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**TECHNOLOGY
FOR
INDEPENDENT LIVING
RESOURCE GUIDE**

TECHNOLOGY FOR INDEPENDENT LIVING
RESOURCE GUIDE

Prepared for Instructional Course One
Technology for Independent Living

August 20-21, 1982
Hyatt Regency Hotel
Houston, Texas

by

Sandi Enders, OTR
Contributing Editor

for

REHABILITATION ENGINEERING SOCIETY
OF NORTH AMERICA

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TECHNOLOGY FOR INDEPENDENT LIVING

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Introduction

This resource guide was compiled for the instructional course "Technology for Independent Living", sponsored by the Rehabilitation Engineering Society of North America. The course emphasizes the practical applications of technology for people with physical limitations; it covers what's available today, comparative product information, how well devices work or don't work, costs, etc.

To provide people with a source for more information, this resource guide was written. The entire faculty contributed to its development. In compiling these pages, I realized that I'd been looking for such a resource for a long time. I've been waiting for someone to provide a "first stop" guide to locating practical information; something I could give to people looking for resources to help them find solutions to everyday problems. The "someone" turned out to be me!

I want to thank the faculty for making this resource guide possible. I'd also like to thank Eugene Murphy, Human Resources Center, Rx Home Care, Communication Outlook, Job Development Laboratory and Rehab. Briefs for permission to reprint materials from their publications. Special thanks go to Eileen Hunt, Kathy Judge and Diane Lindquist from Children's Hospital at Stanford for their work in the preparation of this document.

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.

Sandi Enders

Sandi Enders, OTR
Editor

Readers are invited to make suggestions regarding the updating or expansion of the Resource Guide.

A NOTE ON MYSTIFICATION

"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 HIC's 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, shmricroprocessor!"

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

TECHNOLOGY FOR INDEPENDENT LIVING

Cottonwood Room, Hyatt Regency Hotel
Houston, Texas

Friday, August 20, 1982 - Technology at Home and in the Community

TIME	TOPIC	FACULTY
9:00-9:30	Introduction/Overview	Lex Frieden, Moderator
9:30-10:30	The Selection Process	Kathy Bowman, OTR
10:30-10:45	Break	
10:45-11:30	Technology at Home ADL/Self Care	Sandi Enders, OTR
11:30-1:00	Lunch	
1:00-2:00	Technology at Home Access & Modifications	Jim Tobias
2:00-2:45	Technology in the Community Mobility, U.S.A	Sam McFarland, MSME
2:45-3:00	Break	
3:00-3:15	Technology in the Community Mobility, Sweden	Lars Augustson
3:15-4:00	Technology in the Community Personal Vehicles	Marg Young, OTR
4:00-4:30	Technology in the Community Sensory Aids	Debbie Gilden, PhD
6:00-7:30	Wine & Cheese/No Host Bar	

Saturday, August 21, 1982 - Technology at the Workplace
and for Recreation

9:00-9:30	Overview	Lex Frieden
9:30-10:30	Technology at the Workplace In the Classroom	Elaine Trefler, OTR
10:30-10:45	Break	
10:45-11:45	Technology at the Workplace On the Job	John Leslie, PhD John McNair
11:45-1:00	Lunch	
1:00-1:45	Technology for Recreation Toys	Debbie Gilden, PhD Barry Romich, PE
1:45-2:15	Technology for Recreation Sailing	Richard Olcese
2:15-2:45	Break	
2:45-3:00	Technology for Recreation W/C Sports	Jim Hayes
3:30-4:30	Information Resources	Judy Bernett Marian Hall, OTR

TECHNOLOGY FOR INDEPENDENT LIVING FACULTY LIST

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Handikappinstitutet
Box 303
S-161 26 Bromma
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416/425-6220

THE SELECTION PROCESS

NOTES

THE SELECTION PROCESS

Kathy Bowman, O.T.R.
Project Threshold
Rancho Los Amigos
Rehabilitation Engineering Center
Downey, California

I. Definition

Selection process: systematized procedure for evaluation including functional assessment of client and determination of equipment needs utilizing appropriate personnel.

II. Importance of a Selection Process:

- A. Defines the problem.
- B. Identifies problem in context of overall activities.
- C. Reveals other areas of need for investigation.
- D. Provides functional assessment as a basis for equipment selection.
- E. Insures use of simplest, most cost effective solutions.
- F. Avoids duplication, "re-inventing the wheel."
- G. Involves client in process as a learning experience.
- H. Develops resource information useful for future clients.

