, computer access, and toys. Also modify, for the use of the disabled, devices designed for the general consumer market.
There are alternatives to purchasing special controls. Be creative in shopping! Look for regular mass market products, especially electronic games and convenience appliances.

You can also make adapted controls. These publications have instructions for do-it-yourself projects. Most of them assume that you will not have much previous experience with control fabrication.

Guidelines for Adapting Battery Operated Toys, revised 1982, by Jayne Higgins, California Avenue School, Jayne Higgins, Speech Pathologist, 214 W California Avenue, Vista, CA 92083. $3.00 This 25-page booklet includes procedures and materials for making a pillow switch, touch panel switch, and on-off switch. Toy to in-line jack procedures are also given which permits easy and immediate interchange of information on common pitfalls and problems. Information on where to obtain materials and toys through national wide stores is included (ie. Sears catalog, Radio Shack catalog). All switches are relatively inexpensive to make ($2.00-$5.00).

Helping the Handicapped - A Guide to Aids Developed by the Telephone Pioneers of America. Call the Telephone Company Headquarters in your city and ask for the local chapter of the Telephone Pioneers of America. Though many of the devices are for the communication impaired, there are sections on mobility aids, ADL equipment, and toys.

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children, second edition, by Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740, 1982. 50 pages. $5.00 plus $1.00 postage and handling. This book gives simple directions for constructing toy switches that can be easily operated by severely and profoundly handicapped children. No special skills are needed to make them. All supplies can be found around the house or purchased inexpensively at local stores. One example is a head control switch. The materials cost about $2.50 and take about half an hour to construct. The switch is attached to the child's head with a barrette and plugged into a toy or tape recorder. When the child lifts his or her head, the music or toy turns on, thus giving the child a reason to lift their head.

"Instructions for Constructing a Large Area Flap Switch (LAFS) to Allow Disabled Children to Control Battery Operated Toys," by G. Fraser Shein, Biofeedback Research Project, Rehabilitation Engineering Department, Ontario Crippled Children's Centre, 350 Ramsey Road, Toronto, Ontario M4C 1R8, Canada, November, 1980.

More Homemade Battery Devices for Severely Handicapped Children with Suggested Activities, by Linda Burkhart, 8315 Potomac Avenue, College Park, MD 20740, 1982. $12.50. Continuation of the first book. Includes a section on suggested activities for incorporating these devices into the child's program.

Making Aids for Disabled Living, by Stuart Grainger. Accent Special Publications, Box 700, Bloomington, IL, 1931. 88 pages.

Rehabilitation Engineering Sourcebook Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046, 1979


Toy Modification Note - Build it Yourself Battery Interrupter, by Gregg Vanderheiden. Trace Center, University of Wisconsin, Madison, WI, 1980. 3 pages.


Local Radio Shack Stores are convenient places to buy electrical supplies. Electronics stores also sell these parts, too. They are listed in the yellow pages under "Electronic Equipment and Supplies."
The following organizations are currently doing research in the area of control communication and sensory aids.

**Artificial Language Laboratory**
Department of Computer Science
Michigan State University
East Lansing, MI 48824
(517) 353-8622
Contact John Eulenberg

**Assistive Device Center**
California State University, Sacramento
6000 "J" Street
Sacramento, CA 95814
(916) 454-5422

**Cerebral Palsy Research Foundation of Kansas, Inc**
Rehabilitation Engineering Center
P.O. Box 8217
2021 N. Old Manor
Wichita, KS 67208
(316) 688-1881

**Children's Hospital at Stanford**
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, CA 94304
(415) 327-4800, ext. 345

**Children's Hospital Medical Center**
Rehabilitation Engineering Center
300 Longwood Avenue
Boston, MA 02115
(617) 736-8594

**Institute of Rehabilitation Medicine**
Rehabilitation Engineering Center
New York University Medical Center
400 East 34th Street
New York, NY 10016
(212) 340-6042
Contact Myron Yo, din

**Massachusetts Institute of Technology**
Rehabilitation Engineering Center
Building 31, Room 63
Cambridge, MA 02139
(617) 253-5333
Contact Michael Rosen

**Moss Rehabilitation Hospital**
Rehabilitation Engineering Center
12th Street and Tabor Road
Philadelphia, PA 19141
(215) 329-5715
Contact: Serge Minassian

**Northwestern University**
Rehabilitation Engineering Center
345 East Superior St., Room 1441
Chicago, IL 60611
(312) 649-8560
Contact: Dudley Childress

**Ontario Crippled Children Centre**
Rehabilitation Engineering Dept
350 Rumsey Road
Toronto, Ontario MTG 1R8
Canada
(416) 425-6220

**Palo Alto Veterans Administration Medical Center**
Rehabilitation Engineering R&D Service
3801 Miranda, Bldg 51
Palo Alto, CA 94304
(415) 493-5000
Contact David Jaffe

**The Trace Center**
University of Wisconsin
1500 Highland Avenue
314 Waismann Center
Madison, WI 53706
(608) 262-6595

**Tufts New England Medical Center**
Rehabilitation Engineering Center
171 Harrison Avenue
P.O. Box 1014
Boston, MA 02111
(617) 956-5625

**University of Tennessee**
Rehabilitation Engineering Center
682 Court Avenue
Memphis, TN 38163
(901) 528-6445

**University of Virginia**
Rehabilitation Engineering Center
P.O. Box 3363, University Station
Charlottesville, VA 22903
(804) 977-6730

The following commercial manufacturers are also doing focused research in the area of control.
They can also develop or adapt special one-of-a-kind controls.

**Du-It Control Systems Group, Inc**
8769 Township Road 513
Shreve, OH 44676
(216) 597-2906

**Prentke Romich Company**
8769 Twp Road 13
Shreve, OH 44676
(216) 567-7900

**Zygo Industries, Inc**
P.O. Box 1008
Portland, OR 97207
(503) 297-1724
COMMUNICATION

This response to a commonly asked question was written by the Trace Center, although focused on a child, it is also relevant for adults who need communication assistance. It is particularly interesting for its inclusion of WRITING as a communication technique, an area is far too frequently overlooked (editor).

Q: I HAVE A SEVERELY PHYSICALLY HANDICAPPED SON/DAUGHTER. WHAT KIND OF COMMUNICATION TECHNIQUES ARE AVAILABLE?

"In answering this question, you should be aware that there are two basic areas with which your child may need help - 1) Conversation/interaction and 2) Writing.

Communication

"The communication need that we think of first is conversation/interaction. A basic problem is that many individuals are not able to use speech for communication and interaction. As a result, we need to look toward some augmentative or supplementary techniques to help him/her communicate. In some cases, they may not be able to speak, but may be able to communicate regarding some topics in some environments with some people at some times. However, unless the person is able to communicate and be understood at all times, some type of supplementary technique is indicated."  

"In general, an augmentative aid is necessary unless the individual can communicate about all topics with all people. The augmentative aid would not replace his/her residual speech, but would simply back it up when the individual could speak, he/she would use that mode (or any other mode that was most efficient) when he/she was unable to communicate through his/her other means, he/she would turn to the back-up or augmentative system to communicate."

"There is a wide variety of specific techniques which can be used for communication. All of these techniques can be implemented in one form or another without the use of electronic aids. Painting to words or symbols on a communication board is one example. There are also techniques which can be used by an individual who is so severely involved that he/she is barely able to move an eye in one direction, and has no other volitional body movements at all. These techniques, all of which can be implemented without any technology, can provide even the most severely physically involved individual with a mechanism for communicating. For individuals who can spell, the techniques can allow the individual to spell out exact messages, to write letters, etc. These unaided techniques, however, require the presence of a second person to interpret signals."

"Communication aids are also available. These aids are essentially automated versions of the fundamental (non-technical) techniques described above. The primary advantage of aids is that they allow the individual to be able to assemble messages independently. While not as essential for conversation and interaction (since a second person is there by definition in conversation), these aids can be very important for providing the individual with a means of doing independent work and writing."

Writing

"The second area of need is writing. Essential to any educational process is the ability to write and do independent work, take notes, do homework, and complete assignments. We would not think of sending a normal individual to school without pencil and paper, nor would we allow him/her to go to school without doing the homework and assignments. It would be very difficult if not impossible for him/her to receive a full and adequate education. For those individuals who have the ability to recognize words and learn to spell, some type of writing system will be needed."

"When choosing a communication aid, it should be remembered that the need for aids stems from their ability to be used independently. The primary need for this independence is in messaging and writing. For conversation, the fundamental and unaided techniques are usually faster and more flexible. When looking at independent aids, the writing needs must be considered very carefully, and should weigh heavily in the selection process."

Rate

"A key factor that you will want to look for with conversation or writing systems is the rate of communication. The various techniques (whether aided or unaided) each require different abilities from the handicapped user, and have different efficiencies or speed factors. Some techniques can be used by only a small portion of the handicapped population, but are faster. Other techniques can be used by anyone but are generally slow (for example, scanning techniques). Thus, the problem is not finding a technique which an individual can use, but rather finding the technique which will allow a given individual to communicate most rapidly. It is not uncommon for different techniques to vary in their communication rates by a factor as great as ten to one. Thus, what would take a minute to communicate using one aid might take ten minutes on another, and what would take five minutes on one aid might take almost an hour on another. Since there are many specific techniques and aids as well as variations on their application, it is not a simple task to find the best aid for a given individual. For this reason, it is usually best to involve someone with special training and an in-depth knowledge of all of the various techniques and approaches, especially the newer ones, when making a selection for a more expensive aid."

"This problem is compounded by the fact that there are many therapy and training techniques, which can greatly enhance the physical abilities which a given child (or adult) is able to exhibit. Someone familiar with and trained in these specific strategies may well be able to interface a child...

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to a rich faster aid than a person less familiar with these strategies. Because the field is so new, there is a severe shortage of these specially trained individuals. At the present time, efforts are being made to document these specific strategies and to make them available to individuals through special training materials and programs.

Information Sources

"In the meantime, you may want to invest some time learning about the various techniques and approaches yourself. This will assist you in your interactions with professional teams. The first recommendation is that you subscribe to Communication Outlook. This very application-oriented newsletter gives you a window on all of the latest developments in this field. This includes information on new aids as well as new books and publications which come out in this area. In addition to subscribing to the newsletter, you may want to also get copies of the back issues, since there are many things which have already occurred about which you may want to be aware, but which would otherwise be very difficult to find.

"For general introduction information on the various techniques, you might look at Non-Vocal Communication Techniques and Aids for the Severely Physically Handicapped, by Vanderheiden and Grilley, and/or several chapters in Non-Speech Language Intervention Strategies by Richard Schiefelbusch. Both of these books contain overviews of the basic approaches as well as specific information on symbol systems and the design of fundamental communication boards. For a listing of all of the existing commercially available aids, the most comprehensive source available is the Non-Vocal Communication Resource Book. This is a three-ring binder which contains a two-page description, including photograph, of each of the aids which is available in this area. There is also an Update Subscription Service for the book, which prepares and sends out new entries so that you can be apprised of all of the latest developments. Also see The Comparative Chart of Commericially Available Communication Aids, available from Prentke Romich Company, 8769 Township Road, 513, Shreve OH 44676.)"

PUBLICATIONS RELATED TO COMMUNICATION AVAILABLE FROM THE TRACE CENTER

1983 Revised Non-Vocal Communication Resource Book. G C Vanderheiden, L Krause, 1983. This resource book provides a two-page description (including pictures) of over 90 commercially available aids for non-vocal communication. Revised in 1983 to include all of the entries which have been added in the three sets of updates since original publication. 3-hole punched and bound in a 3-ring plastic binder. NOTE: If you have the original book AND ALL THE UPDATES, you will not want to order this book, since it does not contain additional information. Updates are made available periodically to keep the Resource Book current.

AUGMENTATIVE MODES OF COMMUNICATION FOR THE SEVERELY SPEECH AND MOTOR IMPAIRED. G C Vanderheiden, 1979. Prepared for Congenital Malformation - Its Clinical Managements: Clinical, Orthopedic, and Related Research. (15 pgs). A summary/overview presentation of augmentative modes of communication for severely physically involved individuals. This was prepared as an introduction for individuals not familiar with the field but interested in a short overview of this area. In addition to subscribing to the newsletter, you may want to also get copies of the back issues, since there are many things which have already occurred about which you may want to be aware, but which would otherwise be very difficult to find.

Initiating Communication Systems for Severely Speech-Impaired Persons. L Bottof and D DePape. Published in Topics in Language Disorders, March, 1982. (16 pgs). Describes the goals of an effective augmentative communication program facilitating interaction between non-speaking clients and their environments. Diagnostic intervention techniques, assessment of present strategies, and standardized assessment tools are discussed.

The Rehabilitation Aids Resource Book. Telecommunication, Monitoring, and Environmental Control. Currently being prepared by the Trace Center, 314 Weismann Center, University of Wisconsin, 1500 Highland Avenue, Madison, WI 53705. These publications, and a list of other Trace publications, can be obtained from the Trace Center Reprint Service, Waismann Center, 1500 Highland Avenue, Madison WI 53705, 608/262-6966.

Writing & Typing


IBM's Handicapped Purchasing Program offers rebuilt, used typewriters at a low price to individuals having only a letter from their doctor indicating they are disabled and would receive therapeutic benefit from a typewriter. Call your local IBM or write to IBM, 10100 Santa Monica Blvd., Suite 2100, Los Angeles, CA 90067, attn Dave Kelley.

"Non-Conversational Communication Technology Needs of Individuals with Handicaps." G Vanderheiden, Rehabilitation World, Vol 7, No 2, Summer 1983. $60. Six basic areas of concern are described as encompassing the full spectrum of communication needs for the severely physically handicapped person. A review of current technology available to meet these needs, and a vision of future developments, is presented.
INTERNATIONAL SOCIETY FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION (ISAAC)

ISAAC is a new organization (formed in May, 1983) bringing a unique focus to the field of augmentative and alternative communication. Through its publications, conferences, and scientific meetings, ISAAC will keep its members abreast of the latest developments in the field.

ISAAC is the only organization whose sole focus is the advancement of the transdisciplinary field of Augmentative and Alternative Communication techniques and aids. ISAAC will facilitate an exchange of information and focus attention upon the work being done to help people with communication difficulties throughout the world.

ISAAC's membership is international and includes all those interested in augmentative communication; users and potential users of communication systems and devices; professionals from the field of speech pathology, education, occupational and physical therapy, social work, linguistics, engineering, computer science, medicine, psychology and others; family, friends, and community members wishing to support the communication of those using augmentative and alternative communication systems and devices. The ISAAC membership chairperson is Susan Sansone, c/o NY State Association for the Help of Retarded Children, 2900 Veterans' Memorial Highway, Bohemia, NY 11716. Contact Tamara Redburn, Secretary/Treasurer, at the Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824-1042 for information on membership outside North America. All members of ISAAC receive a one-year subscription to Communication Outlook, which is the official ISAAC newsletter. Members will also be entitled to a special reduced subscription rate of $10 to Communicating Together, a quarterly publication of the Blissymbolics Communication Institute (BCI).

ISAAC will produce several publications: a registry of ISAAC members and others concerned about or working in the area of augmentative and alternative communication; a quarterly journal, Augmentative and Alternative Communication, D. Yoder, editor, Williams & Wilkins, publishers; the official ISAAC newsletter, Members will also be entitled to a special reduced subscription rate of $10 to Communicating Together, a quarterly publication of the Blissymbolics Communication Institute (BCI).

An international conference will be held every two years. The first conference will be held October 18-20, 1984, at the Massachusetts Institute of Technology in Cambridge, Massachusetts. The 1986 conference will be held in the United Kingdom. Other conferences, institutes, and workshops will be scheduled in the future. Further information will appear in future issues of Communication Outlook.

Also see Conference in INFORMATION RESOURCES, p. 14

GUIDES TO COMMUNICATION AIDS

Communication Enhancement Bibliography, compiled by Donald Rabush, Coordinator of Special Education at Western Maryland College, Lyle Lloyd, Professor and Chairman of Special Education at Purdue University, and Michael Gerdes, undergraduate Research Assistant at Purdue University, 1982. 758 entries, annotated. $10.00-$23.00. Available in computer diskette form for the Apple II or TRS-80 Model III microcomputers. Readers of Communication Outlook can obtain bound print copies of the bibliography for $15. Communication Outlook will publish yearly updates of the bibliography at an additional cost. Availability of these inserts will be announced in each Fall issue.

All recent papers, books, proceedings, etc., concerned with communication enhancement will be included in the updates. If you know of any publications which should be included, please send the publication or a complete citation of it to Communication Outlook.

Address all orders, additions and corrections to Communication Outlook, Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824-1042.

Comparative Chart of Commercially Available Communication Aids is presently available from Prentke Romich Company (PRC). The chart was developed by Arlene Kraat and Marsha Sitver of the Augmentative Communication Program, Queens College, Flushing, NY, and funded by PRC.

The chart features communication aids currently available and distributed in the U.S. Aids are divided on the chart into portable and non-portable, and further into categories of scan, direct selection, and scan/direct selection. Features of the aids are classified by selection technique, language content, standard communication outputs, optional outputs available, power used, weight and size, rental possibilities, and price range. Many of the devices are pictures, and all of the manufacturers' addresses are listed. A glossary of terms is included at the bottom of the chart.

Single copies of the chart are available at no cost from PRC. Multiple copies are available at a cost of $1 each for printing, postage, and handling. For further information, contact Prentke Romich Company, 8769 Township Road 513, Shreve, OH 44676.
CONTROL COMMUNICATION AND SENSORY AIDS

SELECTED PUBLICATIONS

“In the past 10 years, there has been a virtual explosion of information and equipment available for the development of nonverbal communication systems for severely disabled individuals. The field has grown from an isolated specialty area into an integral multidisciplinary component of rehabilitation programs. Fortunately, several excellent texts on nonverbal system selection and implementation have been recently published—e.g., Silverman (1980) and Musselwhite and St Louis (1982). In addition, Communication Outlook, a publication focusing on communication aids and techniques, has become an effective vehicle for updating the rapid advance of technology in this area.” James Heller, Rehab Literature, November, 1983, p 364

Books


Communication Programming for the Severely Handicapped Vocal and Non-Vocal Strategies C.P. Musselwhite and K.W. St Louis College Hill, San Diego, CA, 1982

Communication Systems for Severely Handicapped Persons Brenda C Fairweather, Donna H Haun, and Louis J Finke Charles C Thomas, Springfield, IL 102 pp, figures 1982 “Fairweather, Haun and Finke present a historically incomplete approach to non-verbal communication system selection. Although their description of switches is clear and relatively current, their evaluation of technical systems has already been dated by the rapid advance of technology. This text is best utilized as one of many resources for nonverbal system selection.” (James H. Heller, Rehabilitation Literature, November-December 1983, Vol 44, No 11-12)

Directory of Telecommunication Aids for Disabled People Prepared by Bell Canada, on behalf of the Canadian Telecommunication Carriers Assn, Ottawa, Ontario, Canada This directory of telecommunication aids is intended to be a quick reference for people who are concerned with the telecommunication needs of hard-of-hearing, deaf, speech impaired, visually-impaired and motion handicapped people. An attempt has been made to compile the information which is available from various sources both in North America and abroad.

The devices are categorized by function which they perform in relation to telecommunications, especially with reference to the telephone. Each aid is described briefly. Its manufacturer, distributor or contact is listed, and its approximate price, when available, is recorded. Research which is known to be currently underway for developing more aids related to these functions is also briefly outlined. Following this list of aids and research, some existing services relating to telecommunications for disabled people are discussed.

Non-Speech Language and Communication Analysis and Intervention Language Intervention Series Volume IV Richard Schiefelbusch, Editor University Park Press, 233 East Redwood Street, Baltimore, MD 2129 pages 1980 This book examines a wide range of issues relating to language and communication to find viable alternatives for children who cannot speak. It takes a broad look at communication functions and presents models and strategies for developing alternatives for impaired individuals.

Making the important point that communication without speech is better than no communication at all, the chapter authors discuss the design of other ways that will enable children to enjoy the benefits of communication, enhance cognitive development, extend social participation, and strengthen their eventual economic well-being.

For some individuals, an alternative symbol system will facilitate the attainment of far more complex and more standard forms of communication, including speech. For others, the alternative mode will provide a way into a subculture, into a learning environment, into human fellowship, or into a new world of human dignity. It offers specialists in communication a deeper understanding of symbolic processing, as well as specific reviews of research into non-speech communication.

The book is based on invited papers given at The Nonspeech Language Conference held at Gulf Shores, Alabama in March, 1979, and is considered by many to be a classic in the field.

See also Publications Available from the Trace Center on page 204.

Periodicals

Communication Outlook Artificial Language Laboratory Computer Science Department, Michigan State University, East Lansing, MI 48824 Subscriptions $10.00 ($12.00 outside North America) for whole volumes (4 issues), $3.00 for single copies. Communication Outlook is a quarterly newsletter addressed to the community of individuals interested in the application of technology to the needs of persons who experience communication handicaps due to neurological or neuromuscular conditions, edited and published jointly by the Artificial Language Laboratory, Michigan State University, and the Trace Center for the Severely Communicatively Handicapped, University of Wisconsin. It is the principal publication of the International Society for Augmentative and Alternative Communication (ISAAC).

Medical World News The News Magazine of Medicine, Vol 23, No 13, June 21, 1982 211 E 43 Street, New York, NY 10017 This issue carried two articles on technology for rehabilitation, “For the Disabled New Voices, New Freedom,” and “Computers May Let Two Quadriplegics Walk in This Summer’s Sunshine.”
This issue devoted to communication aids for people with speech impairments. In this special issue, experts in a number of communication-related areas probe new technological possibilities, from keyboard-operated speaking systems to simple microphones. Many of the articles are supplemented with photographs and other illustrations, and even some of the technically oriented advertisements may be found informative.


Audiovisuals

Breaking Through the Wall. Gordon News Film Available from HC Electronics Inc., 250 Camino Alto, Mill Valley, CA 94941. 16mm, color, 14 minutes. 1979. Shows the application of the Phonic Mirror Handi-voice, a synthetic speech output communication aid for those without speech. e.g., people with severe cerebral palsy.

Finding a Voice. Martin Freeth, WGBH-Boston Available from Time-Life Video, 100 Eisenhower Drive, Paramus, NJ 07652. 3/4" videocassette, color, 60 minutes. 1982. A WGBH-Boston/NDVA program about the development of electronic aids for the communications-impaired population. Concentrates on the visit of an Englishman with cerebral palsy, Dick Boydell, to the Artificial
These are some agencies that can provide assessment and other services in the area of communication and control for people with physical disabilities. No endorsements are implied by inclusion on this list. If you have information to add to, change, or delete from this list, please send it to the RESNA Sourcebook editor.