III. Project Threshold - Implementation of a Selection Process

A. Background:

- 1. Organization
- 2. Funding

B. Key features:

- 1. Case coordinator.
- 2. Collaboration of client and referring agency.
- 3. Equipment demonstration and trial use.
- 4. Network of consultants.
- 5. Resources

IV. The Selection Process - Steps

- A. Review case referral.
- B. Gather information and clarify request.
- C. Interview client.
- D. Identify problem and set tentative goal.
- E. Discuss case at team meeting and develop formal plan.
- F. Prepare for evaluation.
- G. Evaluate client.
- H. Determine recommendations:

1. adaptive behavior
2. commercially available equipment
3. custom equipment
4. training

- I. Write report.
- J. Provide follow-up when indicated.

V. Implications of Selection Process

- A. Changes in types of solutions with growth of Project Threshold.
- B. Service category statistics and average costs.

VI. Case Examples

- A. Case demonstrating limited Project Threshold intervention.
- B. Case involving extensive evaluation and problem-solving with custom solutions.
- C. Case involving major intervention with client and complex solutions.
- D. Case involving major intervention with client and complex solutions.

PROJECT THRESHOLD

Guidelines for Initial Client Interview

I. General Information

Client's Name _____ Height _____
Telephone no. _____ Weight _____
Age _____
Disability _____

Previous rehabilitation _____

Current Living Situation

Live independently _____ With attendant _____

Live with family _____

Other _____

Own home _____

Rent _____

II. Mobility

Ambulation: Yes _____ No _____

Devices used _____

Wheelchair: Yes _____ No _____

Manual _____

Powered _____

Both _____

Describe use _____

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

III. Ability to use extremities

Upper _____

Lower _____

Devices used _____

Limiting Factors

Spasticity _____

Contractures _____

Other _____

Sensation

Upper, describe _____

Lower, describe _____

IV. Body Handling Skills

Stand from sitting position: Yes _____ No _____

Roll from side to side: Yes _____ No _____

Come to sitting from supine: Yes _____ No _____

Sitting balance

Supported _____

Unsupported _____

Ability to relieve

Ischial pressure _____

V. Transfers

Independent

Dependent

Bed _____

Describe:

Wheelchair _____

Describe:

Toilet _____

Describe:

Tub/Shower _____

Describe:

Car _____

Describe: _____

Other _____

Devices used _____

VI. Activities of Daily Living

A. Eating

Independent _____
Dependent _____

Describe: _____

Devices used _____

B. Light Hygiene/Grooming

Independent _____
Dependent _____

Describe: _____

Devices used _____

C. Dressing

Upper extremity Independent _____ Dependent _____
Lower extremity Independent _____ Dependent _____

Describe: _____

Devices used _____

D. Toileting

Independent _____
Dependent _____

Describe: _____

Devices used _____

1. Bladder function Yes _____ No _____
Describe management _____

2. Bowel control Yes _____ No _____
Describe management _____

E. Bathing

Independent _____
Dependent _____

Describe: _____

Devices used _____

F. Homemaking

Cooking Independent _____ Dependent _____

Describe: _____

Marketing Independent _____ Dependent _____

Describe: _____

Laundry Independent _____ Dependent _____

Describe: _____

Light Housekeeping Independent _____ Dependent _____

Describe: _____

Heavy Housekeeping Independent _____ Dependent _____

Describe: _____

VII. Attendant Needs

Attendant: Yes _____ No _____

Number of Hours: _____

Describe attendant routine _____

VIII. Vocational

Write Independent _____ Dependent _____

Describe: _____

Type Independent _____ Dependent _____

Describe: _____

Phone	Independent__Dependent__
Describe: _____	
File	Independent__Dependent__
Describe: _____	
Retrieve books and papers	Independent__Dependent__
Describe: _____	
Take notes/tape recorder use	Independent__Dependent__
Describe: _____	
Other _____	

IX. Leisure

Describe leisure activities _____

Devices/Methods used _____

Project Threshold
 Rancho Los Amigos Hospital
 Rehabilitation Engineering
 Center
 Downey, California

INDEPENDENT LIVING SKILLS CHECKLIST

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 last column.

	FUNCTIONAL ABILITY					DESCRIPTION
	Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
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 last column.						
<u>ACTION OR ACTIVITY</u>						
<u>Dressing:</u>						
Dress upper body						
Dress lower body						
Shoes, socks						
Buttons, zippers, bras						
<u>Transfers:</u>						
Getting into bed						
Getting out of bed						
Positioning yourself in bed						
Getting on toilet						
Getting off toilet						
Getting into car						
Getting out of car						
<u>Grooming & Hygiene:</u>						
Getting into tub/shower						
Getting out of tub/shower						
Washing hands and face						
<u>Light Grooming:</u>						
Washing hair						
Brushing teeth						
Toilet hygiene						
Nail care						
Makeup						
Ear care						
Brushing hair						
Shaving						
Feminine hygiene						

Enders

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 last column.

Eating - Drinking:

	FUNCTIONAL ABILITY					DESCRIPTION
	Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	
Feeding self						
Cutting						
Drinking						
PROBLEMS: (Describe)						

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 last column.

Physical Mobility:

	FUNCTIONAL ABILITY								DESCRIPTION
	Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Functional	Non-Functional	Speed Range	
Mobility aids									
Walking - inside home									
Walking - outside home									
Up/Down stairs									
Escalators									
Elevators									
Curbs									

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 last column.

Wheelchair:

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

Using Public Transportation:

Bus
BART
Airplanes/Trains

Using Private Transportation:

Drive self
Own vehicle
Valid Driver's License
D.P. plates

FUNCTIONAL ABILITY							DESCRIPTION
Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Functional	Non-Functional	Speed Range
							Where relevant, please describe the aid, either personal or mechanical, that you use.

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 last column.

COMMUNICATION SKILLS

Writing - signature
Speaking
Reading
Listening
Signing
Typing
Work board
Telephone

FUNCTIONAL ABILITY					DESCRIPTION
Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.

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 last column.

ADL TASKS

Cooking:

	FUNCTIONAL ABILITY					DESCRIPTION
	Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.
Using range						
Using oven						
Using refrigerator						
Using freezer						
Using sink - faucets						
Transporting cookware, ingredients, etc.						
Using can openers						
Kitchen Accessibility: (Describe) _____						

Safety Precautions: (Describe) _____

Cleaning:

Washing dishes						
Laundry						
Housecleaning						
Vacuüming						
Dusting						
Floors						

Other:

Opening/Closing doors						
Problem door openings						
Keys						
Light switches						
Pay phones						
Money handling						
Checking account						

Enders

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 last column.

FUNCTIONAL ABILITY					DESCRIPTION
Always Independent	Can But Usually Don't	Absolutely Can't	Want To Change	Not Applicable	Where relevant, please describe the aid, either personal or mechanical, that you use.

ADL - HEALTH

Taking Medications

Diet/Nutrition: (Describe) _____

R.O.M. - Exercise (Frequency)

On-going therapy

Skin care (Pressure sore prevention)

ADL - EQUIPMENT

Wheelchair Maintenance:

General

Water in battery

Air in Tires

Recharging battery on electric chair

Maintenance of mobility aids

Maintenance of assistive devices

Sandi Enders, OTR
Center for Independent Living
Berkeley, California 1977

RESOURCES

The following resources have more information on assessment and the selection process:

Assistive Devices for Handicapped Students. A Model and Guide for a Statewide Delivery System. National Association of State Directors of Special Education. Washington, D.C. 1980 27 pp.

Equipment for the Disabled. National Fund for Research into Crippling Diseases. 2 Foredown Drive, Portslade, Brighton, England. 10 booklet series which provides guidelines to help in the selection of equipment. Pictures of commercially available and do-it-yourself aids, 1973-1980.

Independence through Environmental Control Systems. Symington, David et al. Canadian Rehabilitation Council for the Disabled. Toronto, Ontario, Canada. 64 p. \$5.00 1980.

Occupational Therapy. Willard & Spackman's 5th Edition. Hopkins, Helen Land Smith, Helen O. Editors. J.B. Lippincott Co., Philadelphia, 1978.

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. Downey, California, 1980.

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

"A Systematic Approach to Evaluating Physical Ability for Control of Assistive Devices". Proceedings of the Fourth Annual Conference on Rehabilitation Engineering, 1981. Rehabilitation Engineering Society of North America. Bethesda, Maryland.