California

Assistive Device Center
Calif State University Sacramento
6000 "J" Street
Sacramento, CA 95819
(916) 454-6601
Contact: Colette Coleman, PhD, Director

Blissymbolics Resource Center
Dept of Speech and Language Development
Loma Linda University Medical Center
Loma Linda, CA 92354
(714) 824-4401
Contact: Melvin S Cohen, PhD, Director

Children’s Hospital and Health Center
Speech, Hearing and Neurosensory Center
Speech-Language Pathology Department
3001 Frost Street
San Diego, CA 92123
(619) 292-3482
Contact: Chris Hagen, PhD, Director

Children’s Hospital at Stanford
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, CA 94304
(415) 327-4800, ext 345

Daniel Freeman Hospital
Communication Disorders Department
333 N Prairie Avenue
Inglewood, CA 90301
(213) 674-7050, ext 3328
Contact: Jane Bensussen, Director

Friends of Handicapped Children
UCLA Foundation
23-10 Rehabilitation Center
1000 Veteran Avenue
Los Angeles, CA 90024
213/825-4821

Glendale Adventist Hospital
Non-Speech Communication Program
1509 Wilson Terrace
Glendale, CA 91206
(213) 240-8000, ext 416
Contact: Beth Pohl, Director

Non-Verbal Communication Center
Los Angeles Unified School District
c/o Widney High School
2302 S. Gramercy Place
Los Angeles, CA 90018
(213) 732-1976
Contact: Mary Knerl, Teacher Advisor

Northridge Hospital Medical Center
Innovative Communication Aids for the Non Verbal (ICAN)
183200 Rosco Blvd
Northridge, CA 91328
Contact: Gail L Pickering
Program Coordinator

Rancho Los Amigos Hospital
Communication Disorders Department
7501 Sae; imperial Highway, Bldg 900
Downey, CA 90242
(213) 922-7682
Contact: Frank DeRuyder, PhD, Director
Adult Eval Contact: Diane Bangar
Ped Eval Contact: Linda Lafontaine

Florida

The Communication Systems Evaluation Center
1600 Silver Star Road
Orlando, FL 32804
(305) 293-0473 or 291-7469
Contact: Patty Smith, CSEC Coordinator

Blissymbolics Resource Center
Forrest Park School
1600 Silver Star Road
Orlando, FL 32804
(305) 293-5841
Contact: Sandra Osborn, Principal
(Blissymbols Teacher)

Illinois

Alan J Brown Center for Alternative Communication and Environmental Control
Rehabilitation Institute of Chicago
345 East Superior Street
Chicago, IL 60611
(312) 649-8560
Contact: Ken Kozole

Indiana

Ft Wayne State Hospital & Training Center
4900 St Joe Road
Ft Wayne, IN 46815

Kansas

Cerebral Palsy Research Foundation of Kansas, Inc
Post Office Box 8217
2021 Old Manor
Wichita, KS 67208
(316) 688-1881
Maryland
United Cerebral Palsy of Central Maryland
Non-Vocal Communications Aid Equipment
Delrey Preschool
18 Delrey Avenue
Catonsville, MD 21228
(301) 744-3151
Contact: Noreen Rysticken

Massachusetts
Massachusetts Hospital School
Adaptive Equipment
Canton, MA
(617) 828-2440
Contact: Carol Sargent, OTR

Children's Hospital Medical Center
Communication Enhancement Clinic
300 Longwood Avenue
Boston, MA 02115
(617) 735-6000
Contact: Howard C. Shane, PhD

Tufts-New England Medical Center
Special Equipment Clinic
171 Harrison Avenue
Boston, MA 02111
(617) 956-5622
Contact: Dr. Bruce Gans

Michigan
Communication Enhancement Center
Learning Assessment Clinic
Oakland Schools
2100 Pontiac Lake Road
Pontiac, MI 48054
Contact: Nathaniel Peters, Director
(313) 856-1943
Ina Kirsten, Clinician
(313) 856-1901

Communication Enhancement Program
Jackson County Intermediate School Dist
6700 Browns Lake Road
P O Box 1160
Jackson, MI 49204
(517) 767-2800
Contact: Dianne Taulbee, Supervisor

Communication Enrichment Resource Center (CERC)
Northville Public Schools
405 W Main Street
Northville, MI 48167
Contact: Mark Miko, Program Admin
(313) 349-3490, ext. 277
Contact: John Smallwood, Classroom Eng
(313) 349-0210, artif lang lab

PAM Assistance Center
110 Marshall Street
P O Box 21037
Lansing, MI 48090
(517) 371-5897

Minnesota
Cambridge Area Developmental Rehabilitation and Education (CADRE)
430 N W 8th Street
Cambridge, MN 55008
(612) 689-4466
Contact: Mary Ruprecht

Courage Center
3915 Golden Valley Road
Golden Valley, MN 55422
(612) 585-0811

New Jersey
Cerebral Palsy Association of Middlesex County
Roosevelt Park, Oak Drive
Edison, NJ 08817
Contact: Ms. Travis M. Tallman, CCC-SP
Director, Speech Pathology

Communication Technology Center
P O Box 4111
Atlantic City, NJ 08404
(609) 345-5191
Contact: Joan Bruno, MS, CCC
Chief Speech Pathologist

New York
The Burke Rehabilitation Center
795 Mamaroneck Avenue
White Plains, NY 10605

Cerebral Palsy Center
Sheier Communication Unit
1603 Court Street
Syracuse, NY
Contact: Carol Cohen, Director
(315) 455-5726

Ohio
Prentke Romich Company
8769 Twp Road 13
Shreve, OH 44676
(216) 567-2906
Contact: Susanne Shealey, OTR
Director, Client Services

Oregon
Good Samaritan Hospital
Portland, OR

Tennessee
University of Tennessee
Rehabilitation Engineering Center
682 Court Avenue
Memphis, TN 38163
(901) 528-6445
Contact: Elaine Trefler, OTR
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Texas

Callier Center for Communication Disorders
1966 Inwood Road
Dallas, TX 75235
(214) 783-3033
Contact: Delva Culp

Education Service Center, Region 20
Augmentative Communication Evaluation System
1314 Hines Avenue
San Antonio, TX 78208
(512) 828-3551
Contact: Patricia Wasson

Washington

University of Washington Hospital
Department of Rehabilitation Medicine
1959 N E Pacific Street
Seattle, WA 98199
(206) 543-3674
Contact: Dave Beukelman, PhD

Wisconsin

Communications Aids and Systems Clinic
S-120 Waisman Center
1500 Highland Avenue
Madison, WI 53706
(608) 263-2522

Canada

Augmentative Communication Service
Ontario Crippled Children’s Centre
350 Rumsey Road
Toronto, Ontario M4G 1E8
(416) 425-6229
Contact: Penny Parnes, Director

The Kinsmen Rehabilitation Foundation
Technical Aids Program
Vancouver, British Columbia
(604) 734-8841
CONTROL COMMUNICATION AND SENSORY AIDS

NON-SPEECH COMMUNICATION ADVOCACY ORGANIZATIONS

Arkansas

Evelyn G. Albritton
Speech & Hearing Clinic
University of Arkansas at Little Rock
33rd & University
Little Rock, AR 72204
(501) 589-3155

California

Bay Area Non-Oral Communication Group
c/o Marywin Deegan
4802 Lawton Avenue
Oakland, CA 94609

San Diego Non-Oral Advocacy Group
c/o Nany Oro
United Cerebral Palsy center
7947 Birmingham Drive
San Diego, CA 92123
(619) 278-5429

Southern California Communication Group
8114 West 83rd Street
Playa Del Rey, CA 90293

Idaho

Idaho Nonvocal Group
Susan Lijegreen
Department of Speech Pathology & Audiology
Idaho State University
Box 8116
Pocatello, ID 83209-0009
(208) 236-3495

Massachusetts

Northeast Communication Enhancement Group
Box 268
Brookline, MA 02146-0268

Michigan

Michigan Association for Communication Enhancement
c/o Ina Kirstein
Learning Assessment Clinic/Communication Enhancement Center
Oakland Schools
2100 Pontiac Lake Road
Pontiac, MI 48054
(313) 858-1901

Parent Advocacy Group
6700 Browns Lake Road
P O Box 1160
Jackson, MI 49204
Contact: Lucy lee Neiswander-Whiting

Nebraska

Nebraska Advocacy Services
Lincoln Center Building
215 Centennial Mall, South
Room 422
Lincoln, NE 68508
(402) 474-3185

New Jersey

New Jersey Augmentative Communication Task Force
c/o Joan Bruno
Children's Seashore House
4100 Atlantic Avenue
Atlantic City, NJ 08404
(609) 345-5191

New York

Buffalo Augmentative Communication Group
c/o Cheryl Rogers, LSP/Speech Department
United Cerebral Palsy Association of Western New York
31 Rossflor Street
Cheektowaga, NY 14225
(716) 897-1351

METRO I CAN
c/o Roslyn Holiday Moore
116-39 167 Street
Jamaica, NY 11434

Non-Vocal Communication Group
of Greater New York
19-10 Parsons Boulevard
Whitestone, NY 11357
Contact: Arlene Kraat
(212) 520-7358

North Carolina

Nineveh Murray
Speech/Language programs
Division for Exceptional Children
State Department of Public Instruction
Raleigh, NC 27611
(919) 733-3004

Ohio

Great Lakes Communication Enhancement Group
Fran Watkins
795 Burnside Drive
Tipp City, OH 45371

Oregon

Pacific Northwest Non-Vocal Communication Group,
Portland Chapter
P O Box 1085
Portland, OR 97207


Pennsylvania

Pittsburgh Communication Enhancement Group
c/o Marie Capozzie and Jacky Territo
Pioneer School
Dunster and LaMoine Streets
Pittsburgh, PA 15226
412/531-0626

Texas

Augmentative Communication Task Force
C/o Delva Culp, Speech-Language Pathologist
Callier Center for Communication Disorders
1966 Inwood Road
University of Texas at Dallas
Dallas, TX 75235
(214) 783-3137

Non-Oral Communication Advocacy Group
4339 El Campo
Fort Worth, TX 76107

Washington

Pacific Northwest Non-Vocal
Communication Group (PNWNVCG)
Louise Couch, President
10545 Meridian Avenue Northeast
1-302
Seattle, WA 98133

Canada

Blissymbolics Communication Institute
Ontario Crippled Children's Centre
Penny Parnes
350 Rumsey Road
Toronto, Ontario
CANADA M4G 1R8

Communication Awareness & Action --
Toronto Region
C/o Lynette Norris
78 Glentworth Drive
Willowdale, Ontario
CANADA M2J 2E8

Hamilton Wentworth Communication Collective
C/o Barbara Rush
64 Magnolia Drive
Hamilton, Ontario
CANADA L9C 5T2

All groups are urged to add these addresses to
their mailing lists. Groups wishing to add,
delete, or change their names or addresses should
write to Judy Montgomery, James H. Cox School,
17615 Los Jardines East, Fountain Valley, CA
92708. Ms Montgomery writes an ADVOCACY UPDATE
column in Communication Outlook.
Some Communication Aid Manufacturers

Abbey Medical
8004 Westchester Pike
Upper Darby, PA 19082
715/789-5220

Adaptive Communication Systems, Inc
P.O. Box 12440
Pittsburgh, PA 15231
412/264-2288

American Communications Corporation
180 Roberts Street
East Hartford, CT 06108
203/289-3491

C-Phone
553 Wolfner
Fenton, MO 63026
314/343-5883

Canon, Inc
7-1 Nisni-Shinjuku
2 Chome
Shinjuku Dai Ie
Shinjuku-ku
Tokyo, JAPAN

also: Canon
c/o Telesensory Systems, Inc
455 N Bernardo
Mountain View, CA 94043
415/950-0920

Cleol Living Aids
3957 Mayfield Road
Cleveland, OH 44121
216/352-9700

Communications Research Corporation
1720-130th Avenue NE
Bellevue, WA 98005
206/881-9550

Computers for the Physically Handicapped, Inc
Department RB
7602 Talbert #5
Huntington Beach, CA 92647
714/848-1122

Contemporary Artistic Technology
P.O. Box 58430, Station L
Vancouver, BC V6P 6X2
604/324-8119

Crestwood Company
P.O. Box 045313
Milwaukee, WI 53207
414/391-0311

Developmental Equipment
981 Winnetka Terrace
Lake Zurich, IL 60047
712/438-3476

Dufo
2410 Broad Street
San Luis Obispo, CA 93401
805/541-5022

Educational Microcomputer Systems
1 Clear Spring
Irvine, CA 92715
714/553-0133

Executive Distributors of America, Inc
15055 32 Mile Road
Romeo, MI 48065
313/752-3518
313/237-0554 (Detroit)

Foundation for Communication for the Disabled
31 Southampton Row
London WC1B 5HJ
ENGLAND
Ph. 01-105-1019

Genelex, Inc
64 Gough Avenue
Ivyland, PA 18974
215/672-6643

Handicapped Children's Technological Services
Box 64
Foster, RI 02825
401/222-4622

Handicapped Educational Learning Products, Inc
P.O. Box 9763
Sacramento, CA 95823
916/951-9654

INNOCOMP Innovative Computer Applications
1121 Vegas Court
Charlottesville, VA 22901
804/924-3781

IOR Enterprises
229 Harrison Avenue
Highland Park, NJ 08904
701/846-5200

Jim's Instrument Manufacturing, Inc
P.O. Box 515
Coralville, IA 52241
319/351-3429

Kahstrom, Gunner
Barkspadavegen
S-752 47 Uppsala
SWEDEN

Krown Research, Inc.
6300 Anzace Circle
Los Angeles, CA 90045
213/481-4306
Control, Communication and Sensory Aids

Research & Development Organizations

NIHR supports the following centers in the area of nonvocal communication

Medical Rehabilitation R&T Center
Tufts University
171 Harrison Avenue (Box 1014)
Boston, MA 02111
617/956-5031
Richard Foulds, Project Director
Core area Communication Systems for Individuals with Nonvocal Disabilities

TRACE R&D Center
314 Weisman Center
1500 Highland Avenue
University of Wisconsin-Madison
Madison, WI 53705
608/262-6986
Gregg C. Vanden, Project Director
Core area Access to Communication, Control, and Information Processing Systems

A list of other research organizations can be found in this section on page 202
SENSORY AIDS

TECHNOLOGY FOR PEOPLE WITH IMPAIRED VISION

SELECTED PUBLICATIONS

Aids and Appliances Review is a quarterly journal that provides high quality information on technology that is useful to people with impaired vision. Each issue discusses one topic in depth. The first twelve issues I have covered:

1. Sunglasses
2. Large Print Media
3. Handwriting Guides
4. Speech Compression
5. Alternative Labels Aids for Independent Living
6. Diabetic Control Equipment
7. The Light Probe
8. Kitchen Aids Resources for the Visually Impaired
11. Braille and Computers

The next two will cover:

13. Aids for the Visually Impaired Elderly
14. Tactile Maps

These publications are a valuable source of information, as they are designed to be a consumer report on aids and appliances for visually impaired people. The Review is available in print for free, or on tape in the Library of Congress format. For a taped copy, send one C-9P blank cassette to the AAR Editorial Office at the address below. Contact the AAR Editorial Office and ask to be included on their mailing list.

Aids and Appliances Review, The Carroll Center for the Blind, 770 Centre Street, Newton, MA 02158, 617/963-6200

Braille Research Newsletter is a periodic newsletter devoted to providing state-of-the-art information on the production and use of the Braille reading system throughout the world. The Newsletter reviews new equipment, discusses new or innovative programs described the results of Braille-related research projects, and provides resource listings of manufacturers of various Braille devices. Issue #14 contains such technology-related articles as "Cognitive Processes in Braille Reading," "Telesbraille The New Telecommunication System for Deaf-Blind People," "Tactile Diagrams," "Braille Stereotypes and Duplicators" and others. Each issue is $6 (specify print or Braille), available from National Braille Press, Inc., 88 St Stephen Street, Boston, Massachusetts 02115


Low Vision Services, American Foundation for the Blind, 15 West 16th St, New York, NY 10011 $2.00


Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide. American Foundation for the Blind, 15 West 16th Street, New York, NY 10011 Available in large print and Braille editions $7.50. 1978 Lists devices and equipment which provide on-the-job assistance to visually impaired people. Each entry describes the function of the device, employment application vendor, availability, and, in some instances, price. Listings include hard copy and paperless braille devices, braille readout, tone output or voice output calculators, computer terminals and accessories, labeling aids, measuring aids, communication devices, etc. Indexed by employment area.

"Sensory Aids for Visually-Impaired Clients." Rehab Brief, November 1982, 511. Many of the difficulties experienced by persons with visual disabilities are met by technology in the form of sensory aids. This issue looks at sensory devices, techniques, and systems, primarily within the context of aids that will be of particular help on the job. Available from U.S. Department of Education, Office of Special Education and Rehabilitative Services, Mail Stop 2305, Switzer Building, Washington, DC 20202.

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Sensory Aids Technology Update is a monthly newsletter on technology and employment issues concerning disabled people. This new publication is a rich source of information on technology applications. It is particularly valuable to people looking for information on sensory aids (hearing and vision), but is also useful for other types of technology. It has features on new products, special employment, education and training programs, unusual applications of technology, and new developments in research. New publications and interesting audiovisual programs are regularly reviewed, and each month the product companion section profiles similar devices. It includes new from overseas. The articles are concise, and include references to guide you to further information. A typical issue includes Accessing dedicated word processors what works, what doesn’t, and what’s coming. Financing adaptive aids with government funds fading, where to look for money: Project Finance: what it promised and what it delivers. Equipment demo centers for hearing impaired where they are in the U.S.

Apple software customized for speech output in project for SF Bay Area blind children, Tacti-Phone: new device lets deaf-blind talk on standard phone: Reader’s Forum advice on recruiting disabled college students (December, 1983) A one-year subscription to Update is $30.00; available from Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306.

Smith-Kettlewell Technical File, a quarterly technical journal for blind and visually impaired readers, is available from the Smith-Kettlewell Eye Research Foundation. This do-it-yourself magazine is based upon the concept that given the proper tools and knowledge of exemplary prototype assistive devices, persons who are blind can become involved in solving some of the problems they face. The journal provides its readers with information on such areas as: electronics and radio theory; data on integrated circuits; instructions for constructing devices designed by the Rehabilitation Engineering Center located at the Smith-Kettlewell Institute for Visual Sciences; available electronic test equipment, hints on soldering and the use of power tools, and related bibliographies produced in Braille, large print, and recorded form by various organizations. The Technical File is available for $15.00 per year (Braille or large print edition), and $8.00 per year (Talking Book version). Available from Smith-Kettlewell Institute of Visual Sciences, Rehabilitation Engineering Center, 2232 Webster Street, San Francisco, CA 94115, 415/563-2323

Visual Aids and Informational Material National Association for Visually Handicapped. New York, NY


PRODUCT CATALOGS

Aids and Appliances for the Visually and Physically Disabled, Independent Living Aids, Inc. 11 Commercial Avenue, Plainview, NY 11803

International Guide to Aids and Appliances for Blind and Visually Impaired Persons, American Foundation for the Blind, 15 West 16th Street, New York, NY 10011


Vision Aids Resource Guide, Science Products, (Wayne) Box A, Southeastern, Pennsylvania 19399, 800/233-3121 (in Penn, 800/222-2148). This catalog has been developed to serve as a complete resource guide for the visually impaired consumer or professional in the field of the visually impaired. It includes a wide selection of products from hand-held magnifiers and monoculars to Macular Degeneration Reading Aids, and talking clocks, calculators, and computers.

AUDI/OVISUALS

Dark Silence United States Social Rehabilitation Services Distributed by National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington, DC 20409. 16mm, color, 12 minutes 1975. Reports on the research programs of the National Center for Deaf-Blind Youths and Adults in New Hyde Park, NY. Features new communications hardware for the deaf/blind.

The Handicaps of Blindness and Deaf-Blindness CBS-TV and St Johns University Distributed by Mr. Winst... Kirby, Director, Television Center, Grand Central Parkway, Jamaica, NY 11439. 3/4" video, color, 28 1/2 minutes 1979. Discussion of blindness with Dr. Hellinger, depicting different visual handicaps, illustration of devices to aid the visually handicapped, an introduction to deaf-blindness and the Helen Keller National Center, and an interview with Dr. Smithdas, the Director.

Reading Aids for the Blind Kidsworld #135 Story Bob and Betsy Behrens Distributed by The Behrens Company, Inc., 170 SE 14th Street, Suite B, Miami FL 33131. 3/4" videocassette, color 43 minutes 1981. Kidsworld is a half-hour weekly television news program made for and by kids and telecasts in over 90 U.S. cities. In this segment, Sherrie Liu reports on reading aids at the Maryland School for the Blind. Second Prize, Series, 1981 International Rehabilitation Film Festival.
OTHER RESOURCES ON SENSORY AIDS FOR VISION

Organizations

American Foundation for the Blind
15 West 16th Street
New York, New York 10011

American Printing House for the Blind
1839 Frankfort Avenue
Louisville, KY 40206

Carroll Center for the Blind
770 Centre Street
Newton, MA 02158
617/969-6200

Information for the Partially Sighted (IPS)
9012 Old Georgetown Road
Bethesda, Maryland 20814

Sensory Foundation
399 Sherman Avenue
Suite 12
Palo Alto, CA 94306
415/329-0430

National Institute of Handicapped Research (NIHR)
Supported Organizations

RECs
Rehabilitation Engineering Center
Smith-Kettlewell Institute of Visual Sciences
2232 Webster Street
San Francisco, California 94115
415/563-2323
Development and evaluation of sensory aids for blind and deaf individuals
Dr. Arthur Jampolsky
Dr. John Brabyn

Research and Training Centers
Pennsylvania College of Optometry
Office of Academic Development
1200 W Godfrey Avenue
Philadelphia, Pennsylvania 19141
215/424-5900, ext 252
Orientation and mobility research for persons with low vision
Laura Edwards, project director

Mississippi State University
P.O. Drawer LO
Mississippi State, Mississippi 39762
601/325-2001
Blindness and low vision rehabilitation
William H. Graves, Ph.D., project director

Western Pennsylvania School for Blind Children
201 N Bellefield Street
Pittsburgh, Pennsylvania 15213
412/621-0100
Assessment and treatment of families with visually handicapped children
Janet Simon, project director

National Library Service for the Blind and Physically Handicapped
Library of Congress
1291 Taylor Street NW
Washington, DC 20502
202/287-5100
The National Library Service for the Blind and Physically Handicapped (NLS) collection of full-length braille and talking books and magazines is loaned free to individuals who cannot hold, handle, or read conventional printed matter. Books, magazines, and playback equipment provided by NLS are distributed through a national network of 160 locally funded cooperating libraries and agencies where they are circulated to eligible residents of the U.S. and its territories.

The NLS Reference Section provides information on various aspects of blindness and physical handicaps. Its reference collection consists of approximately 4,000 print books and 500 professional journals dealing with handicaps and related subjects. Information on aids and appliances is included as one of the many topics covered in the reference section. Specific reference circulars and bibliographies are available on reading and writing aids for the handicapped, reading machines for the blind, and closed-circuit reading devices for the visually impaired.

See also PERSONAL MOBILITY “Mobility Aids for the Blind”, MICROCOMPUTER APPLICATIONS, “Access for Blind People”, HOME MAKING, .. RECREATION

DO-IT-YOURSELF TECHNOLOGY FOR BLIND PEOPLE

“Known affectionately to its graduates as the 'little school,' the Smith-Kettlewell Institute of Visual Sciences in San Francisco is offering a free electronics assembly class for blind and visually impaired people, positions are available for three students on a first-come, first-served basis.