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.

Aids to Independent Living: Self-Help for the Handicapped.

Lowman, Edward, M.D., Kleiger, Judith, OTR. 1969. McGraw Hill Book Company, Blakeston Division, New York. The American compendium of assistive devices; also describes adaptive techniques and do-it-yourself devices.

Exercises and Selfcare Activities for Quadriplegic People.

Accent Special Publications, Box 700, Bloomington, IL 61701.

Handling the Young Cerebral Palsied Child at Home. Finnie, N.R.,

FCSP. New York, A Sunrise Book, E.P. Dutton, 1975. Equipment suggestions are made throughout book for commercially available and do-it-yourself devices. There is also a list of resources for equipment and accessories. \$5.95.

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.

Ford, J., Duckworth, B.; Davis, F.A.; Philadelphia, PA 1974. Appendix also has D-I-Y suggestions for aids.

Self-Help Manual for Patients with Arthritis.

Arthritis Health Professions Section of Arthritis Foundation, 3400 Peachtree Road, N.E. Atlanta, Georgia 30326, 1980.

TECHNOLOGY AT HOME

HOME ACCESS AND MODIFICATIONS

Jim Tobias
Matheny School
Peapack, New Jersey

<u>FUNCTION</u>	<u>DEVICE</u>	<u>COST</u>	<u>NOTES</u>
Unlocking Door	Electric Door Lock		available through average lock shop, Mfr. is Trine Co.
	1) electric strike	\$25-\$30	If you're installing it yourself, you will need good tools & good measurements. Lock shop will charge \$75 to install it.
	2) transformer: 12 VAC, 1 Amp	\$10	Should be enclosed in chassis box & equipped with a 2 Amp fuse (slow blow).
	3) Radio control	\$40-\$90	Generally, the more expensive ones have more codes on the transmitter for more security. Sears garage door kits cost \$70 for transmitter and receiver.

NOTE: 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).

Tobias

NOTES

FUNCTION	DEVICE	COST	NOTES
Environmental Control	BSR X-10 Standard	see notes	uses a master console for 16 functions, ultrasonic remote control, plug-in appliance, and lamp modules. Available as a starter set w/master, remote, 3 modules for \$130. Buttons are small, stiff, close together. Available at Sears, Radio Shack, etc.
	BSR X-10 Modified	see notes	Can control 4 or 8 devices (2 models). Good rocker-type switch, 4-device master, 3 modules, \$190. With 8-device master, \$210. Available at some medical houses, Prentke-Romich, or BSR, Rte 305 Blauvelt, NY, 10913, phone: 914/358-6060.

NOTE: Some disabled people may be able to use the stanford model, withn or without a keyguard (not commercially available). Modified design has no ultrasonic remote control. These devices are inexpensive, 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.

Tobias

NOTES

FUNCTION	DEVICE	COST	NOTES
Environmental Control	Touchplate switch	\$20/kit	Available from Heath-kit (see phone for local store) or other electronics sources. Relatively easy to build with soldering iron, a few tools. Plug appliance (current limit on both models 150w lamps, 180w fans into switch box, plug switch box into wall. Small metal disc can be placed anywhere, requires just a light touch to turn device on or off. Can use more than one in the same dwelling.
	Whistle Switch	\$20	Available from electronics or some department stores, or Carol Wright Gifts, Box 8502, Lincoln, NE 68544, or Neil Henson Co., Box 132, Jackson, MO 63755. As above, plug appliance into wall. Transmittal is really a squeeze whistle Device may be triggered accidentally by jangling keys, dog whistles etc. Only 1 per room.

NOTES

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 just for this: old knobs, 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 one that matches the chassis hole size, number of poles, type of activation, etc. Ask for help at an electronic store.

PUSHBUTTONS:

A small pushbutton can be adapted by glueing on a slightly larger plastic plate, or by putting a sort of keyguard 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 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 business office for their number)
- * Vocational schools
- * local technology companies (try the public relations office)
- * colleges, engineering schools
- * Special Education schools

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 me for information exchange:

Jim Tobias
Matheny School
Peapack, NJ 07977

Technology in the Home

Product Information on Environmental Controls and Accessible Home Hardware

Design for Accessibility: Equipment and Aids Catalog. 1979 revised 1981. Michigan Center for a Barrier Free Environment, 6879 Heather Heath, West Bloomfield, MI 48033. \$20.00.

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

Independence through Environmental Control Systems. Symington, David et al. Canadian Rehabilitation Council for the Disabled, Toronto, Ontario, Canada, 64 pp.

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.

Rehabilitation Aids Resource Book-Volume I. Basic Telecommunications Corporation, 4414 E. Harmony Road, Fort Collins, CO 80525.

Basic information about telecommunications, alarm, and environmental control devices that are available for the disabled. Includes various types of switches and interfaces, as well as manufacturers' name and address, prices, and some specifications of the devices. Periodic updates are available by subscription. Currently lists 85 devices and 75 switches. \$30.00.

TECHNOLOGY AT HOME

A Resource Guide for Technology and Techniques Related to ADL and Home Modification

Access: The Guide to a Better Life for Disabled Americans. Bruck, Lilly. Random House, New York. 1978

Adaptations and Techniques for the Disabled Homemaker. Hodgeman, K., and A. Lundberg. Sister Kenny Institute, 811 E. 27th Street, Minneapolis, MN 55404. 4th edition, 30 p.

Aids and Adaptations. The Canadian Arthritis and Rheumatism Society, 45 Charles Street, East, Toronto, M4Y 1S3 Ontario, Canada. Plans for making devices, compiled by the Occupational Therapy Department, CARS, British Columbia Division. \$2.00

Aids and Appliances. American Foundation for the Blind. 15 W. 16th Street, New York, NY 10011. 21st ed., 1975-1976, 34 pp., illus., price: \$2.00. Various aids and home products (braille globes, pressure cookers, etc.) helpful to blind consumers are discussed, and order information is included.

Aids to Independent Living: Self-Help for the Handicapped. Lowman, Edward and Klinger, Judith L. McGraw-Hill, New York, NY 10036. 796 p. 1969. \$41.00.

Aids to Make You Able. Davis, Wendy, Fred Sammons, Inc., Brookfield, IL. 114 pp. 1979. \$6.95.

The Bed and Bath Book, 1978, 360 p.

The House Book, 1974, 448 p.

The Kitchen Book, 1974, 360 p., Conran Terence, Crown Publishers, New York. Small concise section in each book on design ideas for the disabled and elderly. \$30/each.

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

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

Designing for the Disabled. Goldsmith, Selwyn. 3rd edition, 1976, 525 pp. 478 diagrams, RIBA Publications, Ltd., 66 Portland Place, London, England. \$70.00.

Disabled Homemaker. Anderson, Hoyt. Charles C. Thomas, Springfield, IL. 1981.

Disabled? Yes. Defeated? No. Cruzic, Kathleen. Prentice-Hall, Inc., Englewood Cliffs, New Jersey 1982, 212 pp. \$6.95. Resource guide that includes product information and do it yourself adaptations. Sections on ADL, housework, recreation, clothing.

Devices for Visually Impaired Diabetics. Townsend, Alex H. 1978. 8 pp. American Foundation for the Blind. New York.

Do It Yourself Again: self help devices for the stroke patient. American Heart Association, 44 E. 23rd Street, New York, NY 10010, 1969, 47 pp.

An Easier Way: Handbook for the Elderly and Handicapped. Sargent, Jean V.: Iowa State University Press. 1981. 220 pp.

Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, England. 10 booklet series which provides guidelines to help in the selection of equipment. Pictures of commercially available and do-it-yourself aids. Personal Care. Home Management. Disabled Mother. Clothing and Dressing for Adults. Housing and Furniture. Hoists and Walking Aids. 1973-1980.

Handicapped at Home. Foott, Sydney. Quick Fox Press, New York, NY. 71 pp. 1977.

Help Yourself: A handbook for hemiplegics and their families. Ian Henry Publications, 38 Parkstone Avenue, Hornchurch, Essex, England. 3rd edition, 1979, 161 pp.

Helping the Handicapped. A Guide to Aids Developed by the Telephone Pioneers of America. (Call 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 also sections on mobility aids, ADL equipment and toys.

Home Security. TimeLife Books Home Repair and Improvement Series. Time-Life Books, Alexandria, Virginia, 1979. 136 pp. \$11.95. Section on Accident-proofing a house includes 13 pages of direction and sketches for defusing the dangers of bathrooms and stairs. Includes: installation of grab bars, creating a slip resistant surface, adding a rail to a stairway wall, and building on outdoor access ramp.