“Unique in the United States, the 'little school' provides pre-vocational instruction in soldering, parts layout and hardware mounting. Twenty-five students have participated in this program since it began in 1980. There is no formal certification upon completion of training. Assistance is available for finding living accommodations. For more information, contact the program director, Jay Williams, at 2232 Webster Street, San Francisco, California 94115, 415/561-1677”

from Sensory Aids Technology Update, November, 1983

Home Mechanics for the Visually Impaired, R G Utrup, Western Michigan University, Department of Blind Rehabilitation, Kalamazoo, Michigan 49001
96 pages $150 1974 Series of 17 lessons for teaching blind students to make their own home repairs. Supplementary reading list included.
CONTROL, COMMUNICATION AND SENSORY AIDS

TECHNOLOGY FOR PEOPLE WITH IMPAIRED HEARING

EQUIPMENT DEMONSTRATION CENTERS

"The growing availability of assistive devices for the hearing impaired makes it increasingly difficult for consumers and rehabilitation professionals to determine what devices might be most helpful.

"In the last two years, several centers have been established in the U.S. offering hands-on demonstrations to help consumers and professionals assess different devices. There is no charge for visiting these centers. In addition to the working models of equipment, all of them provide up-to-date information on device prices and availability.

1st U.S. Center

"The Fort Lauderdale Oral School pioneered the first such center in 1981. More than 20 devices, including vibrotactile and visual alarms, captioning devices and Telecommunication Devices for the Deaf (TDDs), are set up for display and demonstration. The center is open on Tuesdays and Thursdays and tours are led by people trained in the use of each device. For more information contact The Fort Lauderdale Oral School, 3100 S.W. 8th Ave, Fort Lauderdale, Florida 33315, (305)525-7251.

California Center

"In Northern California, The San Francisco Hearing Society's Lions Den Project offers hands-on demonstrations of various devices, including TDDs. A trained audiologist, who can explain the devices, guides visitors through the display. Since it has no regular scheduled hours, make appointments ahead of time by calling (415)775-5700, or with a TTY (415)776-DEAF.

New York Centers

"In New York City, the New York League for the Hard of Hearing accepts appointments for demonstrations of many devices, including alarms, listening devices and TDDs. They also dispense devices. To make an appointment call (212)741-7640, with a TTY (212)255-1932, or write the New York League for the Hard of Hearing, 71 West 23rd Street, New York, New York 10010.

"The National Institute for the Deaf in Rochester, New York houses another demonstration center. The Institute has an extensive telephone laboratory where TDDs and other phone devices can be examined. In a separate hearing lab, signaling devices are on display. A trained staff member takes visitors through the displays. To arrange a demonstration call Dr. Diane Castle (716)475-6476 or Jackie Gauger (716)475-6553.

Home Setting

"The Hearing and Speech Agency of Metropolitan Baltimore has organized a unique demonstration center that simulates a home setting. The display area is arranged like a living room. Evelyn Burns, the center director, believes it is important to try a device in the environment in which it will be used. (She even taped a baby crying to help test warning devices.) At the moment, they do not have a TDD to demonstrate. The center is open on Tuesdays, but special appointments can be arranged by calling in advance. An interpreter is available to guide deaf visitors. For more information contact Evelyn Burns, Hearing and Speech Agency of Metropolitan Baltimore, 2220 St Paul Street, Baltimore, Maryland 21218, or call (301)243-3800, with a TTY (301)243-2672.

Northwest Center

"In the Northwest, the Seattle Hearing and Speech Center schedules device demonstrations by appointment. Clock timers, pillow buzzers, bed vibrators, amplifiers, and TDDs are on display. Many devices can be bought at the center. For more information call Rose Dias (206)323-5770.

This article appeared in the December 1983 issue of Sensory Aids Technology Update, which is available from Sensory Aids Foundation, 399 Sheridan Avenue, Palo Alto, CA.

DEAFNET

"The Word's Getting Around Local Implementation of Telecommunications Networks for Deaf Users." American Annals of the Deaf, September, 1983 Volume 128, No. 5, pages 613-618. Accessible by both telecommunication devices for the deaf (TDDs) and ASCII-based computer terminals, DEAFNET is the communications network for deaf persons. It provides bulletin-board access, electronic message service, and real-time linking capabilities for deaf users, their hearing friends, businesses, and various services.

DEAFNET is scheduled to be up and running in the 20 largest U.S. cities by 1985.

For more DEAFNET information, contact:

Teresa Middleton
415/859-2236 (voice)
415/326-1802 (TTY)
SRI International
Menlo Park, California
A Survey of Current Developments in Assistive Devices for Hearing-Impaired Persons in the United States

George W. Fellendorf, Ed D

71 pages

$5.00

1982, Gallaudet Research Institute, Office of Research Dissemination, House Three, Gallaudet College, 800 Florida Avenue NE, Washington, DC 20002.

This report is a current summary and information source for the field of assistive devices for the deaf and hearing impaired. It is intended primarily for professionals but will also be useful to consumers. Assistive devices are broadly defined to range from simple visual "door-bells" to teletypewriter to advanced concepts such as computer mail and automatic speech recognizers. Existing devices are described in the following classes: alerting and alarm systems, telephone assistive systems, personal listening systems, captioned TV, and large-room amplification systems. Descriptions are functional, in terms of the consumer-community and client needs, rather than in technical terms. In addition to existing devices, prototype new devices and trends in research and development are discussed, these existing devices, prototype new devices and trends are also briefly outlined. Following this listing of aids and research, some existing services relating to telecommunications for disabled people are discussed.

Directory of Telecommunication Aids for Disabled People Prepared by Bell Canada on behalf of the Canadian Telecommunication Carriers Assn. A reference for people who are concerned with the telecommunications of hard-of-hearing, deaf, speech-impaired, visually-impaired and motion handicapped people. An attempt has been made to compile the information which is available for various sources both in North America and abroad. The devices are categorized by the function which they perform in relation to telecommunications, especially with reference to the telephone. Each aid is described briefly. Its manufacturer, distributor, or contact is listed, and its approximate price, when available, is recorded. Research which is known to be currently underway for developing more aids related to these functions is also briefly outlined. Following this listing of aids and research, some existing services relating to telecommunications for disabled people are discussed.

Equipment Designed to Improve the Communication Skills of the Deaf. Donald Johnson, William E Castle, editors. National Technical Information Services, 5285 Port Royal Road, Springfield, VA 22161. 77 pages. $7.50 1976. This booklet presents equipment designed and developed at the National Technical Institute for the Deaf, Rochester Institute of Technology, to improve communication skills of the deaf. The report includes seven chapters demonstrating the actual design and rationale for development of several items of equipment and their related work space.

Getting the Most Out of Your Hearing Aid. Joan M Armbruster and Maurice H Miller. A G Bell Association, 4317 Volta Place, NW, Washington, DC 20007. 40 pages $2.00 1981. This is a step-by-step guide to living with your hearing aid. It covers the components of a hearing aid, how to wear an aid, how to get accustomed to your aid, common solutions to common complaints, and hints on basic care for hearing aids.
CONTROL, COMMUNICATION AND SENSORY AIDS

Helping the Handicapped: A Guide to Aids Developed by the Telephone Pioneers of America, Telephone Pioneers of America 195 Broadway, New York NY 10007 Call your local phone company for the name of your local area chapter administrator


New Trends for Instructing Deaf People Rochester Institute of Technology, National Technical Institute for the Deaf, One Lomb Memorial Drive, P.O. Box 9837, Rochester, New York 14623

Non-Vocal Communication Resource Book G.C. Vanderheiden, L. Krause $20.00 1983 Trace R&D Center, Reprint Service, 314 Waisman Center, 1500 Highland Avenue, Madison, WI 53705, 608/262-6966

Orientation to Hearing Aids Jaclyn S. Gauger A.G Bell Association, 4317 Volta Place, NW, Washington, DC 20007 $9.45 1978 This package was developed to motivate and train students to use hearing aids to improve communication skills. It is designed as an individualized instruction guide for a hearing aid user and audiologist. Written at an eighth grade vocabulary level, the package includes the following six component workbooks: Hearing Aids and What They Do (48 pages), Earmolds and Hearing Aid Batteries (32 pages), Maintenance and Care of Hearing Aids (26 pages); Troubleshooting Hearing Aid Problems (22 pages); Consumer Information Hearing Aids (32 pages); Student Manual (20 pages)

Reasonable Accommodation Handbook Frank Bow American Telephone & Telegraph Company Available from National Center for a Barrier Free Environment, Information Service, 1015 Fifteenth Street NW, Washington, DC 20005, 202/666-6896 323 pages $37.50 1983 Although prepared for AT&T, this document would also be helpful to employers and vocational counselors. It contains an introductory section discussing the concept of reasonable accommodation and reviewing the legal and regulatory requirements. The book provides one-page descriptions, with photographs, of hundreds of products and devices which may prove useful for use as reasonable accommodations for certain individuals with job-related limitations. The following information is entered for each product and service for which it was available: product name, what it is, what it does, advantages, disadvantages, costs and available from. The data are accurate as of June, 1982

Sensory Devices for the Hearing Impaired Harry Levitt, James M. Pickett, and Robert A. Houde, editors IEEE Press John Wiley & Sons, Inc. 1980

Signaling Devices for Hearing-Impaired People Diane L. Castle, Ph.D A.G Bell Association, 4317 Volta Place, NW, Washington, DC 20007 Free This brochure provides information on commercially available products that perform signaling functions for the hearing-impaired person such as wake-up alarms, multi-purpose signaling devices and warning devices.


Telephone Accessories You Can Build J. H. Guilder Hayden Book Co., Inc. Rochelle Park, NJ 1976 Has information on building your own signaling devices

"What You Should Know About TDDs" Diane Castle, Ph.D Public Information Office, National Technical Institute for the Deaf, Rochester Institute of Technology, One Lomb Memorial Drive, P.O. Box 9887, Rochester, NY 14623 free

Children's Hearing Aids

"All About Hearing Aids" Auditory Services Program, Montgomery County, Maryland, Public Schools Available from A.G Bell Association, 4317 Volta Place, NW, Washington, DC 20007 12 pages $1.75 1975 Simple instructions for parents and teachers on the care of a child's hearing aid


Tim and His Hearing Aid: Eleanor Ronnei and Joan Porter A.G Bell Association, 4317 Volta Place, NW, Washington, DC 20007 48 pages, $3.50 1985 An easy-to-read book for elementary school children about a young boy learning to use a hearing aid. Illustrated

Audiovisuals

Communication Aids for the Hearing Handicapped R.L. Hughes, Ph.D, M.E. Glasscock III, M.D. Distributed by House Ear Institute, Audio Visual Services, 256 South Lake Street, Los Angeles, CA 90057. 16mm and video 15 minutes, 1970. There are many devices other than hearing aids that the hearing impaired person may be able to use. The electronic stethoscope, television and telephone aids, and various light signals are presented in simulated situations to illustrate such devices

OUT Organization for the Use of the Telephone WBAL-TV, Baltimore Distributed by the Organization for the Use of the Telephone, Inc. P.O. Box 175. Owings Mills, MD 21117. 3/4" videocassette, color, 30 seconds, 1981. Information to assist hearing-impaired people with hearing aids in the use of the telephone

Silent Walls United States Social Rehabilitation Services Distributed by National Audiovisual Center, National Archives and Records Service, General Services Administration, Order Section/RT, Washington DC 20409. Examines deafness and the many problems of deaf people who must adjust to a silent world. Shows the training of deaf people
CONTROL, COMMUNICATION AND SENSORY AIDS

to communicate, to find employment, and to bridge
the gap of isolation and alienation. Demonstrates
new office equipment designed especially for the
deaf by deaf persons.

ORGANIZATIONS

National organizations that can provide more
information

Alexander Graham Bell Association for the Deaf
4317 Volta Place, NW
Washington, DC 20007
202/337-5220 (Voice or TTY)

Gallaudet College
800 Florida NE
Washington, DC

National Association of the Deaf (NAD)
814 Thayer Avenue
Silver Spring, Maryland 20910
301/587-1788 (Voice or TTY)

National Technical Institute for the Deaf
Rochester Institute of Technology
One Lomb Memorial Drive
P.O. Box 9887
Rochester, New York 14623

Organizations for Use of the Telephone, Inc
P.O. Box 175
Owings Mill, Maryland 21117
301/655-1827

SHHH/AD
4848 Battery Lane
Suite 100
Bethesda, Maryland 20814

Programs Funded by National Institute for
Handicapped Research

Rehabilitation Engineering Center for the Deaf and
Hearing Impaired
Gallaudet Research Institute
Gallaudet College
800 Florida Avenue, NE
Washington, DC
202/651-5440
Raymond Trybus, Ph.D., Project Director

Rehabilitation Engineering Center on the New
Generation Hearing Aids
The Lexington Center, Inc
30th Avenue and 75th Street
Jackson Heights, New York 11370
Alan Lerman, Ph.D., Project Director

Rehabilitation Engineering Center on Sensory Aids
for Blind and Deaf
Smith-Kettlewell Institute of Visual Sciences
2232 Webster Street
San Francisco, California 94115
Dr. Arthur Jampolsky, Dr. John Brabyn, Project
Directors
Telecommunication Devices for the Deaf (TDDs) are growing in popularity daily. A TDD lets a deaf person make a telephone call directly to another person having similar equipment, without the need for an interpreter, since the conversation is typed through one machine to another machine instead of being spoken.

Some Sources for TDDs

American Communication Corp
180 Roberts Street
East Hartford, Connecticut 06108
Voice and TDD 203/289-3491

C-Phone, Inc.
553 Wolfer Drive
Fenton, MI 63026
Voice and TDD 314/343-5883

CYBERTECH, Inc
P.O. Box 543
Thornhill, Ontario
CANADA L3T 4AZ
Canadian TDD

Krown Research, Inc
6300 Arizona Circle
Los Angeles, California 90045
Voice and TDD 213/641-4306

Northern Telecom, Inc
Advanced Telephone Products Division
640 Massman Drive
Nashville, Tennessee 37210
Voice 615/883-9220
TDD 615/889-1627

Phone-TTY Incorporated
202 Lexington Avenue
Hackettstown, New Jersey 07840
Voice and TDD 201/489-7889

Plantronics
345 Encinal Street
Santa Cruz, California 95060
Voice and TDD 408/462-5606

Specialized Systems, Inc
11339 Sorrento Valley Road
Dept TBJ
San Diego, California 92121
Voice 714/481-6000
TDD 714/481-6060

Ultratec, Inc
P.O. Box 4062
Madison, WI
Voice and TDD 608/273-0707

Weitbrecht Communications, Inc
655 Skyway, Suite 230
San Carlos, California 94070
Voice 415/592-1622
TDD 415/592-1623

For more information on TDDs, contact Telecommunications for the Deaf, Inc (TDF), 814 Thayer Ave., Silver Spring, MD 20910, 301/589-3006 (voice/TDD)

A Service for TDD Users

Even if the other person doesn't have a TDD, you can still communicate using your TDD. There are several new services around the country which help make the connection. TDD users can call the service which connects (on a second line) by voice to the called party. Both lines are kept open simultaneously, so that a complete two-way conversation may take place quickly and easily. The service operator reads the calling party's typing on a TDD unit, the called party then hears the service operator's voice reading and responds in speech, which the service operator then types on a TDD for the calling party to read. The same service, in reverse order, may also apply for persons calling someone who uses a TDD device. Most services are operated by voluntary organizations and do not charge a fee. The only costs are the regular telephone charges between the TDD user and the service, and between the service and called party. However, in some areas these services are run on a monthly fee-for-service basis.

Assessment of TDD Technology

Applied Concepts Corporation has been awarded a research control by the U.S. Architectural and Transportation Barriers Compliance Board to help the Board complete its minimum guidelines for TDD use in federal facilities. One of the purposes of the study is to provide the Board with an assessment of present and future technologies for use in TDDs. A report should be available in the fall of 1984. For more information on the project, contact Sally Free, Office of Technical Services, Architectural and Transportation Barriers Compliance Board, 330 C Street, SW, Washington, DC 20202, 202/472-2700 (voice or TDD).

Also see COMMUNICATION and EDUCATION & VOCATIONAL TECHNOLOGY
MICROCOMPUTER APPLICATIONS

INTRODUCTION

"A group of statisticians once rated the efficiency of various species in motion. They used the criterion 'Which one can get from point A to point B with the least amount of energy exerted?'"

"The condor won. The human being came in about a third of the way down the list."

"Then the scientists re-rated each species, but this time put the human on a bicycle. Suddenly we humans were twice as efficient as the condor."

"Personal computers can work the same way as the bicycle -- as amplifiers of human ability."

"There are an estimated 20 million people in the United States with some disabling physical handicap. Of that number, 7.9 million are severely disabled. The numbers are great, but each disability is unique -- because each person is unique."

"Although an ideal computer system for the disabled doesn't exist, the pieces, and the knowledge necessary to assemble a computer system to meet specific needs do exist."

"By improving the applications that exist today, we can develop the personal computer into a more powerful tool for everyone."  

From the Introduction to Personal Computers and the Disabled, A Resource Guide, Apple Computer, Inc, Cupertino, CA 95014

In the not too distant future, it will be strange to look back on this section called Microcomputer Applications and wonder why a separate section was pulled out of the other function-oriented areas in this book. It will probably look as peculiar as if there had been a section on the use of books, or applications of paper and pencil. In 1984, however, we are not yet ready to position information on computers solely within their functional application areas, e.g., environmental control, education, worksite. The field is too new. The potentials are not fully understood, and we are still learning -- how, when, where, why -- to use this new tool effectively. These tools may even make our traditional functionally separate categories obsolete (home, work, play, etc.). More likely, though, computers will slip in to the background and become like the motor vehicle, a part of every aspect of our lives.

We are all influenced by this new technology. Whether we are enthusiastic, intimated, or just confused, the computer is here to stay.

Even if you are diligently trying to ignore them, it is becoming increasingly difficult to avoid the references to computer applications for just about everyone and everything.

Disabled people, educational education and rehabilitation are obvious areas which can benefit from microcomputer applications. There has been an explosion in the number of workshops, conferences, publications, hardware and software developed and targeted at the disability market. Even so, the need is far from satisfied.

The potential and range of applications is mind-boggling. For example, at a recent conference in California, "Software for the Handicapped and Vocational Rehabilitation," the range of presentations included:

- Single Switch Training and Software for the School Age Population
- A Computer Assisted Communication System for Aphasics
- Vocational Considerations for Application to Computer Technology
- Environmental Control Systems
- Software Application for Multiply Handicapped School Age Children -- Group Problem Solving and Social Interaction
- Robotics
- Computer Access by Voice Recognition
- Software for Traumatic Head Injury

GENERAL GUIDELINES FOR SELECTION OF COMPUTERS

"When trying to select a computer for a given application, there are a number of considerations. Actual purchase of the computer is generally the last rather than the first step in this process. The recommended procedure is as follows:

1. What do you want the computer to do?
   "Very carefully define exactly what it is that you want the computer to achieve. I want it to help him with his schoolwork, I want it to help him write. I want it to help him communicate," are not sufficient definitions of need. These are general goals or wishes, but not specific functions that you wish the computer to achieve. I would like the computer to provide me with some mechanism for printing out messages."
   "I want it to help me communicate, I would like the computer to provide me with some mechanism for printing out messages which would allow me to communicate."
   "I want it to help me write."
   "I want it to help me communicate." These are more specific needs. In making your description of the needs, use as many paragraphs as necessary, and be as absolutely explicit as possible.

2. Is there a simpler alternative?
   "When exploring solutions to your problem, look at both computer-based and non-computer-based techniques or approaches to the solution. Also look at technology-based and non-technology-based solutions. Often, a simple strategy or technique may be a more powerful and more flexible solution than the electronic or computer-based aid.

3. Is appropriate software available?
   "No computer is of any value without software. The next step should therefore be to identify whether software exists, for any computer, which will provide the functions desired. Carefully examine any software packages available to see..."
whether they provide all of the functions re-
quired, or whether they will need modification.
Modification to software can be extremely expen-
sive, or impossible, depending upon the com-
plexity of the program, the language it's written in,
and the availability of the source code. Writing a
program from scratch can be very expensive. A
program which could be purchased for $50-$100 may
cost $20,000-$200,000 to write. Many of the more
expensive programs may have cost $500,000-
$1,000,000 to develop and perfect.

4 Does the software really do what you want it to?
“Get hold of the software packages (or hardwa-
re modifications) and try them out. Most pieces of
software sound good when described, but fail to
deliver much when actually tried. Also, it is
evry easy to have over-optimistic expectations of
the value of computers in carrying out various
tasks. A good demonstration of the software in
use can reduce many of these problems, and help to
identify truly useful software packages or hard-
ware modifications/modules.

5 Which hardware does it run on?
“If the software is available for multiple com-
puters, situate the various computers to de-
termine which one would be the best for your
particular application. The physical characteris-
tics of the computer, its specific features and
capabilities, the likelihood that additional soft-
ware in this area will be developed for each
computer, and the availability and maintenance of
the computer locally are all factors which should
be taken into account

6 How can I compare them?
“If several computers appear to be equally good,
some type of a scoring cross-comparison may be
useful. The individual items discussed would be
listed, along with a notation as to whether they
were absolutely required, highly desirable, desir-
able, or optional. The various computers can then
be compared. Any computer which fails to provide
an absolutely required item would be automatically
disqualified. Points could then be scored for the
other items, and the systems compared against each
other in this manner.

7 Is the solution adequate?
“Check to be sure that the solution is sufficient.
Just because you have identified the best of the
computer/software packages available does not
guarantee that you have a package which is good
enough to meet your particular needs or to justify
the expenditure. In some cases, it is wiser to
wait for additional developments than to move
immediately and purchase something which in fact
will not meet your needs.

8 Have I got all the pieces?
“Finally, when you have identified a package which
is both optimal and sufficient, proceed to pur-
chase all of the components required. When com-
paring different computers, be sure to compare the
entire package price. Often, a computer will look
to be less expensive, but its cost will rapidly rise as
all of the various accessories and modules are
secured to complete the system.

Throughout the process, remember that a litt'
extra legwork on the front and can prove invaluable
in the final selection. Also, if you do not see
a piece of hardware or software that really
meets your needs, do not be afraid to hold off and
wait for developments. The field at this time is
expanding very, very rapidly. New hardware and
software are constantly being announced. New
programs and special modifications are also being
developed in the area of rehabilitation. Check
summary documents such as the Trace Center Inter-
tional Software/Hardware Registry of Programs
Written or Adapted for Handicapped Individuals to
see what programs/ modifications are available or
under development in your area. A short note to
some of the principal developers in the area to
ask whether they are aware of any new research or
aids may also be helpful in identifying new soft-
ware packages or special hardware adaptations
which are still in development stages and not yet
documented

Excerpted from *Comparison of Apple, Epson,
IBM Microcomputers for Applications in
Rehabilitation Systems for Persons with Phys-
ical Handicaps* 1984, Trace Research &
Development Center, University of Wisconsin-
Madison, $8.50

The complete document also includes the follow-
ing information:

* An overview of considerations regarding the
  use of microcomputers with/ by handicapped
  individuals
* A cross-comparison of computers and their
  features
* A cross-comparison of different sized system
  configurations for each computer
* A discussion of the different computers in
  terms of the considerations discussed under
  (a) above
* A comparison sheet for evaluation of your own
  needs

**COMPUTER SHOPPING FOR THE BLIND CONSUMER**

Know what you want to do
“ What are your intended applications? There
are no universal solutions. You choose in soft-
ware, assistive aids, and the computer, all depend
absolutely on the intended application. Don’t
shop the computer first and then look for some-
thing it can do.