Housing and Home Services for the Disabled: Guidelines and Experiences in Independent Living. Laurie, Gini. 434 p. Harper & Row, 2350 Virginia Avenue, Hagerstown, MD, 1977. \$20.00.

How To Create Interiors for the Disabled: A guidebook for family and friends. Cary, Jane R. Random House, New York, 1978, 127 pp.

How to Make it Cheap Manual. 3 volumes. Independence Factory, P.O. Box 597, Middletown, OH 45042. Line drawings of self-help aids you can make or have made. Also, prices of aids that can be ordered from the Independence Factory, a non-profit volunteer group.

Ideas for Making Your Home Accessible. Garee, Betty, editor. Accent Special Publications, Cheever Publishing, Inc., P.O. Box 700, Bloomington, IL 60701. 1979, 104 pp. \$6.50.

Independent Living for the Handicapped and the Elderly. May, Elizabeth, E.; Waggoner, Neva R. and Hotte, Eleanor B. Houghton Mifflin Company, 2 Park Street, Boston, Mass. 02107, 271 pp., illus., bibl. (414), price: \$11.50. This book demonstrates ways in which work simplification techniques used by industrial managers may be applied to the home by handicapped persons. The care of young children by physically limited parents and the design and adaptation of clothing are covered. It includes a bibliography of over 400 citations classified by subject.

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 Port City Press, Baltimore, MD 21208, 255 pp. 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.

Making Aids for Disabled Living. Grainger, Stuart Accent Special Publications, Box 700, Bloomington, IL. 88 pp. 1981.

Mealtime Manual. Institute of Rehabilitation Medicine (New York University Medical Center) and Campbell Soup Company, Box (MM) 56, Camden, NJ 08101. 1978. Principles, techniques and equipment suggestions for meal preparation and homemaking.

The One Hander's Book, A Basic Guide to Activities of Daily Living. Washam, Veronica The John Day Co., New York.

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

A Resource Guide to Habilitative Techniques and Aids for cerebral palsied persons of all ages. High, Elizabeth Job Development Laboratory, George Washington University, Washington, D.C. 150 pp.

Resource Guide to Protective Aids. Frank, Judith A.; Kalisankar Mallik; Chiu, Wu S.; and Lowry, Charlene P. Job Development Laboratory, The George Washington University Division of Rehabilitation Medicine, Washington, D.C. Sections include: Protection of the Head; Positioning, Restraining and Joint Protection; Pressure Relief; and Skin Protection.

Self Help Manual for Arthritis Patients. Klinger, J. Arthritis Foundation, 1974.

The Source Book for the Disabled. Hale, Glorya, editor Paddington Press, Ltd., distributed by Grosset & Dunlop, New York. 1979.

Therapeutic Devices, 1956-1976. Bellman, J. 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.

Wheelchair Bathrooms. Paralyzed Veterans of America, Inc., 3636 16th Street, N.W., Washington, D.C. 20010. 1971.

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

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

The Wheelchair in the Kitchen. Paralyzed Veterans of America, Inc., 3636 16th Street, N.W., Washington, D.C. 20010. 1973.

Sandi Enders, OTR
Children's Hospital at Stanford
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Palo Alto, California
June, 1982

TECHNOLOGY FOR CHILDREN

At Home and In School

Aids for Children. Technical Aids for Physically Handicapped Children. ICTA Information Centre, Fack S161 03, Bromma 3, Sweden. (ICTA) ISRD Committee on Technical Aids, Housing and Transportation). An international catalog of children's assistive devices.

Caring for Your Disabled Child. Spock, Benjamin, and Lerrigo, Marion O. New York: CollierMacMillan, 1965. \$1.95. Part VII-Tools and Techniques for Daily Living has information on selfhelp aids, crutches, braces, wheelchairs, etc., \$1.95.

Communication Outlook (an international information coordinator and resource newsletter) \$10.00 (\$12.00 overseas), Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824.

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 issues that include all children, regardless of their disabilities.

Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, England. 10 booklet series which provides guidelines to help in the selection of equipment. Pictures of commercially available and doityourself aids. Disabled Child.