Talk to blind users
“ If you know what you want to do, talk to blind
users doing the same thing. This is the hard
part. Unless you have a blind friend who uses
computers, you’ll probably need help. To start,
call manufacturers and distributors of software
and aids specifically designed for blind users and
ask for names of their customers. Local and
national organizations that work with visually
impaired people, many VA hospitals, and even some
computer user groups can prove good resources

“A number of newsletters regularly print detailed
product comparisons, evaluations, and reviews of
unusual computer applications for blind users. In
addition to Update, some of the better ones are by
David Holliday (717)323-8739, for Grovanechi
(Blind Apple Users Group) (516) 33-0717, Vito
Two recent books on the subject have been published by the Carroll Center for the Blind (617) 620-0000 and the National Braille Press (617)266-6160.

The local computer store
"Be wary of advice from the local computer store. They will rarely have any knowledge about software for blind users, or be able to answer questions on interfacing assistive aids with the computer. And if you haven't done your homework, many computer sales types can easily overwhelm and confuse you with their technical jargon. The same advice is true for computer-literate, sighted friends. They will generally be interested in the latest state-of-the-art advances and consider obsolete the machine that may be best for your purposes.

First find the software:
"Software is the brain of the machine, it makes the computer do what you want. After talking to other blind users, you should know what your software choices are, as well as the available aids you may need and the computers they interface with.

"Here are some dangers to be aware of: Line-oriented displays software that displays information left-to-right on a line as opposed to full screen often requires line-oriented computer aids (called seracs). And sometimes software is protected so it will only read directly to the computer monitor, thus bypassing your voice output synthesizer or braille device. So make sure your software can be intelligibly read by your assistive aids and computer. In many cases you won't be able to use commercial software such as Visi-Calc, or word processing packages that have full screen editing features.

"Finally, equipment interfacing (connecting different pieces of hardware to the computer) is an onerous bogeyman that haunts all computer users. A ain, with software, make sure your assistive aids and peripheral devices all connect to the computer and each other.

Try before you buy
"This will be difficult, but before buying, arrange a demonstration of the system you've chosen, including all software and aids. This may mean traveling, but remember, you're considering an investment of $3000 to perhaps more than $20,000. Some organizations (see the November Update) are now, or will soon be, offering hands on demonstrations of computer access aids. Also contact vendors of special equipment for blind users, they can sometimes assemble a local demonstration not only of their device but of the other hardware you want to try.

Watch where you buy
"Stay with reputable, known dealers. At the same time, of course, price is a very important consideration. Fortunately blind consumers today breathe a much more bracing, competitive air than in the past. There are many good software packages, voice output devices, braille printers, and modified computers offered by healthy, young firms that should be considered. Blind consumers are no longer hostages to a handful of high priced manufacturers competing in a small marketplace.

"With that said, make sure your vendor offers support for its product. Ask for the names of several customers and investigate the firm. The support should include service assistance (local, factory and telephone hot-line), regular product updates, and a new product warranty, followed by a reasonably-priced service contract. For more information, see this issue's 'Buyer Beware' article."

Reprinted with permission from "Sensory Aids Technology Update", January, 1984

"Editor's note I asked Gregg Vanderheiden to comment on the problem of protected software. His reply was

"Protection of software itself does not usually cause this problem. Protection is only one of 6 or more possible causes for this, and is usually not the culprit. This problem is just as common in unprotected high speed software. Some causes are:

1) Software bypass of operating system to gain speed
2) New patch needed for program wipes out your patch
3) All memory is used leaving no room for your patch
4) Software just assumes empty computer and kills patch by accident
5) Software clears out computer to make sure other patches from old program are removed so user won't have trouble using this program
6) Software clears out other programs and patches to help protect this program from being copied"

Another somewhat longer article on computer selection for blind people, entitled "How to Select a Computer" by Harvey Lauer, appears in the COPH Bulletin Vol XIX, No 7, 1st Quarter 1984, Issue 50

Also refer to the reference books in this section.
IN CURBING AND COMPUTERS: PROVIDING ACCESS TO COMPUTERS AND INFORMATION SYSTEMS FOR DISABLED INDIVIDUALS

Gregg Vanderheiden, Trace R&D Center, raises the disturbing issue of how computers could become the greatest new handicap that disabled people will ever face.

He points out that computers have the very great potential of creating new barriers and widening the gap between disabled and able-bodied people, rather than helping the disabled individual overcome these gaps.

"How does a computer become a barrier? First, we have to realize that the computer was not invented for the individual with a disability. We get so excited about all of the potential uses of the computer to carry out special activities for individuals who have disabilities that we forget that the reason computers were developed, and the reason the technology is racing ahead and the prices are dropping, is that they are very rapidly being applied and incorporated into the lives of non-handicapped individuals. They are extending the capabilities of able-bodied individuals, increasing their efficiency and effectiveness, and providing them with new capabilities.

Computers are showing up at an ever-increasing rate in our educational system. Soon there will be computers in all classrooms, and they will be used as routinely as blackboards and pencils and paper are today. Similarly, employers are making more and more extensive use of computers in all aspects of employment. Even in daily life, we may soon be doing most of our ordering and bill-paying through computer terminals and the like from our homes.

In all of these cases, however, the software is being written to be operated by individuals who have use of all senses and fingers. As such, they are for the most part unusable by individuals who have various types of physical disabilities. Thus, while we are busy providing handicapped individuals with ways of using a computer to act like a typewriter, pencil and paper, or environment control system, to parallel the manual activities of non-handicapped individuals, the rest of society is busy moving on to the next generation where many of these activities will be carried out much more efficiently and effectively.

Moreover, the future of computer technology. Moreover, these new ways are designed to make maximum use of all of the senses and movement patterns of able-bodied individuals, and may thus exclude many handicapped individuals.

"So, while the computer is advancing handicapped individuals two steps through the use of special programs designed for handicapped individuals, the computer is advancing everyone else in society five steps. The five steps are being designed in such a way that the handicapped individual often can not take advantage of them, thereby leaving them actually three steps behind.

"For example, we now find bright physically handicapped individuals being placed in the classroom, where half of the coursework is being done on computers. Although these handicapped individuals have the few special programs which have been written for them, and which they can operate with their limited physical abilities, they are unable to use the much larger (for the order of a hundred to a thousand times larger) body of standard software which is being used by the rest of these classes, since they are physically unable to operate it. As a result, half of the coursework (and the educational system) is inaccessible to them.

"Other individuals, moving into the job market, find that companies are not interested in the fact that these handicapped individuals can use their own computer, and their specially adapted programs. The employer is only interested in whether the disabled individual is able to operate the accounting program running on the company's computer. If not, then he can't carry out the job, and is unemployable, despite the fact that he has a computer and a program he can operate. Care must be taken to distinguish between having the ability to do something or operate a computer and the ability to operate the programs and computers that are required. This is roughly akin to being able to easily access your bathroom at home, which does you little or no good if you cannot use the facilities on the job. It's not enough that you can access a bathroom -- you have to be able to access the bathrooms that are in the environments where you need to operate.

"Even in the home, however, this problem can arise. As we move toward telecommunication systems where ordering and bill-paying is carried out through specialized communication links, it will become necessary for the handicapped individuals to operate the specific keypads or control panels on these automatic home communication systems. If standard computer terminals were used, then a specially adapted 'terminal for the handicapped' might be usable. More likely, however, due to security and other considerations, very specialized systems will be used. Then, what could have been a very powerful capability for handicapped individuals (remote ordering and bill-paying, etc.) instead be available only to non-disabled individuals.

"Thus, although custom software programs can provide a great number of interesting capabilities to handicapped individuals, custom software is not enough. Access must be provided to the world of standard computers and, most importantly, to the world of standard software, if computers are in fact to result in a net gain for handicapped individuals.

"The first method that come to mind for providing access to standard software is to simply modify the software so that it can also be used by handicapped individuals. However, this is an extremely difficult proposition, even when support from the original software developer is available. Again, for security and commercial reasons, most standard software is a carefully guarded and protected commodity, making modification almost impossible. Moreover, the software programs are continuously updated and revised, making it impossible to keep
handicapped users supplied with a modified version. It should be remembered that modifying a single program can cost between $8,000 and $20,000, writing a program from scratch can cost anywhere from $5,000 to $2,000,000 and up.

**Transparent Access**

"The only real solution to the problem is therefore the ability to provide transparent access to computers. Transparent access refers to the ability of the handicapped individual to access the computer in such a way that the computer program cannot tell in any way that the input is not coming in the standard fashion. For example, if a program is written to accept input from the keyboard, the modification must be made in such a way that it is impossible for the program to tell that the input is not coming from the keyboard.

"One technique that can be used is a keyboard emulator. The keyboard emulator is a small module which is installed inside a computer between its normal keyboard and the rest of the computer. Once installed, it does not affect the operation of the computer in any way. The keyboard operates in exactly the same fashion as it did before. The emulator, however, provides a small port or plug point where individuals using specialized communication aids can connect. They can then use their specialized communication system (which they may use) to enter movements, head movements, or eye movements, or spindlefuff) to generate the 'keystrokes' which are then fed to the keyboard emulator. The keyboard emulator in turn feeds them into the computer in such a way that it looks as if they were actually typed on the computer's keyboard. With a keyboard emulator installed in a computer, a wide range of individuals having very different communication aids and input techniques would be able to use the computer and all of its software without requiring any modifications of any kind to any software.

"In a classroom, for example, there might be fifteen computers lined up along one wall on which the students carry out their written assignments, etc. Two of the computers might have keyboard emulators installed in them, and a small 'access' sticker similar to that found on restrooms placed on the computers' cases. Any individuals who are unable to use the standard input keyboard could then use these two computers and control them using their specialized communication or writing systems. When not being used by handicapped individuals, these two computers could be used by anyone else. The situation would in fact look very much like a bathroom, where one or two stalls have been modified for use by handicapped individuals. The difference here would be that the non-handicapped individual would not be able to distinguish in any way (except, perhaps, by seeing the access sticker) that any type of modifications had been made to the system.

"For visually impaired individuals who cannot use the CRT display, substitute displays using tactile and voice output are under discussion and development. One proposed system uses a pad about the size of a pad of paper, which the blind individual touches. Wherever he touches the pad, the contents of the CRT screen corresponding to that portion of the pad are read vocally to him. This system can therefore be used by individuals who are blind in one eye as well as those who are congenitally blind, since it does not require any learning of special skills, such as Braille, etc.

"The problem, however, is not solved yet. While we are now coming up with solid solutions to the problem of transparent access to keyboards, the computer designers are being urged non-keyboard methods for input to computers. Most of these input methods take advantage of the many physical abilities of the non-handicapped individual, as a result, they are even more difficult for handicapped individuals to operate than the keyboard. These input techniques include 'mice,' voice inputs, and body tracking technologies. In addition, more complex video displays are being used, with heavy use of graphics and visual-spatial representations, which make the task of providing alternate displays for visually impaired individuals even more difficult. The development of new strategies to deal with these problems, as well as the raising of the awareness level of computer designers to these problems, is therefore very important, and needs to be one of our highest priorities.

"So, where are the children's needs? Let's imagine for a moment a town where there are only roads and no sidewalks of any kind. Individuals in wheelchairs are not allowed on the road, and are therefore trundling their chairs across the grass. This is of course is a very difficult activity, so they greet with great anticipation and joy discussions about putting little concrete runways along the side of all the roads, on which people can walk. Although it's clear that these walkways aren't being put in for the specific benefit of handicapped individuals, it also appears that it will be a tremendous boon to them. In all the celebration, though, people don't notice that along with the sidewalks come curbs. Thus, when the whole system is in place, the handicapped individuals find that they are now able to move very swiftly around on their own block, but for the most part are unable to access these nice pathways that have been laid throughout the society. Moreover, putting in the paths increased everybody else's ability to get around, thus making the difference between their mobility that much greater. They could put ramps on the sidewalks near their homes, or in the places that they go to a lot, but they really need to be able to access all of the little pathways if they are to be able to get around and about.

"Today, we find ourselves in exactly the same situation with regard to the area of computers and information systems. Very rapidly, our society is moving toward electronic assisted everything. In the process, electronic pathways are being laid throughout our society -- pathways which could tremendously increase the functional mobility and capabilities of individuals with physical and sensory disabilities. All of these electronic information pathways will be of little use, however, if unrestricted access is not available. Patching one or two access points is not sufficient, in the same manner that providing curb ramps or curb cuts for some of the sidewalks is..."
not sufficient

"My message to you today is, let's not wait until all of the sidewalks have been laid and the curbs poured before we begin talking about curb cuts. It's incredibly expensive to go back and tear everything up to install the curb cuts later. Let's identify the problem and move now so that we can pour the curb cuts and provide unrestricted transparent access while we are laying these electronic pathways.

"It is certainly a bright, shiny and dynamic field. The potentials are enormous. But as it races ahead -- and continues to evolve -- it will be a continuing challenge to make sure that we maintain open channels of access -- unlimited handicapped access -- to these systems and all of their software. This applies not just to computers, but to the information systems they are going to generate. As we go through our society developing and creating these wonderful computer systems and information highways, let's make sure we don't forget to build the means to access them at the same time."

Gregg C. Vanderheiden, Trace R&D Center on Communication, Control, and Computer Access for Handicapped Individuals, University of Wisconsin - Madison

Excerpted from a Keynote Speech at the Indiana Governor's Conference on the Handicapped, October 13, 1983

COMPUTER-RELATED INFORMATION FROM THE TRACE CENTER

The Trace Center has a 10-page listing of publications related to communication and computer access. These publications, available from the Trace Center, are:

Access Problems with Computer-Based Services EJ Desautels October 1983 Published by the University of Wisconsin, Department of Computer Sciences, Technical Report #516 16 pages Automated library services which students interrogate through computer terminals are becoming commonplace. This report examines the situation at the University of Wisconsin-Madison campus, and analyzes the general computer access problem in libraries as it impacts upon severely handicapped students.

Blissapple Description $15 (one copy free) This is a brief descriptive overview of the Blissapple program, including a listing of the hardware necessary to implement the program, the capabilities of the program, and some applications.

Blissapple Program $35.00 (Manual only -- $20.00) This program allows a standard Apple microcomputer to function as a Blissymbol writing device. The program is on a 5" floppy disk. The price includes the program, a special "fix" disk to allow the program to be double-booted, and a 2-page manual.

Comparison of Apple, Epson, IBM, Microcomputers for Applications in Rehabilitation Systems for Persons with Physical Handicap. Revision D, 1984

GC Vanderheiden This report provides a framework and discussion for comparing microcomputers as they relate to applications in rehabilitation. The report is structured in such a way that it can comparatively evaluate the systems in terms of costs and functions, and is formatted so that it can be used to profile and compare other computer systems. Information on the IBM PC, Apple IIe, TRS-80 Model 3 and 100, Epson HX 20, Sharp 1500/Radio Shack PC2, and HP75 are provided as examples.

Considerations and Approaches to Modifying and Designing Terminals to Allow Access by Handicapped Individuals to Data Processing Information Retrieval Systems. GC Vanderheiden 1981 $2.00 This paper discusses some of the potentials and problems involved in making computer terminals and data processing systems available to handicapped individuals.

International Software/Hardware Registry GC Vanderheiden and L. Walstead $15.00 Program and adaptations for microcomputers to facilitate their use by handicapped individuals. Section 1 of the registry and listing provides a one-page description and a cross-reference listing of programs which have been written or adapted for use by individuals with handicaps. Each one-page entry includes a description of the program, the computer used, memory required, language used, accessories required, and current status and availability. Section 2 contains selected software that is not written for use by handicapped individuals, but which is particularly useful in offsetting their special needs. Section 3 provides a one-page categoricial listing of special hardware modules and adaptors to facilitate use of microcomputers by handicapped individuals. Section 4 provides additional notes on adaptations and tips on the use of microcomputers by handicapped individuals. However, if you are looking for information on controls, switches, mounting, accessible accessories, etc., you won't find them in the Registry, please refer to the Non-Vocal Communication Resource Book from the Trace Center, the Rehab Sourcebook, or the Guide to Controls from Children's Hospital at Stanford, and to the sections on CONTROLS, COMMUNICATION, and ENVIRONMENTAL CONTROL for references on these topics.

Practical Application of Microcomputers to Aid the Handicapped G C Vanderheiden January 1981 $1.00 Microcomputers are providing rehabilitation engineers with powerful tools for designing cost-effective assistive devices. Potentials, approaches, and current shortcomings are discussed.

These publications are available from Reprint Service, Trace Center, 214 Weisman Center, 1500 Highland Avenue, Madison, WI 53705. Prepaid U.S. dollars only, payable to "University of Wisconsin--Madison."
USING A COMPUTER WHEN YOU CANNOT USE ITS STANDARD KEYBOARD

The Trace Center provided the answer to the following question. If you are still a little naive about computers and don't understand all the jargon, please refer to the glossary in any of the mass market "intro to computer" books.

How can I use a computer if I can't use its standard keyboard?

At the present time, there are four basic approaches for using a microcomputer or large computer, even if you have difficulty with the standard keyboard.

1) Custom Software

There are a number of custom software programs which have been written or adapted for use by handicapped individuals. Some of these programs require as little as one switch to operate. These programs generally run on the standard computer with little or no modification. They allow the handicapped individual to use the computer for these programs, but since the computer can only run one program at a time, it is not possible to use these programs to control other standard computer programs.

Some of the new operating systems, however, are allowing options which allow you to specify what the "keyboard" input to come from in such a way that it does not affect the operation of the rest of the computer or the use of the computer screen for the display. If a serial input port is specified as the "keyboard" in this fashion, it provides the equivalent of a "keyboard emulator", as described below. This emulator, however, will only work with software designed to run on these operating systems.

2) Modification to the System Software

This approach involves changing the firmware (fixed software) which other programs use to read the keyboard, etc. One could modify the BIOS in a CP/M system to do this. Any software used in the CP/M system thereafter could include this new feature. Unfortunately, there are many pieces of software which use tricks of various kinds to increase their speed or flexibility. These tricks often rely on an unmodified operating system or circumvent the operating system (or monitor routines). As a result, these software system modifications provide only a partial solution, and work with only an unpredictable subset of the software for any given microcomputer. At the present time, no good patches or modified software systems have been identified. They are identified, they will be listed in the Software/Hardware Registry.

3) Keyboard Emulators

About the only way to guarantee that a handicapped individual will be able to use standard software is if it is impossible through any software means to tell the difference between the handicapped individual using the keyboard and using his special interface. To accomplish this, a keyboard emulator could be used. This emulator would plug into the computer between the keyboard and the computer, and would look electrically identical to the keyboard. The handicapped individual would use whatever communication aid or interface was most appropriate. The output of the aid would go into the keyboard emulator, which would then feed it into the computer as if it had been typed on the keyboard. By using a keyboard emulator, therefore, an individual on a scanning aid, for example, would be able to use any standard software written to be operated by the keyboard of that computer (Programs which use game paddles or push buttons would require game paddle or push button emulator capability as well). The individual would be able to do anything from his "keyboard" that anyone else could do from the normal keyboard, he/she would be able to write programs for the computer as well as run existing programs.

Use of a keyboard emulator does not affect the normal uses of the computer in any way. The normal computer keyboard remains active and functional at all times, whether the keyboard emulator is being used or not. Thus, installation of a keyboard emulator in a computer allows access to the computer by handicapped individuals using special aids, but does not in any way degrade the function of the computer for non-handicapped users.

Commercially Available Keyboard Emulators

Several keyboard emulators are currently available. Prentke Romich Company (PRC) makes one which is designed to work with their Express communication aids. This keyboard emulator uses a two-wire serial ASCII input on a 1/4" phone jack. Although designed to work with the Express aids, this emulator can also be used by other serial output communication aids. No "busy" line is provided, the sending aid must therefore be careful to not send characters faster than the computer is expecting them, or they will be lost. This emulator has a switch which allows it to be used with aids having standard RS-232 output as well as with the Express aids. PRC currently has keyboard emulators available for the Apple II, Apple Ile, Atari, and IBM.

ZYGO also has an Apple keyboard emulator. It can also be used on the Franklin Ace. This emulator works only with the ZYG0 communication aids, and has a special connector which interfaces directly to the connector on the side of the ZYG0 aids. Since the ZYG0 is not normally able to put out full words, the keyboard emulator has been designed to handle or provide some full-word commands in addition to single characters (e.g., "CATALOG", "R", etc). ZYG0 also has the TETRA-SCAN aid, which is a special scanning computer interface which includes its own keyboard emulator. Other related products are also in the works.
The Trace Center is currently working on a series of keyboard emulators. These emulators are being designed to allow access to a broad range of commonly used computers and terminals. Wherever possible, these modules will support a "busy" line to allow communication aids to send out complex command strings to computers. These emulators will then meter the commands to the computer as it is ready to receive each successive command or keystroke.

The interface card by Paul Schwejda (see below) also has a keyboard emulating capability in addition to its other input modes.

Johns Hopkins University has also developed a Morse code interface which has a built-in keyboard emulator. This unit is now being marketed by Medical Equipment Distributors in Chicago. It is designed to be used with the Apple II Plus computer.

For further information on these and other keyboard emulators, see the International Software/Hardware Registry.

4) Parasitic, Transparent Systems with Integral Keyboard Emulators

The previous section described the use of keyboard emulators with independent communication aids. They could also be independent interface systems which are physically built into the same box as the computer, but which have their own intelligence, display, etc. This is the most straightforward and fool-proof method to provide the handicapped individual with a means for controlling the computer in a way that will still allow the use of standard, unmodified software.

There are ways of accomplishing the same basic objective, however, without using fully independent systems. These techniques, however, in order to carry out their task of being compatible with all software, must exist within the computer without altering the state of any portion of the computer, and without using any CPU time. Since it is impossible to do all three of these things, none of the techniques in this category will work with all software. The amount of software with which they will work is purely dependent upon the cleverly they are implemented. In general, they are not as good a solution as using a keyboard emulator and having the second computer or a communication aid do the actual interfacing with the handicapped individual. Techniques in this category can, however, be less expensive than having a second independent computer/aid.

Two different efforts in this area should serve as examples. One effort is the Adaptive Firmware Card by Paul Schwejda, in Seattle, Washington. The second is a project under development at the Trace Center.

Paul Schwejda's Adaptive Firmware Card is designed to be used with the Apple microcomputer. It provides several different input modalities, including 1) assisted keyboard (for one-finger or mouthstick operation), 2) various types of scanning (for single-switch input), and 3) Morse code (for multi-switch encoding). The card plugs into slot 7 in the microcomputer, where it is the first to be scanned at start-up. The card has a keyboard emulator built into it which allows it to control standard software. The card also has an interface box which mounts to the side of the Apple and allows users to connect special keyboards, switches, etc., to the firmware card, and use them for input.

The firmware card has all of its programs stored in ROM on the card itself. Thus, it uses no space in the computer for its programs. In addition, it has sufficient RAM on-board to be able to run its programs completely independently from the Apple system RAM. Because the card is almost completely transparent (i.e., cannot be "seen" by the computer), and does not use or alter the main memory, the card can be used with most software without modification to the software.

It does use some CPU time, however, and could throw off programs with crucial timing loops. (One interesting use of the ability to interrupt the CPU would be to slow the program down by simply stealing a significant portion of the CPU time. Through this mechanism, the firmware card allows users to slow programs down from their ordinary speed, which is occasionally faster than the handicapped individual would desire.

Please note that there are two different versions of the Paul Schwejda Adaptive Firmware Card, one for the Apple II Plus and one for the Apple IIe.

Software Approach

The second example involves a purely software approach to the problem, although a software/hardware implementation could evolve. This work involves the modification of the operating system to implement other input routines besides the keyboard. This pure software approach is possible due to the design and structure of the operating system. Unfortunately, many programs currently go around the operating system in the computer. Thus, the modifications we make for computer access would be ignored, and many programs would not be accessible. Also, frequent updates to the operating systems by the computer companies could make "patches" obsolete. Work is continuing in this area in coordination with the software/computer companies themselves to see if solutions can be developed.

Summary

There are several ways to interface Apples and other computers to handicapped individuals. Some of these involve modification of the actual software. Others involve modification of the hardware. The best approaches are the ones which allow the computer systems to use standard software. These approaches open up a much broader spectrum of materials and opportunity to the handicapped individual. They also allow the individual to actually program the computer himself.

The best overall approach to the problem is the use of a well-designed keyboard emulator. Such an emulator would be transparent (invisible to the computer), and would allow the use of all.
standard software and hardware accessories which are developed for the given computer. The keyboard emulator can be fed from another communication and from another microcomputer. For example, a small (inexpensive) microcomputer with a custom program written specifically for that individual (or that individual's type of handicap) could be used with a keyboard emulator in order to allow the individual to access any standard software on a second microcomputer. To do this, the two computers would not necessarily have to be the same make or model of computer, nor even from the same manufacturer. One computer could therefore be chosen to provide the characteristics and capabilities to best match the user's interface needs and abilities at an optimum price. The second computer would be chosen to have the capabilities and characteristics necessary to run the types of programs or utilize the types of standard software that the individual is most interested in using.

For more information on this topic area, see "Computers Can Play A Dual Role," available from the Trace Center Reprint Service or from the September 1982 issue of BYTE Magazine.

The best way to keep up with the latest developments in this area would be to check the Hardware section of the International Software/Hardware Registry. This Registry lists special interface programs and hardware modules as they become available.

Addresses of organizations cited in this article:

Medical Equipment Distributors
1701 South 1st Avenue
Maywood, IL
312/681-2828

Prentke Romich Company
8769 Township Road 513
Shreve, OH 44676
216/567-2906

Paul Schweida
Adaptive Peripherals
4529 Bagley Avenue North
Seattle, WA 98103

Trace R&D Center
1500 Highland Avenue
314 Waissman Center
Madison, WI 53705

ZYGO Industries
P.O. Box 1008
Portland, OR 97207
503/297-1724

According to the editor of "Network News,"

"The more often a company is asked how to modify their brand of microcomputer for specific populations and uses, the more likely that company will be to incorporate transparent access into the design of their machines. Additional effort on this part of physically disabled individuals and those professionals working with them may be required to keep the interests of physically disabled individuals and other disabled persons in the awareness of microcomputer manufacturers and software producers. Computer manufacturers can be contacted by writing

"APPLE COMPUTER INC., Education Division, 20525 Manzan Drive, Cupertino CA 95014, (408)996-1010

"ATARI INC, Home Computer Division, P.O. Box 61657, Sunnyvale, CA 94086, (800)538-8547

"IBM/IBM-PC/IBM-PCJR, Educational Marketing, P.O. Box 1328, Boca Raton, FL 33432, (404)238-2208

"COMMODORE BUSINESS MACHINES, INC., 120 Wilson Drive, West Chester, PA 19380, (215)331-9100

"RADIO SHACK, P.O. Box 2625, Fort Worth, TX 76113, (817)390-3700"

Just because an information source has "computer" and "a word related to disability" in the title does not mean that it will meet your needs.

Computer applications for the disability field seem to fall into 12 major areas. These are best represented in a generic model (below) of computer applications for handicapped persons. From Computer Applications for the Handicapped in Special Education and Rehabilitation: A Resource Guide.

It has become increasingly important to understand the potential of computers in our lives. But before investing your time and money in books or courses on Computers and the Disabled, make sure you are going to gain the type of knowledge you are seeking, e.g., if you are looking for special hardware and software useful in the classroom for a child with a high spinal cord injury, you are unlikely to find it in a book that gives wonderful references to computer-assisted instruction (CAI) materials for learning disabled kids. In your enthusiasm to play into the world of high tech, be advised to be more selective than this writer was — or you, too, will have a shelf of useful books that are mostly useless to you (Editor).

The publications listed below could help guide you through this wealth of information, and help point to the knowledge you seek.


A Beginner's Guide to Personal Computers for the Blind and Visually Impaired. National Braille Press, 88 St Stephen Street, Boston, MA 02115. 100 pages, $12.00. This book is written for people who don't know anything about computers. It offers guidelines for buying software, definitions of computer terminology and jargon, a review of six talking microcomputers and a chapter listing information on manufacturers, computer clubs and other useful resources for personal computer shoppers.

Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide. Nave, G. Browning, P. & Carter, J. Eugene, Oregon University of Oregon, International Council for Computers in Education, 135 Education, 97403, January, 1983. 190 pages, $7.00 prepaid. This manuscript provides a means for interested persons to become informed about the newly emerging computer technology and its potential for improving the lives of physically and developmentally disabled individuals. It is a comprehensive bibliography comprised of 191 annotated references on computers for handicapped persons. The references, over half of which have been published since 1980, were drawn from more than 60 different periodicals, books, monographs, reports, and conference proceedings. A detailed descriptive narrative is provided for each reference. As reflected in the subject index, the materials cover a wide range of topical areas, e.g., Computer Assisted Instruction, Functional Aids, Microcomputer Application, Service Delivery, Management, and Research. These and other major content headings are further subdivided. For example, subsumed under the Disability/Handicap heading are the subcategories of autism, cerebral palsy, deaf, developmentally disabled, emotionally handicapped, learning disabled, mentally retarded, nonvocal, physical general, quadriplegic, and severely disabled.

Consumer Reports has an excellent series of articles on computer selection for the general public. They are usually available at your local library (The Library of Congress publishes Consumer Reports on sound sheets).

Microcomputer Resource Book for Special Education. Dolores Hagen. 1984. 224 pp. $15.95. Almost one third of the book is devoted to a series of appendices which provide information about more than two hundred publishers of software products. Products are grouped by disability area and detailed information is provided about each program's use. Management programs, information on hardware including adaptive devices, and resources on LOGO are also included. Highly readable for parents and teachers.

A Generic Model of Computer Applications for Handicapped Persons.

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From "Computer Technology for the Handicapped in Special Education and Rehabilitation: A Resource Guide".
Microcomputers in Special Education, Selection and Decision Making Process. Florence M. Taber. 1983. 112 pp. $7.95. Provides the kind of information and guidance school administrators and other decision makers need before committing themselves to a given microcomputer system. Considerations related to software evaluation, hardware, and inservice education are covered, including rating forms and questionnaires.

Personal Computers and the Disabled, A Resource Guide. Apple Computer, Inc. Has prepared this document as a public service to stimulate research into personal computer applications for the disabled. "This guide brings together a range of ideas and information to help people use personal computers in applications designed especially for the disabled. In it you'll find feature articles on how the computer is helping the disabled to overcome obstacles that once limited career opportunities and job performance. You'll also find articles on how the computer is helping individuals communicate even when motor and speech functions are severely impaired. Some are using personal computers to tap their creativity in art, writing, and computer programming."

"If you are a software developer, original equipment manufacturer, or computer dealer, this guide will introduce you to specific personal computer products and applications for the disabled. If you're already working on applications for the handicapped, this guide provides a way for you to let others know what you are doing."

This booklet has an excellent resource directory listing people and organizations active in the area of personal computers for the disabled. A free copy of the Resource Guide is available from your local Apple computer dealer, or contact Apple Computer, 20525 Marian Ave., Cupertino, CA 95014.


Signs for Computing Technology. National Association of the Deaf Book Store, 814 Thayer Avenue, Silver Spring, MD. 20910. $19.95 plus $1.50 for postage and handling. This book lists signs for more than 600 computing terms. The book will assist deaf people working in the computer industry, as well as managers and co-workers who want to facilitate technical communication with their deaf peers. The book will also be helpful for data processing instructors teaching deaf students.

Also see the Trace Center Publications which have already appeared in this section.

MICROCOMPUTER APPLICATIONS

CLE: RINGHOUSES AND CATALOGS


HHDB Online Courseware Directory. Handi-House. CAI, 69 Winchester Avenue, Spruce Grove, Alberta TOE 2CO, Canada. 403/962-3933. Handi-House CAI is a division of DSS Decision Support Systems Limited, and was formed in 1982 as a computer software clearing house for individuals experiencing handicaps. The clearinghouse responds to a need for centralized information, consulting, evaluation, and registration of suppliers of computer-aided instruction programs matched to users.

Handi-House offers an inquiry answering service by which clients are provided with a list of software and suppliers matched to individual needs and equipment. Information requests are maintained for one year, during which new updates will be sent to clients as additional software becomes available. Additionally, its software customizing service includes the provisioning and modification of software on a time and materials cost basis.

Data sources include other clearing houses, authors, personal computer suppliers, libraries, data bases, government agencies, research centers and educators.

The Handicapped's Source. A division of Computability Corp. J.A. Reston Corporation, 60 Page Road, Clifton, NJ. 07012. 800/631-7277, 201/777-2700. This catalog offers descriptions of personal computers, hardware, software, peripherals, and the services available to the disabled individual and those who assist them through rehabilitation and care services.

The MECC Educational Computing Catalog. Minnesota Educational Computing Consortium, 3480 Lexington Avenue North, St. Paul, MN 55112. 612/638-0627. Contains a complete listing of courseware developed by MECC for the Apple II personal computer and the Atari home computer. Containing a wide range of sections, it includes one on special education which describes several programs particularly suited to handicapped students.

NEWSLETTERS

BAUD is the newsletter of the Blind Apple Users Group. It is available from Joe Giovaneli, 1158 Stewart Avenue, Bethpage, NY 11714, phone 516/433-0171

The Bulletin of Science and Technology for the Handicapped, American Association for the Advancement of Science, 1776 Massachusetts Ave, Washington, DC 20036 No charge

The Catalyst Western Center for Microcomputers in Special Education, 1259 El Camino Real, Suite 275, Menlo Park, CA 94025, 415/326-6997 Subscriptions Organizations $20.00, Individuals $12.00

Communication Outlook is an international publication which provides a forum for individuals interested in the application of techniques and aids for people who experience communication handicaps due to neurological or neuromuscular conditions. It is a cross-disciplinary information source and regularly has articles related to microcomputer applications. Subscriptions cost $12 ($15 outside North America), are available from Artificial Language Laboratory, Michigan State University, East Lansing, MI 48824

Closing the Gap is a bimonthly newsletter aimed specifically at the use of computers for handicapped persons. This newsletter covers hardware, software reviews and articles on computers as they affect handicapped people in education, independent living and employment. Subscriptions are $15.00 per year in the US, $22.00 per year in Canada and Mexico, and $33.00 per year in all other countries. Write to Closing the Gap, Route 2, Box 39, Henderson Minnesota 56044 Phone (612) 685-6573

Link and Go is published by the Committee on Personal Computers and the Handicapped (COPH-2), a part of the Illinois Congress of Organizations of the Physically Handicapped (COPH). Its purpose is to search out, evaluate, and share information about personal computer systems as relevant to the person with disabilities in its membership. A major stance of its founders is that COPH-2 is a mainstreaming effort which will enable persons with disabilities to use the same computer technologies with the same attitudes as the public at large. The newsletter is an excellent information resource. Quarterly, $8.00, which includes membership dues. Available from COPH-2, 2030 West Irving Park Road, Chicago IL 60618

Raised Dot Computing Newsletter. This monthly newsletter focuses on personal computer applications for the blind. It includes information on the use of low-cost Braille devices, voice synthesizers, paperless Braille, and the use of microcomputers in Braille translation. In addition, the newsletter supplies technical notes and information on the use of software and hardware products that extend the performance of Braille-Edit, a product of Raised Dot Computing. Print or radio subscriptions are available from Raised Dot Computing, attn: David Holladay, 310 S. 7th Street, Lewisburg, PA 17837 717/523-8739

Re Able is a bi-monthly newsletter on computer-assisted living published for the professional community and the disabled. Re Able explores the newest in computer equipment and new technology. Each issue details advances in equipment and applications, with emphasis on the usefulness to the disabled. Evaluations of hardware and software, products, books, and resources provide the professional with information vital to serving the disabled. Subscriptions are $18 per year ($21 overseas). Send to Re Able, P.O Box 384, Bellflower, California 90706

Sensory Aids Technology Update is a monthly newsletter on technology and employment issues concerning disabled people. This new publication is a rich source of information on technology applications. It is particularly valuable to people looking for information on sensory aids (hearing and vision), but is also useful for other types of technology. It has features on new products, special employment, education and training programs, unusual applications of technology, and new developments in research. New publications and interesting audiovisual programs are regularly reviewed, and each month the product comparison section profiles similar devices. It includes news from overseas. The articles are concise and include references to guide you to further information. A typical issue includes Accessing dedicated word processors, Financing adaptive aids, Project Partnership: Equipment demo centers for hearing impaired, Apple software customized for speech output (December, 1983). A one-year subscription to Update is $30.00, available from Sensory Aids Foundation, 399 Sherman Avenue, Suite 12, Palo Alto, CA 94306.

SIGCAPH Newsletter. A quarterly publication of the ACM Special Interest Group on Computers and the Physically Handicapped, print and tape cassette versions. Available from Computing Machinery, 11 West 42nd Street, New York, NY 10036

MASS MARKET COMPUTER MAGAZINES

BYTE, Volume 7, No 9, September, 1982 BYTE Publications, Inc. P.O. Box 328, Hancooc, NH 03443 $3.70 The theme in the September 1982 issue is "Computers and the Disabled". Greg Vanderheiden discusses how "Computers Can Play a Dual Role for the Disabled," and with co-author Paul Schweda demonstrates how to make an "Adaptive Firmware Card for the Apple II,". David Stoffel reviews talking terminals for the blind and William L. Rush evaluates the Ablephone, a device for nonvocal communication. Patrick Dernasco and Richard Foulds show how the Panasonic Hand Held Computer can be used as a communication device in "A New Horizon for Nonvocal Communication Devices". Steve Garcia brings you his latest speech-synthesis system in "Build the Microvox Text-to-Speech Synthesizer Part 1 -- The Hardware,". Dr. William Murray reviews The Cognivox VI-1003, a speech-recognition system, Bruce Baker discusses his highly original Minspeak associative memory system for portable speech synthesis and Alfred Fant, Jr shows you how to use a line printer to produce Braille. In case you're thinking of marketing your own computerized aid, see BYTE's overview of the FDA's regulations con-

CONFERENCE PROCEEDINGS

Computers for the Disabled Conference Papers
Edited by Janet E. Reehl, Ph.D. Available from Materials Development Center, Stout Vocational Rehabilitation Institute, School of Education and Human Services, University Wisconsin-Stout, Menomonie, Wisconsin 54751 1984

"This conference provided teachers, administrators, counselors, government personnel, researchers, purveyors of computer technology, and persons with disabilities an excellent opportunity to learn about the advances made in computer technology that are impacting special education and vocational rehabilitation today."

The conference was held September 12-14, 1983 in Minneapolis, Minnesota. There were over 500 participants, 60 presentations, 40 exhibitors, and three keynote addresses.

"The Conference Papers offer an abundance of new ideas, research findings, and innovations that were presented at Discovery '83 Part I includes the three keynote addresses. They were given by Dr. Douglas A. Fenderson, Director, National Institute of Handicapped Research, United States Department of Education; Dr. Gregg Vanderheiden, Director, Trace Research and Development Center for the Severely Communicatively Handicapped University of Wisconsin-Madison; and Mr. Thomas Shworles, Chairperson, Committee on Personal Computers and the Handicapped (COPH-2), Illinois Council of Organizations of Physically Handicapped. These addresses are printed in order of appearance.

"Part II is the papers presented during the three-day conference. These include reports of research activity in computer usage, papers detailing the modification of hardware and software, as well as designing of new products. The general interest areas were deaf and hearing impaired, blind and vision impaired, physically handicapped, learning disabled, and EMT-TMH."

Computers and the Handicapped Tutorial, Canadian Medical and Biological Engineering, Society Secretariat, 1142 Elmlea Drive, Glouster, Ontario, Canada K1J 6V9 613/993-0475. An overview of new programs, accessories and communication aids that work with the Apple II and other personal computers to help the physically-disabled. The articles were presented in June, 1982, in Ontario, Canada, at a tutorial sponsored by the Biomedical Engineering Research Program. A sampling of the 18 articles contained in the guide include "Interfaces for Physically Handicapped Persons" by J.R. Charbonneau, "The Handicapped Typewriter" by Simon Cox and Bill Smith, and "Application of the Apple Microcomputer as an Augmentative Communication Aid for the Non-Vocal Physically Handicapped" by Penny Barnes and Kathy Lee.

Computers and the Handicapped Workshop, Canadian Medical and Biological Engineering, Society Secretariat, 1142 Elmlea Drive, Glouster, Ontario, Canada K1J 6V9 613/993-0475. This publication compiles the results of the Workshop on Computers and the Handicapped held in June, 1982, in Ontario, Canada. The purpose of the Workshop was to present new developments in the use of personal computers for the handicapped, and to address many of the problems and limitations in this field. A sampling of the 17 articles that appear in the guide includes "Choosing a Dedicated Communication Device vs a Personal Computer What Are the Differences and What Difference Does It Make?" by Shirley McNaughton, "Technical and Social Implications of Computer Use by the Handicapped Consumer" by Patricia and John Israel, and "Impact of Low-Cost Microcomputer Technology for the Blind" by Ian Lowrie.

Proceedings of the Johns Hopkins First National Search for Applications of Personal Computing to Aid the Handicapped, October 31, 1981, The Institute of Electrical and Electronics Engineers, Inc. (IEEE) Computer Society, New York, New York. 30 pages 1981 Available from IEEE Computer Society, P.O. Box 80452, Worldway Postal Center, Los Angeles, CA 90080. A national search for applications of personal computing to aid the handicapped was carried out by the Johns Hopkins University Applied Physics Laboratory. This one-year program was sponsored by grants from the National Science Foundation and Radio Shack, A Division of Tandy Corporation. Professionals, amateurs, and students were invited to present their ideas and concepts, leading to ten winners being selected by a panel of judges in each of ten regions of the United States, as well as ten prizes awarded on a national level. One important output from this contest was the increased awareness by technical computer personnel of the problems and needs of the handicapped.

The sources of the hardware and software resulting from this contest are difficult to locate. The Trace Center International Hardware/Software Registry now includes all hardware and software that was reported in this document and is known to be currently available.

The Institute of Electrical & Electronic Engineering (IEEE) Computing Society has committed itself to furthering the use of computer technology for aids for the handicapped by creating a Technical Committee (TC) on Computing and the
Handicapped, and by supporting such activities as the Johns Hopkins National Search Workshops have been held annually, and proceedings are available

Proceedings of the IEEE Computer Society Workshop on Computing to Aid the Handicapped, November 4-5, 1982, Charlottesville, Virginia. Available from IEEE Computer Society, P.O. Box 80452, Worldway Postal Center, Los Angeles, CA 90080


For information on the 1984 conference, which is scheduled for November 8-9, 1984, in Wichita, Kansas, contact Dr. Elmer Huyer, Wichita State University, University Box 44, Wichita, Kansas 67208.

This conference will provide a forum for interaction between those involved in the use of computers in special education and those designing the hardware and courseware. Proceedings are also expected to be available from this meeting.

Proceedings of the National Conference on the Use of Microcomputers in Special Education, Hartford, Connecticut, March 1983. Michael M. Behrmann, Editor, Liz Lahm, Assistant Editor 1984. Approx. 200 pp. $20.00. The Proceedings from CEC's First National Conference on the Use of Microcomputers in Special Education was undertaken to provide state of the art information on the application of microcomputer technology to special educators. Presentations are grouped thematically in five major sections. Section I is an overview and includes the two keynote presentations, the material from the special continuing education training, and other presentations of general interest. Section II, on Management, includes computer assisted management and computer managed instruction. Section III, the teacher training section, is directed specially toward teacher literacy in the use of microcomputers. Section IV includes material on training children in computer literacy and presents some instructional uses with exceptional children. Section V, Computers as Tools, presents papers that show how computers can be used as tools by handicapped individuals. Information about commercial resources gathered from conference exhibitors is also included.
ELECTRONIC INFORMATION EXCHANGE NETWORKS

A newsletter for those involved in electronic mail systems is Handi-Communications. Quarterly newsletter for Working Group 65 (Computer Message Systems) of IFIP (International Federation for Information Processing), Julian Davies, Editor Published at the Department of Computer Science, University of Western Ontario, London, Ontario, Canada N6A 5B7 519/679-3569 or 519/679-6016 Annual subscription $5.00 Canadian in Canada, $5.00 US elsewhere Single issues $1.50 This newsletter is devoted to the topic of computer communication systems and their use by or for handicapped people. It is published for those concerned that the needs of the handicapped be met in the design and provision of computer message systems. The main focus for Handi-Communications is in Computer Based Message Systems (commonly known as "electronic mail"). They will cover other aspects of telecommunications for handicapped people that have a bearing on message systems, such as terminal design. A hard-copy distribution is the only medium available initially, but proposals to arrange distribution in other forms are welcome. In particular, the text can be made available in computer-readable form, and could be distributed electronically

Large Networks

These large networks also provide a means of information exchange for disabled people

Compuserve, 5000 Arlington Center Blvd, P O Box 20212, Columbus, OH 43220 800/848-8199

In addition to a wide range of general information, financial data, games, newspapers and a travel bureau, Compuserve offers a database especially designed for disabled computer users. This database includes addresses of organizations providing services to disabled people, information about adapted software, and articles describing various disabling conditions.

Source, Source Telecomputing Corporation, 1616 Anderson Road, McLean, VA 22102 703/734-7500

National Networks Devoted to Disability

CONFER: See INFORMATION RESOURCES section, p 14

Handicapped Education Exchange (HEX) See INFORMATION RESOURCES section, p 14

Special Net: National Association of State Directors of Special Education, 1201 15th Street NW, Suite 404E, Washington, DC 20036 202/822-7933 See INFORMATION RESOURCES section, p. 14

DEAFNET See SENSORY AIDS section, p 219

Model Projects for Local Disability-Related Networks

CHIP Network, 222C View Street, Mountain View, CA 94041 415/968-8798 The Community Health Information Project (CHIP) is developing a permanent microcomputer-based network called WellNet. This information exchange, based on Apple computers and Communitree electronic bulletin board software, will form the basis of a larger network that will link rehabilitation groups, health-service organizations, and disabled groups and individuals in the Santa Clara Valley and eventually the Bay Area. The network will include a transportation bulletin board (ride board), consumer evaluations of products and services, an international program, health care aids, and services to buy, sell, or barter. WellNet currently involves four California-based organizations. CHIP in Mountain View, Physically Limited Services at DeAnza College in Cupertino, Center for Independence for the Disabled in Belmont, and United Cerebral Palsy in Palo Alto

DEAFNET: See SENSORY AIDS section

"Land of Ah's" Network, Topeka Independent Living Resource Center, 421 Southeast Winfield, Topeka, KS 66607 913/333-6233 The "Land of Ah's" Network is currently under development by four agencies in the state of Kansas. This Apple-computer-based network will allow the disabled throughout the state of Kansas to share information, resources, and technical assistance on independent living. In addition, disabled volunteers will be trained to operate and maintain the information network, enabling them to become knowledgeable in areas of computer technology. It will also increase their potential for employment. Agencies developing the network include the Topeka Independent Living Resource Center, Independence Living Resource Center, in Lawrence, Operation LINK in Hays, and Kansas Rehabilitation Services in Topeka
CONSUMER-RUN INFORMATION EXCHANGE NETWORKS

Blind Apple Users Group, Contact Joe Giovenelli, 1158 Stewart Ave, Bethpage, NY 11714, 516/433-0171

Committee on Personal Computers and the Handicapped (COPH-2), 2030 West Irving Park Road, Chicago, IL 60618 312/477-1813 COPH-2 is a consumer-based organization which provides members with technical assistance, personal computer loans, use of a resource library, and networking opportunities. The organization also designs and produces keyguards to prevent inadvertent striking of keys, publishes a quarterly newsletter, and conducts public education meetings.

Quadriplegics Communications Group Inc, 407-333 Strasbrook, Winnipeg, Manitoba R3L 0J5, CANADA

DISABLED CHILDREN'S COMPUTER USER GROUPS

Disabled Children's Computer Group, c/o Lawrence Hall of Science, University of California, Berkeley, CA 94720 The Disabled Children's Computer Group was formed in November, 1983 by a group of parents of disabled children. Among the members of the group are parents, teachers and professionals in the field of education, social services and computer technology. The DCCG provides a forum for the sharing of information and experiences about computer applications for disabled children (visually impaired, hearing impaired, physically disabled, learning disabled and developmentally disabled).

DCCG activities include general meetings where presenters demonstrate uses of hardware and software (held every other month at the Lawrence Hall of Science, UC-Berkeley), weekend workshops on specific topics, maintaining a collection of reference materials, housed in the LHS science and math library, and demonstrations and presentations at local community conferences and meetings. DCCG, working with the Lawrence Hall of Science, is seeking support to establish a "lending library" of computer hardware for disabled children, which would provide parents the chance to try out a system before investing in it, a demonstration center featuring computers for disabled children, serving as a focal point for hardware modification and software development, and for parent, teacher and student training, and a local computer network to share resources and needs, in part via an electronic bulletin board.

Kansas Handicapped Children's Computer Cooperative, HCC, 7938 Chestnut Street, Kansas City, MO 64132 Newsletter $4.00/year

SPECIAL INTEREST GROUPS

Handicapped Special Interest Group (SIG), International Apple Core, P.O. Box 261, Lincoln, MA 01773-817/886-1581 Handicapped SIG is one of 30 special interest groups under the organizational umbrella of the International Apple Core (IAC), a group of Apple computer users. The group currently functions as a clearinghouse of resources and information for Apple users, and potential users, who are handicapped.

Occupational Therapy Microcomputer Club, Marilyn Sidler, president, P.O. Box 158, La Mesa, CA 92031 Occupational therapists who now have or plan to acquire a microcomputer have formed a special interest group. A newsletter is available.

SIGCAPH Special Interest Group on Computers and the Physically Handicapped, Association for Computing Machinery, 11 West 42nd Street, New York, NY 10036. Open to all computer professionals and others with serious interest, not just their disabled colleagues, SIGCAPH was founded in 1970 with the following aims: promoting the professional interests of computing personnel with physical disabilities, promoting the application of computing and information technology toward solutions of disability problems, promoting public education in support of computing careers for suitably-trained blind, deaf, and motor-impaired individuals. Publishes quarterly SIGCAPH Newsletter in cassette "talking" edition as well as print version.
RESOURCES FOR SPECIAL APPLICATIONS

INFORMATION ON COMPUTER APPLICATIONS IN SPECIAL EDUCATION

The Council for Exceptional Children (CEC) was founded in 1922 to serve those who serve the educational needs of exceptional children. It has 989 local chapters, 46 student & teacher associations, 58 state chapters, and 12 special education divisions.

The following publications and resources on microcomputers in Special Education are available from CEC, Department SS12, 1920 Association Drive, Reston, Virginia 22091-1584:

Microcomputer Resource Book for Special Education Dolores Hagen 1984 224 pp $15.95 This book provides understanding of the microcomputer as a life competency tool. The full spectrum of software and adaptive devices are described. Material is supplied on learning disabled, hearing impaired, visually impaired, mentally retarded, and physically handicapped. Computer needs of each disability group are examined. The advantages and disadvantages of each type of program are weighed. Descriptions of real children's experiences with computers are included. Appendices provide information about more than two hundred publishers of software products. Products are grouped by disability area, detailed information is provided about each program's use. Management programs, information on hardware including adaptive devices, and resources on LOGO are included. Shows how computers can work for children at home and in the classroom.

Microcomputers in Special Education: Selection and Decision Making Process Florence M. Tiber 1983 112 pp $7.95 Provides the kind of information and guidance school administrators and other decision makers need before committing themselves to a given microcomputer system. Considerations related to software evaluation, hardware, and in-service education are covered, including rating forms and questionnaires. Includes chapters on effective uses of the microcomputer for instructional and administrative purposes, elementary programming, and special education applications. Useful to the individual engaged in the selection and decision making process. Also appropriate as an incentive or supplementary text for regular and special educators.

Microcomputers in Special Education: Special Issue of Exceptional Children, October 1982

Proceedings of the First Conference on the Use of Microcomputers in Special Education Hartford, CT March 1983 M.M. Berhman, Editor, L. Lehm. Assistant Editor 270 pp $20.00 Description listed in Conference Proceedings section, p 240

Special-Ware Directory LINC Resources, Inc 1983 97 pp $13.95 A resource on microcomputer software for special educators. It lists and describes commercially produced software which is useful in special education programs included in the directory are three categories of software: (1) software designed specifically for special education use, (2) software applicable to special education, and (3) software which may be modified for special education use.

Computer Search Reprints

Computer search reprints are bibliographies with abstracts from the ERIC and ECER databases. Topics that continue to be popular are updated twice a year. Computer search reprints are $10.00 each:

506 Computer Assisted Instruction for Handicapped Children and Youth (100 abstracts)
509 Use of Computers in Regular and Special Education Teacher Education (100 abstracts)
528 Computers and Gifted Students (50 abstracts)
532 Computers Managed Instruction for Handicapped Students (50 abstracts)

Technology and Media (TAM) A New CEC Division

TAM was recently organized to be an international association of special education professionals interested in technology and media, and its impact upon the diagnosis, treatment and educational habilitation of exceptional persons. It works toward promoting a closer professional relationship among educators and others concerned with the uses of technology and media with exceptional children, encouraging development and dissemination of new applications, technologies, and media, initiating and working cooperatively with education agencies, government, and business and industry in research demonstration, and validation efforts, and advancing standards for technology and media to be used with exceptional individuals. For more details on TAM, contact membership committee chairperson Dr. Charles MacArthur, P.O. Box 47, Vienna, Virginia 22180, 301/454-5427

Project RETOOL CEC Training Project on Microcomputers in Special Education for Teacher Educators. Elizabeth McClellan, EdD Coordinator 1920 Association Drive, Reston, VA 22901, 703/920-3660 The RETOOL Center is in the process of forming a network of teacher educators who are interested in microcomputers. The purpose of the network is to provide a means of communication for microcomputer users who want to request information on a particular topic or to share information and resources. The network will be using the SpecialNet system of communication. Any TED member who is interested in technology and who have access to SpecialNet are encouraged to join. A bibliography, "Microcomputers in Special Education," is available from the RETOOL Center.

To get more information on CEC's initiatives in technology, write to: Future CEC Training and Technical Assistance in Special Education Technology, CEC Department of Field Services, 703/620-3660

Division of Physically Handicapped (DPH) CEC has one division supporting the interest/needs of educators of physically handicapped children. If you are member of CEC and not DPH, please consider joining this division.

The future is here." Exceptional, 13, June 1983, pages 7-43. Among the topics in this issue, which is almost exclusively on computers, are explanations of computer types, discussions on properly matching the best suited systems with special needs of different children, descriptions of available devices, personal narratives about computer experiences, and resources for parents.


Model Training Projects for Blind Children.

Twenty-two San Francisco Bay Area blind children, ages eight to eleven, will be taught by Sensory Aids Foundation (SAF) to use educational software on Apple computers. The new program, funded by a $50,000 grant from the U.S. Department of Education, hopes to demonstrate the practical and commercial feasibility of modifying off-the-shelf software for use by blind students. For more information, contact Susan Phillips, Sensory Aids Foundation, 399 Sherman Avenue, Suite 2, Palo Alto, CA 94306. 415/329-0430.

UC Berkeley's Center for Multi-Sensory Learning recently received a grant from the U. Department of Education to evaluate the educational potential of microcomputers in teaching visually impaired students from junior high school through college. For more information, contact Linda DeLucchi, Center for Multi-Sensory Learning, Lawrence Hall of Science, UC Berkeley, Berkeley, CA 94720. 415/642-3679.

INFORMATION ON COMPUTER APPLICATIONS IN COGNITIVE REHABILITATION

Cognitive Rehabilitation.

Odie L. Bracey, Editor.

This magazine is intended for those therapists doing the day-to-day therapy with brain injured patients. It publishes articles on special techniques used in therapy, observations on working in rehabilitation, information on programs available, and what seems to work and what does not. At least one complete and hopefully useful computer program will be listed in each issue. These programs will provide statistical routines, data analysis programs, record keeping programs and computerized data collection techniques. In addition, utility programs for drawing and designing screen displays, graphing and plotting will be provided. This publication provides support for sharing information about the Psychological Software Service (PSS) cognitive rehabilitation computer programs.

Published bi-monthly by B&B Publishing Co., P.O. Box 29344, Indianapolis, IN 46229. Subscription rate is $25 per volume.

Computer Treatment of Speech/Language/Cognition Disorders.

This workshop presents a system for microcomputer-assisted treatment of patients with speech, language and cognitive impairments, and can accommodate up to 5 participants at a time. It is held at Beaumont Hospital, so participants can observe patients using clinical software programs as part of their treatment on Beaumont Hospital's Rehabilitation Unit, in the hospital's Outpatient Aphasia Program and during Cognitive Rehabilitation activity, and interact with staff members using the microcomputer with brain-damaged patients at various levels of communicative impairment. For more information, contact Michael I. Rolnick, Ph.D., Director, Speech and Language Pathology, William Beaumont Hospital, 3601 W 13 Mile Road, Royal Oak, MI 48072. 313/288-8085.
MICROCOMPUTER APPLICATIONS

VOICE INPUT / VOICE OUTPUT / BLIND ACCESS

SOME SOURCES OF INFORMATION: VOICE INPUT

Maryland Computer Services, Inc
(Various voice input hardware and software)
2010 Rock Spring Rd
Forest Hill, MD 21050
(301) 879-3366

Motor Handicapped Support System ($399.00-$499.00)
(Voice recognition microcomputer access program)
ARTRA Inc
P.O. Box 653
Arlington, VA 22216

Shadow/Vet $995.00
(Voice entry terminal)
Scott Instruments
1111 Willow Spring Drive
Denton, TX 76201
817/387-9514

Talk Tyner
(Voice-operated word processor)
G.E. Rushakoff
Department of Speech, Box 3W
University of New Mexico
Las Cruces, NM 88003
(505) 564-2801

Vocalization Trainer ($)0.00)
(Visual feedback program for hearing impaired)
Ken Macurik
SVTC Box 4110
Petersburg, VA 23903
(804) 611-7274

Voice Connection
(formerly Voice Machine Communications, Inc
17835 Skypark Circle #C
Irvine, CA 92714
714/261-2365

Voice Recognition Systems
(Voice Input Module for Apple II+, Ile, and IBM
PC $995-1395)
550 Battery Road, Suite 1716
San Francisco, CA 94111
(415) 738-2007

SOME SOURCES OF INFORMATION: VOICE OUTPUT

BAYSIK Speech
(SAYIT program* for TRS-80 Model I or II - $125)
1259 E! Camino Real, Suite 289
Menlo Park, CA 94025
(415) 854-1727

Art Gaylord
(The Message Writer* program for Apple II+ - $75)
2268 Country Square Dr
Urbana, IL 61801
(217) 333-1728

Carl Geigner
(Say It* program for Apple II+ - $30)
Schneller Communications Unit, Cerebral Palsy Center
1603 Court Street
Syracuse, NY 13208

Dr. Michael Hillenger
(Syntax 1* program for Apple II)
RFD, Sharon, VT 05675
(802) 448-8388

Intelligent Software Systems
(SpeakEasy* program for Apple II+ - $500)
P.O. Box 621
Amherst, MA 01002
(413) 549-0474

I.O.R. Enterprises
(Various voice output programs)
229 Harrison Avenue
Highland Park, NJ 08904
(201) 846-5200

Maryland Computer Services
(Talking computer terminal - $599.50)
2010 Rock Spring Road
Forest Hill, MD 21050
(301) 879-3366

Raised Dot Computing
(Braille-Edit* program for visually impaired, Apple II+)
310 S. 7th St
Levisburg, PA 12837
(717) 523-6739

G. Evan Rushakoff
(Talk II* program for Apple II+ - $90)
Box 3W
Department of Speech
University of New Mexico
Las Cruces, NM 88003
(505) 546-2801

James S. Schafer
(Basic Interpreter for the Blind* program for TRS-80 Model II - $15)
33 Jackson Rd
Berlin, NJ 08009
(609) 767-2751

Street Electronics
(speech synthesizers & related software)
114th Village Avenue
Calumentia, CA 93103
(805) 684-4593

Trace R&D Center
(Talking BlissApple Program for Apple II - $35)
314 Waisman Center, 1300 Highland Avenue
Madison, WI 53705
(608) 262-6966

Votrex Division of F.J.eral Screwworks
(speech synthesizer)
500 Stephenson Hwy
Troy, MI 48084
(800) 521-1350

* These programs require a separate commercially available speech synthesizer.
Audiovisuals

Voice Input and Voice Output Technology Computers

That Talk and Computers That Listen - Division of Computer Research and Technology. Available from DCRT Information Office, Building 12-A, Room 3027, National Institutes of Health, 900 Rockville Pike, Bethesda, MD 20892. 3/4" videocassette, color, 22 minutes. 1980. Demonstrates two kinds of computer systems operated by disabled persons. One computer system has a voice box and speaks, and is operated by a blind programmer. The other computer system listens - a quadriplegic programmer talks to it.

SOME SOURCES OF INFORMATION

COMPUTER ACCESS FOR BLIND PEOPLE

The Carroll Center for the Blind
770 Center Street
Newton, MA 02158
(617) 969-6200
Publishes Aids and Appliances Review

Computer Aids
4528 S Lafayette St
Fort Wayne, IN 46806
(219) 456-2148

COPH 2 (Committee on Personal Computers and the Handicapped)
5225 N Kenmore
Chicago, IL 60640
(312) 728-9879
Publishes Link and Go newsletter (print/tape), $8.00, quarterly

Dialogue Magazine
"Technology" column
3100 South Oakpark Avenue
Berwyn Heights, IL 60402

Mr Joe Giovanelli
Audio-Tech Laboratories
1158 Stewart Avenue
Bethpage, NY 11714
(516) 433-1717
Editor of BAUD (Blind Apple Users Group)

Jarely Lauer
2010 S 7th Avenue
Maywood, IL 60153
(312)343-7959

Maryano Computer Services
Ted Hentar
2010 Rock Spring Road
Forest Hill, MD 20150
(301) 879-3366
voice output

National Braille Press, Inc
88 St Stephen Street
Boston, MA 02115
617/266-6160
Published a Beginner's Guide to Personal Computers for the Blind, available in tape/print/braille, $12.00. Also published Braille Research Newsletter

National Library Services
Regional libraries provide recorded material for people with any handicap, and Braille and large print material for blind persons. There are many books on computers available, mostly at the beginning level. "The Blind Data Processor" is a Braille magazine which provides good articles on the computer field; some of them quite advanced. Magazines such as Popular Mechanics and Science Digest also carry timely information on computers and software and are available from NLS.

Raised Dot Computing
David Holladay and Caryn Navy
310 S 7th St
Lewisburg PA 17837
(717) 523-6779

Braille, newsletter available. Source of BRAILLE EDIT (word processor/braille translator program), Cramner Modified B'ailer, and various interface guides, cables, and cards

Sensory Aids Foundation
399 Sherman Avenue
Suite 12
Palo Alto, CA
(415) 563-2323
Publishes a very informative newsletter, Sensory Aids Technology Update. Published monthly, available in print or cassette $30.00/year.

Smith-Kettlewell Institute of Visual Sciences Rehabilitation Engineering Center
2232 Webster Street
San Francisco, CA 94115
(415) 563-2323

Solutions by Example, Inc
375 Concord Avenue
Belmont, MA 02178

Source of PC Speak program, provides software interface between IBM PC and Votrax Type 'n' Talk, Votrax Personal Speech System, ECHO PC, or Intex Talker. Also source of Junior Speak, a program that interfaces the synthesizers with PCjr.

Tele-Text Electronics
1144 Mark Avenue
Carpinteria, CA 93013
(805) 684-4593
Enforce of the Echo II for the Apple I lying and 11e computers, and of the Echo PC for the IBM PC

Telsensory Systems, Inc
455 North Bernardo Avenue
P.O. Box 7455
Mountain View, CA 94033
415/960-0920
Manufactures and sells Optacon, VersaBraille, TeleBraille, SonicGuide, etc

Trifon Systems, Inc
3139 S.E. Jay Street
Stuart, FL 33473
305/283-4817
LED-120 Braille Printer, MicroBraille paperless Braille device, Braille transcription services. Offers leases on its products.
The registry provides a common reference point to help handicapped computer users determine what software and hardware adaptations are available, and where additional information can be found. If you have any programs or hardware adaptations that will benefit handicapped computer users, please fill out this form (for software), or the form on the next page (for hardware), and send it to the Trace Center, Registry Coordinator 314 Waisman Center, 1500 Highland Avenue, Madison WI 53705. For more information, call the Registry Coordinator at 608/262-6966.

TRACE CENTER INTERNATIONAL SOFTWARE/HARDWARE REGISTRY. PROGRAMS FOR HANDICAPPED INDIVIDUALS

SOFTWARE ENTRY FORM

<table>
<thead>
<tr>
<th>PROGRAM NAME</th>
<th>GENERIC NAME</th>
<th>SORT CODES (see code explanation, next page)</th>
<th>PROGRAM DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

HARDWARE REQUIREMENTS (Standard, modified, or custom boards, accessories.)

OTHER NOTES (or continuations from items above):

DEVELOPER

PHONE

VENDOR

PHONE

MANUAL SIZE (PAGES)

AVAIL W/O PHG? (Y/N)

COST: 

REFUNDABLE W/PURCHASE? (Y/N)

SOURCE CODE AVAIL? (Y/N)

COST:

MACHINE READABLE MANUAL AVAIL? (Y/N & FORM)

OTHER SOFTWARE REQUIRED (DOS, operating system, standard programs, etc)

If possible, we ask that you provide a copy of your program, and/or documentation, with your completed entry form. Thank you.
# Hardware Entry Form

## Hardware Requirements

- **Hardware Name**: 
- **Generic Name**: 
- **Sort Codes**: (see code explanation below) 
- **Hardware Description**: 
- **Software Provided or Required (OS, operating system, standard program, etc.)**: 
- **Hardware Requirements (Standard, modified, or custom boards, accessories)**: 
- **Computer Req'd**:  
- **Memory Req'd**:  
- **Source Code Avail? (Y/N)**:  
- **Cost of Adaptation**:  
- **Manual Size (Pages)**:  
- **Availability w/o Hardware? (Y/N)**:  
- **Cost**:  
- **Refundable with Purchase? (Y/N)**:  
- **Machine Readable Manual Avail? (Y/N & Form)**:  
- **Cost**:  
- **Date Developed**:  
- **Plans for Updating? (Y/N)**:  
- **Cost of Adaptation**:  
- **Speech Code Explanation**:
  - **A**: Alarm, Alarm/Call, and monitoring systems (including monitoring systems)  
  - **B**: Business Systems (other than writing/editing -- see W)  
  - **C**: Control Aids (including phone, self-care, environment control)  
  - **D**: Drawing Aids  
  - **E**: Evaluation/Testing  
  - **G**: Gains (for handicapped individuals)  
  - **H**: Hearing Impaired  
  - **I**: Computer Aided Instruction (CAI)  
  - **J**: Vocational Placement  
  - **K**: Keyboard Modifications, Alternate Keyboards, and Non-Keyboard Input  
  - **M**: Mobility  
  - **P**: Portable Aids (battery operated, and less than 25 lbs [12 kg] including battery)  
  - **Q**: Cognitive Disabilities & Retraining  
  - **R**: Robots & Manipulators  
  - **S**: Speech Output (NOTE: Z — speech input/recognition)  
  - **T**: Telephone Communication  
  - **V**: Visually Impaired  
  - **W**: Writing/Editing  
  - **Z**: Speech Input/Recognition

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Send to Registry Coordinator, Trace R&D Center, 314 Weisman Center, 1500 Highland Avenue, Madison, WI 53705. For more information, call the Registry Coordinator at 608/262-6966.
FUNDING MODELS, POLICY, STATISTICS

FUNDING

A FUNDING RESOURCE NETWORK?
FUNDING FOR DEVICES
SOME IDEAS FOR REDUCING PRODUCT COSTS
USED EQUIPMENT
EQUIPMENT LOANS
TAX DEDUCTIONS
DO-IT-YOURSELF
SELECTED PUBLICATIONS ON FUNDING FOR DEVICES
A NOTE ON FUNDRAISING

SERVICE DELIVERY MODELS

EXAMPLES OF SERVICE DELIVERY MODELS
A MODEL PROGRAM FOR SERVICE DELIVERY
AN INFORMATION AND ASSISTANCE CENTER
A PROJECT IN THE SCHOOL SYSTEM
AN INSTITUTION-BASED ADAPTIVE AID SERVICE
SELECTED PUBLICATIONS DELIVERY MODELS

PUBLIC POLICY AND TECHNOLOGY FOR DISABLED PEOPLE

SELECTED PUBLICATIONS

TECHNOLOGY COST/EFFECTIVENESS/BENEFIT

STATISTICAL INFORMATION RESOURCES
A FUNDING RESOURCE NETWORK?

"But the problem of payment for unique or adaptive devices remains.

"In seeking an answer to the cost question, I discovered from Dr. Justus Lehmann, University of Washington, Seattle, that they have solved the problem in their setting. They have on staff a person skilled at securing needed resources. This person tries every conceivable source -- public and private -- insurance, voluntary health organizations, service clubs, community organizations, churches. Dr. Lehmann reports that no truly needed device has been denied for lack of a sponsor. If you think this sounds too good to be true, some of you with this problem may want to write to Dr. Lehmann for advice."

Douglas Fenderson, Ph.D.
In "High Tech/High Touch", a keynote address, Discovery '83 Computers for the Disabled Conference Papers, edited by Janet Roehl
Available from Materials Development Center
Stout Vocational Rehab Institute, University of Wisconsin-Straut, Menomonie, WI

There are several people around the country who are particularly good at locating the resources to pay for hard-to-find equipment. Unfortunately, there is as yet no good mechanism or them to share information. RESNA has a subcommittee on Funding within the Service Delivery Committee. This Funding subcommittee could become the nucleus for a broader network of people. If you are interested in participating in a funding resource network, please contact RESNA

FUNDING FOR DEVICES

Funding issues are generally the bottom line in providing technology for disabled people. We can research, develop, transfer to private sector, utilize, build and adapt, but if money is not available the device -- be it simple or sophisticated -- will not reach the intended user, the disabled individual.

In the U.S. Congress Office of Technology Assessment's Report Technology and Handicapped People (May 1982), the major conclusion was that "despite the existence of numerous important problems related to developing technologies, the more serious questions are social ones -- of financing, of conflicting and ill-defined goals, of hesitancy over the demands of distributive justice, and of isolated and uncoordinated programs."

If devices are to reach persons who need them, the issues surrounding funding must begin to surface so they can be dealt with. In this area of health and social welfare many, if not most, people are very uncomfortable putting the obvious needs of disabled individuals onto the same ledger line with money. But until the world is a more ideal place, we must live with these realities. To balance them in your favor, you need to know where to find funding and how to ask for it, what to do if it is denied, and the alternatives to direct funding.

Identifying Funding Sources and Resources

Knowing where to seek funds begins with a thorough exploration of the consumer's personal resources and his/her current or potential program eligibility. It is valuable to encourage the involvement of the individual and the family in determining and effectively using funding sources.

Potential funding sources include:

- Personal or family income, including extended family and friends
- Loans, savings accounts, inheritances, trust funds, etc
- Private health insurance
- Government programs, e.g., Medicare, Medicaid, veterans' programs, crippled children's services, vocational rehabilitation programs, developmentally disabled programs, etc
- Voluntary health organizations such as United Cerebral Palsy Association, Easter Seal Society, Muscular Dystrophy Association
- Employer of consumer or family
- Labor union of consumer or family
- Workers' Compensation benefits
- School, as part of an individual Education Plan
- Alumni associations
- Church group of consumer or family
- Civic and other community service organizations such as Elks, Sertoma Clubs, Quota Clubs, Lions Clubs, Kiwanis, Rotary Clubs
- Major corporation/corporate giving programs
- Private philanthropic foundation grants
- "Earn-marked gifts" sponsored through health organizations or medical facilities
- Special-event fund raising

Funding time can be reduced by choosing the most likely resources, coordinating the efforts of client, family, and involved professionals, and including the durable medical equipment supplier in the process.

Writing for Results

Miracles do happen! Good-hearted neighbors might raise $1,000 over a weekend on the strength of hearing of a family need. People do give for people they care for. However, few public or private agencies, companies, or service organizations can work that way, they need paper.

The most effective way to prepare paperwork is to understand who is the intended receiver of the written document. The key is to know and understand your "audience" and the definitions and regulations they follow so that supporting documentation can be prepared appropriately. Someone must make a decision. What information is needed for a favorable response? You are writing for results; give neither more nor less data than needed. Too much information costs you extra effort to collect and write up, providing too little usually results in a second round of paperwork and/or an unfavorable judgement (i.e., no money and no equipment).
For "result-oriented writing" consider these factors.

**Point of view** Know the audience you are writing for and ensure that all information can be understood from the reader's point of view. Who will read this report? What would you need to know if you sat behind his/her desk?

**Determination of need** Supporting evidence of consumer's need is usually required, but must be described appropriately. For example, Medicare requires "medical necessity", private insurance focuses on "improving the condition of the patient", and with Medicaid you may need to emphasize "restoration of the patient to his best functional level".

**Benefit to consumer** Never focus on the equipment and its features. Describe the benefits each feature will provide for the consumer.

**Credibility** You probably will be seeking funding again, this is not an exercise in creative writing.

Additionally, funding sources are interested in knowing what their return on investment will be. A financial statement of how money will be saved as a result of the request: service and device, including the dollar amount, will be helpful. For instance, if some equipment will result in less attendant time, this should be reflected in the request. However, the cost-effectiveness issue is not always appropriate. It is great to predict a cost saving as the result of a certain device or service, but sometimes there is no change (or actually an increase) in total care costs as a result of a service. For example, a person acquiring a communication aid may need continued speech therapy to learn how to use the system effectively. Quality of life is often the issue. There may be an increase in care costs because a person is more independent and is able to make more demands on the system. In this case, do not stress costs, emphasize independence or whatever concept the funding agency needs to hear to make a favorable funding decision.

**Following Through**

Once the process of seeking funding has been initiated, persevere and appeal denials. The appeal process is educational for the third-party payer, and successful appeals are precedent-setting for future requests. They force review of general policies by the third-party organization. However, care must be taken in selection of the first case to be presented and in specifying criteria for effective use of the device and other services that will be required as part of the process (i.e., additional therapy).

If frustrations with the process inspire you to write long, impassioned reports, it would be more effective to send them to people who can actually change policy -- state and federal legislators. You are generally wasting your time targeting pleas for policy change to bureaucrats who are only following the rules they are put to follow.

**Alternatives to Direct Funding**

As funding becomes more difficult to obtain, we are being forced to look at more charitable funding possibilities. Rehabilitation engineering services should not be philanthropy and, ideally, should not have to depend on philanthropy for funding. But until we reach the ideal world referred to earlier, becoming a more sophisticated "beggar" may help fund more devices. There are many nonstandard philanthropic sources locally. Some have never been approached. Ask if the answer is "no" then ask "Do you know someone else I could ask?" Once you achieve a breakthrough, follow up with another request.

Other possibilities include reducing products costs and using tax provisions. The creative use of mass market products can bring some types of equipment into an affordable price range. "Do-it-yourself" construction is sometimes feasible. Rehabilitation engineering volunteer networks are developing in New Jersey and other places in the United States. Equipment can be purchased second hand or obtained on loan through clearinghouses and equipment loan closets.

**SOME IDEAS FOR REDUCING PRODUCT COSTS**

**Used Equipment**

A Used Equipment Referral Service has been established by the Metropolitan Center of Independent Living, Inc., in St. Paul. The service acts as a clearinghouse, matching disabled persons who need rehabilitative equipment with those who have used the equipment available. All types of equipment are considered, including wheelchairs, bathroom equipment, ramps, lifts, vehicles, hospital beds, walkers, prone standers, etc. The service does not warehouse the equipment, instead it provides telephone referrals to those persons who have the equipment available throughout the state. The service also provides information on funding, repair and maintenance resources. Anyone interested in buying, selling, or donating equipment, or anyone interested in setting up a similar program, can contact Gary Tegrootenhus, MCIL, 1728 University Avenue, St. Paul, Minnesota 55104. 612/646-8342.

The ASSISTIVE DEVICE bulletin board on SpecialNet can be used to list used assistive devices for sale or purchase. For information on SpecialNet, see the Information Resources section.

**Other sources for this type of exchange are**:

- ads in the local newspaper
- bulletin boards at Independent Living Centers and Disabled Students Programs
- ads in consumer publications such as Accent on Living and Mainstream
- electronic bulletin boards such as WellNet, Compuserve, and The Source (see section on microcomputer applications for addresses)
Equipment Loan Programs

Easter Seals

Most local affiliates maintain an equipment loan program. Although details vary from one affiliate to another, a loan program usually maintains a supply of wheelchairs, crutches, canes and appliances for anyone who is in need. Upon acknowledgement by a physician or therapist, a chair or appliance can usually be loaned for the length of time it is required.

American Cancer Society

Local chapters frequently loan hospital beds for in-home use, or sometimes other equipment to people who have cancer.

Tax Deductions

Generally, any expenses incurred for medical care or equipment are deductible on an individual tax return and can be included with other medical expenses that would normally be deducted. Refer to IRS publications 502, Medical and Dental expenses, 503, Child and Disabled Dependent Care, 522, Disability and Payments, 552, Recordkeeping Requirements and a List of Tax Publications, and 907, Tax Information for Handicapped and Disabled Individuals. These are available at no charge from the Internal Revenue Office.

"151 Tax Deductions You Can Take" is a simple tax guide for the person with a disability. This monograph provides a listing of what is and what is not tax deductible. It is primarily a medical expense deduction guide and is therefore of particular value to persons with disabilities and their families. It includes information on the types of assistive devices that can be deductible. Written by Gregory Thomsen and Paul M. McInerny, it is available from ACCENT Special Publications, P.O. Box 700, Bloomington, IL 61701 (20 pages, 1982).

Do-It-Yourself

An alternative to purchasing a piece of equipment is to make it yourself or hire someone else to construct it. There are references to D-I-Y materials throughout this guide (e.g., the TECHNOLOGY AT HOME and CONTROLS sections).

Some of these references have been collected here. Please refer to specific chapters for more information.

Aids and Adaptations. The Arthritis Society, 920 Yonge Street, Suite 420, Toronto M4W 3J7, Canada. Instructions for aids to make yourself.

Application and Construction Notes for Laptrays and Adaptative Pointers 31 pages, $3.00. A packet containing application notes describing the construction of various adaptive interfaces and communication charts includes Wobble Stick Toy Control (for battery-operated toys), Adaptive Pointers (for communication boards and keyboards), Slide-Away and Swing-Away Laptrays (for wheelchair mounting), and Folding Communication Board (lightweight and highly portable).

Design and Construction of a Laptray. G.C. Vanderheiden 30 pages: $3.00 1977. This report provides basic information on the construction of a wheelchair laptray which may be used as a communication board. Included in this report are all of the drawings and directions needed to construct a laptray communication board using materials readily available from local hardware and department stores. Simple directions and guidelines are provided.


Equipment for the Disabled (series). Oxford Regional Health Authority, 2 Foredown Drive, Portslade, Brighton BN4 2BB, England 1984. Each volume in this series contains descriptions and illustrations of commercially available equipment for the disabled, as well as do-it-yourself ideas. Titles include Communication, Clothing and Dressing for Adults, Home Management, Outdoor Transport, Wheelchairs, Leisure and Gardening, Disabled Mother, Personal Care, Housing and Furniture, Hoists and Walking Aids, Disabled Child.


How to Build Special Furniture and Equipment for the Handicapped Child  "RB Hoffman, Charles C Thomas Co, Springfield, IL 1970

How to Make It Cheap Manual  Independence Factory, P.O. Box 597, Middletown, OH 45042
Volumes 1 and II, $1 donation plus postage, volume III, $2.75 Line drawings of aids you can make or have made, plus list of aids that can be ordered from this non-profit volunteer group

An Instructional Playground for the Handicapped Using Tires as Inexpensive Playground Equipment  Activity and Construction Manual  University of the State of New York, State Education Department, Division for Handicapped Children, Special Education Materials Center, Albany, NY 1975

Making Aids for Disabled Living  S.E. Grainger Batsfords, North Pomfret, VT 1981


Please Help Us Help Ourselves  C. Nathan United Cerebral Palsy of Central Indiana, Indianapolis, Indiana 1970

Rehabilitation Equipment and Devices Constructed in Wood  Institute of Rehabilitation Medicine, Publication Office, New York University Medical Center, 400 East 34th Street, New York, NY 10016 1969 102 pages  $2.00 Illustrates complete directions for constructing many devices, including kitchen cutting board, kitchen lapboard, and sewing and embroidery frame

Strategies for Helping Severely and Multiply Handicapped Citizens  G. Greer, Robert M. Anderson, and Sara J. Odle (Editors)  University Park Press, Baltimore, Maryland 1982

"Teacher-Made Adaptive Devices for Archery, Badminton, and Table Tennis"  J. Cowart Practical Pointers, May 1978, (13), 1-16

Therapeutic Devices, 1956-1975  J Bellman, et al  American Journal of Occupational Therapy, American Occupational Therapy Association, Inc., 6000 Executive Blvd., Rockville, MD 20852  112 pages  1977 Do-it-yourself instructions for devices which have appeared in AJOT, includes wheelchair trays, ADL devices, communication aids, etc

Toy Modification Note: Build-it-yourself Battery Insert  G.C. Vanderheiden  18 pages  $2.00 1982 Describes construction and operation of battery inserts to allow control of battery-operated devices by handicapped individuals without requiring modification of the toys themselves. Full diagrams and operating instructions included


Periodicals Featuring DIY Information

Accent on Living magazine has a regular feature called HOW TO, which lists ideas on adapting your own equipment. The Spring 1984 issue's HOW TO was entitled "Hands on Their Own" and presented solutions that two Accent readers have worked out for themselves, an electric lift and a hydraulic lift. Accent on Living is a quarterly magazine, their address is P.O. Box 700, Bloomington, IN

Rehabilitation Gazette (Gazette International Networking Institute, 4502 Maryland Avenue, St. Louis, MO) also has DIY ideas in its annual publication

Technical Aid to the Disabled Journal (Ryde New South Wales, Australia) published by Technical Aid to the Disabled, an Australian voluntary organization dedicated to designing and making aids for people with disabilities when such aids are unavailable commercially. The journal contains articles about the design, construction and use of aids, organizational news, and an information exchange

Do-it-yourself devices can quickly move into the realm of "fugitive literature." Some examples of the kind of information available are

Kit for Remote-Area Wheelchair  An Australian biomedical engineer has designed an inexpensive wheelchair that may be made from a kit or ordered assembled. The construction booklet is free to disabled individuals who wish to build a chair for their own use, but the chair is protected by patent from commercial production except where license to manufacture has been granted. The kit and chair are described in a free brochure from the designer Robert Bowshard, Biomedical Engineer, Spinal Unit, Royal North Shore Hospital, St. Leonards 2065, New South Wales, Australia

Plans for Making Mobility Devices for Children To obtain free blueprints of a child's wheelchair and tricycle, write to R.J. Reynolds Tobacco Company, Winston-Salem, NC 27102

Portable Rocking Chair Plans are available on loan from Rehabilitation Gazette, 4502 Maryland Avenue, St. Louis, MO

This book does not help you make devices, it helps you install them. It is generally available at a good bookstore

Home Security  Time-Life Books, Alexandria, VA 1979. This self-help book on home security includes a section on accident proofing a house, which has 13 pages of directions and sketches for reducing dangerous conditions in bathrooms and on stairs. Features instructions for installing grab bars, slip-resistant surfaces, stair rails, and outdoor access ramps
Publications with Information on Funding Devices


Funding Book The Many Faces of Funding. Anna Hoffman. Available from Phonics Ear, Inc 250 Camino Alto, Mill Valley, CA 94941 $25.00 (includes the Monthly Newsletter, shipping and packaging). Although focused on funding strategies for communication devices, the information is also readily applicable to funding for other types of equipment.

The book, a three-ring looseleaf notebook, is divided into five sections. The Overview provides highlights of sources of funding on the federal, state, educational, insurance and private levels. Method of Procedure informs on how to package funding applications. Case Histories inspires ideas through “how to” stories. Legislation informs on any changes in federal, state or local laws, and the Monthly Newsletters provide the most current funding information, and keeps the book current and updated.

“Funding Challenges” Myra Williams, In Sealing for Children With Cerebral Palsy A Resource Manual, Elaine Treffler, editor. Available from University of Tennessee, Rehabilitation Engineering Program, 632 Court Avenue, Memphis, TN 38163 $200.00 1984


Guidelines for Seeking Funding for Communication Aids. Donna DePape and Lavonne Krause. Trace Center, Wasmann Center, University of Wisconsin-Madison, Madison, WI 53705 44 pages Revised 1980

Health Insurance Benefits and Communication Disorders. Steven White, PhD. Director, reimbursement policy division, American Speech-Language Hearing Association. In Shhh., November/December 1982, 4848 Battery Lane, Bethesda, Maryland 20814.


FUNDING, MODELS, POLICY, STATISTICS

Report on the Advanced Topical Discussion: Funding Strategies for the 80s. RESNA Suite 402, 4405 East-West Highway, Bethesda, MD 20814. August 1982


These periodicals regularly provide information related to equipment funding strategies.

Accent on Living, Cheever Publications, P.O. Box 700, Bloomington, IN 47401.

Bulletin on Science & Technology for the Handicapped, AAAS, 1775 Massachusetts Avenue, Washington, DC 20036.

Communication Outlook, Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824.

Funding Book of Mobility Equipment: Current Issues and Strategies. Virginia Ruggles, Muscular Dystrophy Association, 810 7th Street, New York, NY 10019 30 pages

These publications provide an overview of the financial aid programs and special services available to the disabled person, primarily on the federal and state levels. Although not oriented specifically toward funding devices, each covers a broad range of programs which focus on such areas as basic living needs, education and employment. Major programs are identified which exist throughout the nation, or could exist if a particular state or community elected to participate in a program.


Financial Resources for Disabled Individuals. Institute for Information Studies, Falls Church, Virginia. Available from NARIC, Catholic University, Washington, DC 20017 5 pages $11.00 1980


Most geographic areas have some type of Community Service Council, usually operational on a citywide
or countywide basis, which can be a valuable resource in finding specific programs on a local level.

Information on new programs which could be used to pay for assistive devices can be found in publications such as Communication Outlook, and the monthly updates from The Many Faces of Funding. The following is from Communication Outlook, Winter, 1984, page 2:

"Public Service Community Development Block Grant Funds are awarded to cities by the federal government to both provide new services and increase the public services already available to individuals experiencing handicaps. Several years ago, the city of Fort Collins, Colorado began using these funds to provide nonverbal individuals with communication aids. The city carefully monitors the acquisition of these aids and for five years considers them the property of the city for depreciation purposes, although users maintain exclusive use of the devices.

"This project has also encouraged community advocacy, heightening public awareness of its citizens' needs. Most importantly, the new augmentative system user is able to communicate with city government and elected officials.

"Beginning in March 1984, Block Grant Funds will be set aside in each receiving city to operate a needs assessment for individuals experiencing handicaps. Funds will be allocated based upon proposals submitted to each city. Those interested should contact their city regarding the Public Service Community Development Block Grant Fund, Section 570201, Circular A-102, Attachment B."

If you want to learn more about funding available from the federal government, refer to

"The Who, What, When and How of the Federal Funding Process" Donald Barrett. In Programs for the Handicapped. Available from Clearinghouse on the Handicapped, Department of Education, Washington, DC. An overview of the federal funding process in the disability field, intended to direct first-time grantseekers to the proper source for information. Include a "Resources for Funding Information" section which lists a variety of organizations and publications which offer more detailed information on this subject.

To receive the current information on relevant federal funding programs, you might consider subscribing to

Education of the Handicapped. The Independent Weekly News Service on Federal Legislation, Programs and Funding for Special Education. Published every other Wednesday. $157/year

Federal Grants & Contracts Weekly. Selected Project Opportunities for the Education Community. Published every Tuesday. $157/year.

Both are available from

Capitol Publications, Inc
1300 North 17th Street
Arlington, VA 22209
703/528-5400

You'll notice that these are not inexpensive. If not available at your local library, you might see if the grants and contracts office of your nearest major university subscribers and would let you read them.

A FINAL NOTE ON FUNDRAISING

If you and/or your agency are working on obtaining funding for devices, it is important to avoid being overwhelmed by the magnitude of the problem. If you find more and more of your worktime (and after work time) being consumed by funding problems, it may be time to reassess the situation.

IDENTIFY whose responsibility fundraising is.

EVALUATE the input needed -- it can take considerable effort to get the ball rolling.

If you can't afford the time, DEVELOP a network of people who can do it or help you.

IDENTIFY the rewards -- what they are, and who gets them.

If all else fails, you might tack a notice on the wall:

"TAKE THE 'O' OUT OF FUNDRAISING!"

And reapply the above guidelines. Good luck!
SERVICE DELIVERY MODELS

There probably are as many definitions of service delivery as there are agencies providing it. However, the following working definition is provided:

Service Delivery is a process/system which provides evaluative and/or advisory services, and/or technical devices to disabled persons to increase their independence and productivity.

These services are provided on a cost-effective basis with the eventual outcome the improvement of the quality of life.

Service delivery agencies are listed throughout this resource guide. Each has its own approach to providing technology to disabled people. For more specific information on their individual programs, please contact the organizations directly.

There are several frameworks for looking at service delivery. Some are listed in this section. Information on others can be found in the Prosthetics/Orthotics literature. The main Independent Living Programs (ILPs) across the country can provide help in selecting, obtaining and using assistive devices—but most of them don’t have a formal “equipment” service, so it’s easy to overlook their model as a service delivery approach. Unfortunately, most of the ILP information relevant to this field is not written up, you will have to contact the programs directly.

EXAMPLES OF SERVICE DELIVERY MODELS

A MODEL PROGRAM FOR SERVICE DELIVERY

Project Threshold is a model program for delivery of rehabilitation engineering services in the State of California. It was designed to meet the unique needs of severely disabled clients who require specialized assistance in performing tasks of daily living, assistance with management of attendant time and activities, and/or performance of school and job related tasks. The client’s needs are met by identifying problem areas and then working out solutions to the problems, thus increasing the client’s level of independence.

Follow-up with clients and counselors indicates satisfaction with the program. Project Threshold has evolved into a model program which is being explored by other agencies nationwide who are interested in developing similar programs for the severely disabled.

Project Threshold is an example of a successful cooperative relationship between a rehabilitation engineering program and a state vocational rehabilitation agency.

For more information, contact Nancy Somerville, Project Threshold, 500 W. Rancho Los Amigos Hospital, Downey, CA.

AN INFORMATION AND ASSISTANCE CENTRE

The PAM ASSISTANCE CENTRE provides information about assistive devices old and new—what they are, what they cost, how they might be secured. The Centre has a reputation for being innovative and practical.

The Centre offers information from more than 1,500 companies, and more than 10,000 products. Sometimes a homemade device or the innovative use of some standard item is suggested. If the services of other persons, such as a rehabilitation engineer or an artificial language specialist, are required, the Centre acts as a linker. Additionally, the Centre displays provide hands-on experience with many assistive devices. The Centre has a trained ABLEDATA broker on staff.

Centre staff specialize in problem-solving, working with medical personnel, special educators, parents, and directly with any person for whom special equipment may be of benefit. Any handicapped individual is eligible for Centre help.
FUNDING, MODELS, POLICY, STATISTICS

without cost or "red tape"

PAM is a service for Michigan, although out-of-state requests also may be honored. A majority of requests for problem-solving are initiated by phone. All ages are eligible for service. The special education population (ages 0-25), rehabilitation clients, and older persons are included. Physically handicapped, deaf, blind, or multiply handicapped individuals often find the Centre helpful.

For more information, contact PAM Centre, 601 Maple, Lansing, MI. 517/371-5897

A PROJECT IN THE SCHOOL SYSTEM

In July, 1978, The Bureau of Education for the Handicapped awarded a three-year demonstration grant to the Memphis City Schools, Division of Special Education. One objective of this grant was to demonstrate that severely physically handicapped children could participate more meaningfully in their educational program with the assistance of technical aids in the areas of communication, seating, mobility, feeding, and toileting. Technical services were contracted from the University of Tennessee, Rehabilitation Engineering Center to provide and modify appropriate aids. The project developed a model for the delivery of technical aids in an education setting, and designed an instrument to aid in the prescription of technical aids.

The full report, Project TEACH: Technical Educational Aids for Children with Handicaps, A Model and Demonstration Project, may be ordered at $5.00 each from the Division of Special Education, Memphis City Schools, 2597 Avery Avenue, Memphis, Tennessee 38112.

For a summary of some of the findings related to technology, see the TECHNOLOGY IN THE CLASSROOM section in this Resource Guide.
AN INSTITUTION-BASED ADAPTIVE AID SERVICE

The Commonwealth of Massachusetts Department of Mental Health supports six adaptive design services, one in each of the six state schools. The following is a description of the Region I Adaptive Design Service.

The program was established in 1977 to help meet the needs of the most severely disabled residents of the Belchertown State School in cooperation with and complementing the existing therapeutic, medical and educational services. For the past three years, services have been extended to DMH clients outside the institution (including many former state school residents), and nearly half of our time is now devoted to community projects. We have continued to focus on those needs of the most severely disabled which cannot be met through commercially available equipment. Our primary goal has been to design and build comfortable, stable, and safe positioning systems for those people, seeing good positioning as a prerequisite for any other skills. Most often we do this by modifying standard wheelchairs, sometimes quite drastically, to provide very specific and individualized support. We also design and build pieces of equipment to aid clients with self care activities like eating and dressing, communication, and school and work-related activities. Our environmental design services include custom design of wheelchair ramps, accessible bathrooms, work station modifications and recommendations for commercial equipment to increase a client's independence within his or her environment. Although the emphasis of the program has been on service delivery, the philosophy and funding structure have allowed time for researching technical and clinical developments and availability of equipment on the commercial market.

Adaptive Equipment Services

Region I Adaptive Design Services, Belchertown State School, Box 42, Belchertown, MA 01007

Alternative Design, Wrentham State School, Box 144, Wrentham, MA 02093

Adaptive Design Services, Paul A. Deyer State School, Taunton, MA 02780

Therapeutic Equipment Clinic, Fernald State School, 200 Trapelo Road, Waltham, MA 02172

Adaptive Equipment Clinic, Hocan Region Center, Hathorne, MA 01937

Adaptive Equipment Services, Monson Developmental Center, Drawer "F", Palmer, MA 01069

A similar program exists in the state of California. For more information, contact Mobility Engineering, Sonoma State Hospital, Eldridge, CA 95431, 707/238 6445

To find out if your state has such a service, contact the agency responsible for Developmental Disabilities.
Assistive Devices for Handicapped Students: A Model and Guide for a Statewide Delivery System
National Association of State Directors of Public Education, 1201 Sixteenth Street, NW, Washington, DC 20036
202/844-4193 27 pages $4.50 1980
This publication describes an ideal model for a comprehensive assistive device center that can provide a cost-effective, coordinated delivery system to assure that handicapped students who need adaptive aids and equipment have access to them and are trained in their most efficient use. The document includes a guide for implementation of the model and a comprehensive listing of available resources throughout the country.

"Delivery of Assistive Devices Through a Client Oriented Approach" AM Cook In Technology for Independent Living, V.W. Stern and M.R. Reddon, editors AAAS, 1776 Massachusetts Avenue, Washington, DC 20036 1982


Project TEACH Technical Educational Aids for Children with Handicaps, A Model and Demonstration Project may be ordered at $5.00 each from the Division of Special Education, Memphis City Schools, 2537 Avery Avenue, Memphis, Tennessee 38112 1981 Describes a project to direct rehabilitation engineering to the needs of children with severe neuromuscular and communication deficiencies. Aids and devices were designed or adapted to assist in communication, seating, mobility, feeding, and toileting. The program included a technology section, services to children and to parents. Includes case studies, project newsletters, forms, data sheets, and photographs. The project was conducted in cooperation with the University of Tennessee Rehabilitation Engineering Program.


"The Service Delivery Process" C. Greg Shaw Chapter 13 in Seating for Children with Cerebral Palsy: A Resource Manual, Elaine Treffer, Editor University of Tennessee, Rehabilitation Engineering Program, 682 Court Avenue, Memphis, TN 38163 $20.00 1981


Interagency Cooperation

These references do not deal specifically with device delivery, but could prove useful if the approach you develop involves developing interagency cooperative agreements and efforts involved with the home health care market.

Handbook on Developing Effective Linking Strategies Vocational Education Model" for Linking Agencies Serving the Handicapped Wisconsin Vocational Studies Center, University of Wisconsin-Madison, Madison, WI 53706 1982 Although this book is focused on vocational education models, the strategies they use could be useful to organizations or agencies trying to implement rehabilitation engineering services and/or interagency technical aids projects. The bibliography in this book lists reports on exemplary programs in several states.

Home Care/Health Care

How to Establish a Home Health Agency Some Preliminary Considerations Publication 84-1 National Association for Homecare, Research Division, 519 C Street NE, Washington, DC 20002 $12.00 The National Association for Home Care has published a booklet advising persons considering entry to the home care field of the steps necessary for establishing a home health agency. The goal of the publication is to ensure that persons or organizations considering entering home care know all the state and federal requirements and NAHC's code of ethics.

Planning for Home Health Services A Resource Handbook US Department of Health and Human Services Available from National Technical Information Service (NTIS), 5795 Port Royal Road, Springfield, VA 22161 Specify Publication #HFP-0102001 Free. A guide for planners of home health care services. It can be a particularly useful tool for new agencies.

Software Catalog of Computer Programs for the Health Care Industries Moore Data Management Services, 1660 South Highway 100, Minneapolis, MN 55415, 612/540-1033 $39.95

Sound Business Practices

Little has been written on the business operation aspects of specialized assistive device services. However, there is a considerable amount written about business practice and funding issues in the durable medical equipment (DME) trade magazines. If you are concerned with starting a service in the black, you might consider organizational such as National Association of Medical Equipment Suppliers (NAMEs), and attend some of the DME/Home Care trade shows to learn more about the commercial perspective and what you can learn from it.
POLICY-RELATED PUBLICATIONS ON TECHNOLOGY FOR DISABLED PEOPLE


Health Technology Case Study Report #26: Prepared as a background paper for: Technology and Handicapped People. Office of Technology Assessment, U.S. Congress, 1982. One third of the report covers the area of "Information and Funding for the Speech Impaired." It provides an analysis of funding issues related to communication aids.


The Use of Technology in the Care of the Elderly and the Disabled: Tools for Living. Jean Bray and Sheila Wright, editors. Greenwood Press, Westport, Connecticut. 1980. Based on papers at two symposia held in London and Berlin in 1979 under the sponsorship of the Commission of the European Communities. The main focus of this book is on ways and means of putting better products at the service of the elderly and the disabled. In presenting a collection of international papers by industrialists, government officials, financiers, experts from consumer protection services and charitable organizations, as well as those working daily in the field, this study sets out to provide a blueprint for understanding how the development of new and adapted products can most constructively be translated into practical help for the elderly and the handicapped.

These publications address the broader public policy issues related to disabled people. Each of these references includes references to technology use by physically disabled individuals.


"Physical Disability and Public Policy." Gerben DeJong and Raymond Lichter. Scientific American, Vol. 248, No. 6, pages 40-49, June, 1983. This article examines U.S. policy with respect to citizens with disabilities. The authors summarize the existing knowledge of the dimensions of disability and the growth patterns over the past twenty years, discuss the extent to which disability laws have been implemented, and suggest necessary economic ingredients for a working disability policy in today's political and economic climate. A major focus of the article is the area of architectural accessibility. Complementing the article are charts and graphs illustrating the federal disability laws and the demographic information.


The Unexpected Minority: Handicapped Children in America. John Gliedman and William Roth for the Carnegie Council on Children. Harcourt Brace Jovanovich, New York, NY. $17.95. This fifth and final report from the Carnegie Council on Children comes to a stunning conclusion: no other minority group has its social and political oppression so thoroughly masked as the 10 million handicapped children and 30 million handicapped adults in America. This book is the first comprehensive study to apply a civil rights lens to the problems of both handicapped children and adults. As the authors make clear in this analysis, it is the social rather than the biological aspects of disability that doom so many handicapped children and adults to stunted and useless lives. The authors also propose a radically new approach to disability.
EMployment-Related Technology Facts & Figures


Some of the findings of the study include:

- An overall conclusion of the analysis is that for firms which have made efforts to hire workers with disabilities, accommodation is "no big deal." Rarely did an accommodation involve much cost. 51% of those reported cost nothing, an additional 30% cost less than $500, and only 8% cost more than $2,000.

- Accommodations for individual workers take many forms, including the following training and transfers (14%), job modification and restructuring (23%), orientation of staff and supervisors (18%), special equipment and assistance (15%), work environment and location changes (21%), and other (9%). No particular type of accommodation dominates. Most workers receive more than one kind of accommodation.

- The most expensive and extensive accommodations tended to be provided to the blind and those who use wheelchairs. Higher skilled workers were more often provided environmental adaptations of the work place or special equipment than lower skilled workers. Lower skilled workers were more likely to receive job redesign accommodations, e.g., training or selective placement.

- Accommodation efforts are generally perceived as successful in allowing the worker to be effective on the job. Firms frequently reported that the accommodation would benefit the employee if promoted or transferred to a new job and also stated that often non-disabled workers also benefited from the accommodation.

- Availability of the report is limited at this time, but inquiries should be directed to:

  Mr. Thomas Hodges, Development and Research, Employment Starfars Administration, Dept of Labor, Room C-3313, 200 Constitution Avenue NW, Washington, DC 20210, 202/523 9145


- Succinct well-written articles contain information and statistics which could be useful in documenting the need and cost effectiveness for various technology-related services. For example, in Volume 1, Issue 3, "The Cost of Back Pain" identifies:

  - $20 billion spent annually on back problems
  - 60 million Americans with back problems
  - 7 million new victims each year
  - 40% of Social Security benefits awarded to people with back problems
  - 80-90% of Americans will suffer a back problem sometime in their lives


- Making low cost changes in work environments helped clients perform more job-related physical tasks. As a result, productivity of many of these clients equals or surpasses that of non-disabled employees doing the same tasks. State vocational rehabilitation agencies paid for purchased equipment and materials for custom-designed aids.

  - The average cost per client was $153, with the range from $0 to $1,806. The average time required to fabricate devices or install purchased devices was 2.1 hours, with the minimum 0 and the maximum 30 hours.
INDEPENDENT LIVING TECHNOLOGY: FACTS AND FIGURES

Project Threshold has been described in other sections of this Resource Guide (EQUIPMENT SELECTION PROCESS, SERVICE DELIVERY MODELS). It is significant to note that despite the fact that all clients serve by Project Threshold are severely disabled, in 77% of these cases the solution involved adaptive behavior and/or commercially available devices and resulted in lower average costs per client. Only when these more conservative methods had been exhausted did they turn to custom modification and fabrication of equipment for problem solution. This occurred in 23% of the cases. After developing and refining their systematized approach to service delivery, they have noted growth and changes in the program. Initially, the vast majority of solutions involved custom devices; now the majority of solutions are found in adaptive behavior and/or commercially available equipment.

<table>
<thead>
<tr>
<th>Service Categories</th>
<th>Percentage of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Identification and/or Adaptive Behavior</td>
<td>20%</td>
</tr>
<tr>
<td>Evaluation and Recommendation of Commercially Available</td>
<td>57%</td>
</tr>
<tr>
<td>Evaluation and Modification of Commercially Available</td>
<td>9%</td>
</tr>
<tr>
<td>Evaluation and Custom Design and Fabrication of Equipment</td>
<td>14%</td>
</tr>
</tbody>
</table>

Service Category Statistics for Project Threshold 1982-82 (Total=80 clients)

SEATING & POSITION G DEVICES: FACTS & FIGURES

" Provision of Assistive Equipment for Handicapped Persons" J. Kohn, M.D., S. Enders, OTR, J. Preston, Jr., MSW, W. Moltoch, CO, Archives of Physical Medicine and Rehabilitation, Vol. 64, August 1983, pages 376-381 Data from the National Health Survey (1977), US Vital and Health Statistics, indicated that 645,000 persons require the use of a wheelchair. At the 1977 median cost of $700 per wheelchair, the total expenditures in the United States totaled more than $550 million. Data concerning costs, service delivery problems, and equipment life span were not available in the literature. The evaluation of these factors appears to be a major gap in measuring the success of rehabilitation engineering services and research. In this study, effectiveness and relative costs of mobility-postural seating were evaluated in 196 clients. Of the 196 to whom a questionnaire was sent 138 (70%) responded and 49 (25%) were selected for personal interview. Demographic data were comparable in the groups. Eighty-eight percent were entirely nonambulatory, 54% received electric wheelchairs. In the 49 clients visited 75% of the devices were rated optimal or close to optimal in performance, 21% were rated limited or unsatisfactory. Fifty-two percent were being used currently, 23% had been outgrown and replaced, and 25% were not being used for other reasons. Of the devices in use, the average duration time was 25 months and the average time in use per day was 9 hours. For the devices which had been outgrown, the life span of the device was 30.9 months and the cost per day was about $150. Implications of the findings are discussed and recommendations are made for better assessment, follow-up and evaluation of both the assistive devices and the service process.

The full report of the study in this paper is entitled "Team Assessment of Device Effectiveness: A Retrospective Study," by J. Kohn, M.D., S. Enders, OTR, J. Preston, Jr., MSW, W. Moltoch, CO. It is available from Children's Hospital at Stanford, 320 Willow Road, Palo Alto, CA 94304.
The following chart is reprinted with permission from "How Much Is Your Disability Worth?" Accent on Living, Summer 1981. The article discusses the use of a human factors analyst to determine the cost of a disability.

"The following is the summary of the goods and services needed by a 23-year-old who lost one hand and most of the other in a punch press machine accident. The figures are based on an ergonomic study done in 1978. The figures cover costs for him over his remaining life span to meet his disability-related needs. No amounts are allowed for extra medical expense, insurance coverage, or earning losses.

**Major Categories**

<table>
<thead>
<tr>
<th>First-Year Costs</th>
<th>Total Life Span Costs (without inflation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Prosthetic Aids and Services</td>
<td>$7,912</td>
</tr>
<tr>
<td><strong>B</strong> Special Exercise Aids and Physical Therapy</td>
<td>$400</td>
</tr>
<tr>
<td><strong>C</strong> Dressing Aids and Clothing Modifications</td>
<td>$4,031</td>
</tr>
<tr>
<td><strong>D</strong> Special Home Aids, Furnishings, and Modifications</td>
<td>$11,896</td>
</tr>
<tr>
<td><strong>E</strong> Travel Aids and Special Automobile Features</td>
<td>$4,833</td>
</tr>
<tr>
<td><strong>F</strong> Special Vocational Aids and Counseling</td>
<td>$7,202</td>
</tr>
<tr>
<td><strong>G</strong> Special Recreative Services</td>
<td>$2,030</td>
</tr>
<tr>
<td><strong>H</strong> Assistance and Extra Services</td>
<td>$4,321</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>$43,115</td>
</tr>
</tbody>
</table>

"Application of Dimensional Analysis in Determining Cost/Benefit of Handicapped Devices"

Brian R. Drufke, P.E., Selyn W. Becke, Ph.D.
Proceedings of the Fourth Annual Conference on Rehabilitation Engineering, Washington, DC
Available from RESNA, Suite 402, 4405 Last-West Highway, Bethesda, MD 20814 1981.

This paper presents a generalized method of performing cost/benefit analysis on aids and devices for the handicapped using dimensional analysis. The utility of the method presented is that both objective and subjective selection factors influencing the cost/benefit analysis can be considered simultaneously. Additionally, this analysis method allows dissimilar devices or aids designed to compensate for the same loss of function to be compared with each other or against a chosen benchmark.

**IS COST EFFECTIVENESS THE ANSWER?**

Before we get too caught up in looking at ways to produce evidence of cost effectiveness, it is important to look at the results of this OTA study.

The Implications of Cost-Effectiveness Analysis of Medical Technology. Office of Technology Assessment, Congress of the United States, Washington, DC 20510 August, 1980

"The rapid and continuing growth of expenditures is a central issue in many policy decisions concerning the medical care system of the United States. Policymakers, health professionals, and consumers are seeking ways to control this growth while simultaneously improving the quality of health care. Increasingly, the use of cost-effectiveness analysis/cost-benefit analysis (CEA/CBA) is being advocated as a possible means of making the medical care system more efficient. In particular, this technique is suggested for use in health care programs -- for example, by the Medicare program in its reimbursement coverage decisions. Nevertheless, a great deal of confusion and disagreement surrounds the implications and feasibility of applying CEA/CBA in health care. To aid in their decisions concerning the wise use of CEA/CBA in Federal health programs, the Senate Committees on Labor and Human Resources and on Finance asked OTA to explore the applicability of CEA/CBA to medical technology.

"The primary focus of the assessment is on the application of CEA/CBA to medical technology, i.e., the drugs, devices, medical and surgical procedures used in medical care, and the organizational and support systems within which such care is provided. The findings of this assessment, though, might very well apply to health care resource decisionmaking in general and with modification, to other policy areas such as education, the environment, and occupational safety and health.

"This OTA assessment finds that CEA/CBA cannot serve as the sole or primary determinants of a health care decision. In decisionmaking could be improved, however, by the process of identifying and considering all the relevant costs and benefits of a decision. At present, using the approach or process of CEA/CBA in decisionmaking may be more helpful than the rigid and formal application of CEA/CBA study results in health care program decisions. It is unrealistic, moreover, to expect that CEA/CBA in itself, would be an effective tool for reducing or controlling overall expenditures for medical care, if, from Summary and Policy Options."
STATISTICAL INFORMATION RESOURCES

Whether you need demographic statistics for activities such as program planning, or for documentation of needs and impact statements in research and funding proposals, the references can be hard to find. Here are some sources of data.

Statistics on Technology for Disabled People


Statistics About Disabled People

The Physically Impaired Population of the United States. Finney & Associates, 4075C 24th Street, San Francisco, CA 94114. $40.00 1978. This report presents a statistical breakdown on the handicapped population of the U.S. Both published and unpublished survey data from the U.S. National Center for Health Statistics serve as the basic source of figures. The report covers physical conditions only, as opposed to mental. Six major categories are detailed: visual, hearing, speech, paralysis — partial or complete, absence of extremities, and orthopedic. Each category is broken down further by degree. A unique feature of this report is a description of how the individuals themselves view their characteristics as a limitation of their ability to carry on daily living activities.

In addition and complementary to describing these conditions, several sections are devoted to demographic characteristics of the target population. Noteworthy, are statistics on family income, age use of selected aids, and the costs of rehabilitation programs to the federal government.

Characteristics of the institutionalized population are described separately from those of the noninstitutionalized population. A final section provides information on geographic distribution, including state-by-state breakdowns for all categories and for the total population among the working-age population.

Spinal Cord Injury Statistics.

John S. Youn et al. Available from Good Samaritan Medical Center, Phoenix, AZ. 152 pages. $25.00 prepaid 1982. The National Spinal Cord Injury Data Research Center (NSCIRC) established at Good Samaritan Medical Center in Phoenix, Arizona, has summarized their collection of data on spinal cord injuries in the publication Spinal Cord Statist...
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INFORMATION SERVICES AND RESOURCES
DATABASES, CLEARINGHOUSES, NETWORKS

Assistive Device Database System (ADDS) is now solely available from Assistive Device Center, California State University, Sacramento, CA 95819, phone 916/454-6422. Contact person Helen Woolall, Resource Coordinator.

TECHNOLOGY AT HOME

An Accessible Entrance Ramps Design Coalition, Inc., 1201 Williamson Street, Madison WI 53705 1979 37 pages Text and clear graphics presents the basics of ramp evaluation, planning design, construction and materials.

The Idea Machine Mary O'Donnell, RPT Little People of America Foundation 20 pages $2.00 Available from the author at Johns Hopkins Hospital Baltimore MD 21205, or from local chapters of Little People of America. A booklet of handy hints for short-statured people. Mainly describes adaptive techniques, and creative use of mass market products, but also includes several DIY equipment ideas.

Making Life More Livable Irving Dickman American Foundation for the Blind, 15 West 16th Street, New York NY 10011 1983 92 pages Describes simple, inexpensive adaptations for the home of blind and visually impaired older people. The emphasis is on solutions that can be made by the person him, herself or by a relative, friend, or handy neighbor. The information is very practical, and makes every effort to make do with what is on hand, e.g., a rubber band to identify which bottle is heart medicine.

Resource Guide of Continence Aids and Services Summer 1984 41 pages $3.00 Available from Help for Incontinent People (HiP) P.O. Box 544 Union SC 29739

Xandra Collection Catalog Special Edition for Disabled People Lawrence Research Group, P.O. Box 31039, Department DP, San Francisco CA 94131 3rd edition (special) 1983 35 pages Free This discreet catalog of commercially-available sexual aids has a section (pp 26-28) on homemade adaptations, modifications, etc., for vibrators written for people who find gripping a vibrator difficult.

EDUCATIONAL AND VOCATIONAL TECHNOLOGY

Proceedings of the International Conference on Rural Rehabilitation Technologies October, 1984 285 pages $30 plus $25.40 postage Available from ICCRT Headquarters, Box 8103, University Station, Grand Forks ND 58202

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Microcomputers in the Schools -- Implementation in Special Education Tom Hanley BHA Technologies 301 S Highland Street Annapolis, MD 21401

Personal Computers and the Disabled Peter McWilliams October 1984 416 pages $39.95 Quantum Press, Doubleday & Company, Garden City NY

FUNDING


Policy Analysis Series Paper No. 22. Improving the Quality of Life for People With Disabilities Potential Uses of Technology April 1984 31 pages Available from Developmental Disabilities Program, State Planning Agency, 201 Capitol Square Building, 550 Cedar Street, St Paul MN 55101

FUNDING -- DO-IT-YOURSELF

Adaptive Equipment. Inexpensive, Custom Designed. Do-it-yourself Leonard Davis, Sherrilyn Hawkins, and Taurie Raymond 1979 81 pages No charge. Available from Educational Service Region, Cook County, 33 West Grand Avenue, Chicago, IL 60610

Patterns and plans for constructing therapy equipment, positioning devices, and other assistive devices from TRI-WALL cardboard.
The Association for the Advancement of Rehabilitation Technology (RESNA) is an organization concerned with the application of science and technology in the rehabilitative process. RESNA brings together a diverse group of individuals with widely varying credentials, activities, and interests who are committed to designing, developing, evaluating, and providing devices that will put the benefits of technology to persons with disabilities. Its membership includes rehabilitation professionals, (from all disciplines), providers, and consumers. A goal of the organization is to facilitate the interaction between these groups so they can better meet the needs of those who can benefit from the application of technology in rehabilitation.