Functional Aids for the Multiply Handicapped. Medical Department, Harper & Row Publishers, Hagerstown, Maryland, 1973. (The \$3.50 paper cover edition printed for and made available only through United Cerebral Palsy Association, Inc.) Editor/Isabel P. Roinault. A revised second edition is to be available soon.

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

Handicapped Children Strategies for Improving Services. Breuer, Gary D.; Kakalik, James S. McGraw Hill, 1221 Avenue of Americas, New York, NY 10020, 1979.

HandiSitters: How to Sit for the Handicapped Cohn, M.S.; Caffey, K.J. 1979, 63 pp. Melissa Cohn, OTR, 1812 Mapleleaf Blvd., Oldsmar, Florida 33557, 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.

Helping the Severely Handicapped Child: A Guide for Parents and Teachers. Doyle, P.B.; Goodman, J.F.; Jeffrey, G.N.; and Mann, Lester New York, Thomas Y. Crowell, Publishers, 1979. Chapter on Special Equipment. pp 93108.

How to Build Special Furniture and Equipment for Handicapped Children. Hofman, Ruth B. Springfield, Illinois: Charles C. Thomas, 1974, 100 pp., paperback, cost: \$6.50. Explicit instructions including pictures, measurements and materials for making a standing board, a cutout table, a standing table, chair inserts, a potty chair, etc.

Inexpensive Equipment for Activities of Daily Living. Cservenyansky, Kathryn S., C.O.T.A. George Washington University Hospital, Occupational Therapy Department, 1973, 18 pp. Illus., cost: \$1.00, available through: Job Development Laboratory, George Washington University Medical Center. Xeroxed manual of easily made aids for feeding, dressing, hygiene.

Let Me Do-It-Yourself: A Curriculum Guide for Teaching Daily Living Skills to Orthopedically Handicapped Children. 1978. Prepared by Joan McCollom. Available from Albert Schweitzer School, San Diego, CA. Pub #1B785. Includes suggestion for assistive devices and a checklist for daily living skills evaluation for school age and preschool children.

Manual for Cerebral Palsy Equipment. Easter Seal Society for Crippled Children and Adults, Inc., 2023 So. Ogden Avenue, Chicago, IL 60612.

Nonoral Communication System Project. Beverly Vicker, Editor. Campus Store Publishers, The University of Iowa, 17 W. College, Iowa City, Iowa 52242, 1964-1973. This publication has excellent program ideas.

Nonvocal Communication Resource Book. Edited by Gregg Vanderheiden. Baltimore: University Park Press.

NonVocal Communication Techniques and Aids for the Severely Physically Handicapped. Edited by Gregg Vanderheiden & Kate Grilley. Baltimore: University Park Press. This and the preceding publication provide lists of basic inventors of assistive devices for communication.

Occupational Therapy for Mentally Retarded Children Copeland, M.; Ford, L. and Solon, N. University Park Press, Baltimore, MD, 1976, 226 pp. Chapter 6, Adapted Equipment. Suggestions, sketches and construction details for low cost aids that can be constructed in the clinic classroom or home.

Physically Handicapped Children: A Medical Atlas for

Teachers. Bleck, Eugene E., M.D.; Nagel, Donald A., M.D. Grune & Straton, Inc., 111 5th Avenue, New York, NY 10003, 2nd edition, 1982. Fundamental medical facts are accompanied by practical suggestions for teachers. Assistive devices are included where appropriate.

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

Products for People with Vision Problems. Twentysixth Edition 1980/1981. American Foundation for the Blind, Consumer Products Department 15 W. 16th Street, New York, NY 10011. Section on Pre School Products, as well as other devices used by children with vision problems.

Selected Equipment for Pediatric Rehabilitation. Bergen, Adrienne, R.P.T. 1975. Illus. Spiralbound paperback, available through: Blythdale Children's Hospital, Bradhurst Avenue, Valhalla, NY 10595, (914) 5927555. Well illustrated guide to equipment for positioning, transfers, ambulation, toileting and therapy.

Special Technology for Special Children. Goldberg, Paul University Park Press, Baltimore, MD. 1979. A publication which addresses technical needs of both cerebral palsy and hearing impaired children.

Teaching Individuals with Physical and Multiple Disabilities. Bigge, J.L.; O'Donnell, P.A. Charles E. Merrill, Columbus, OH, 1976, 279 pp. Assistive devices 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. This is a resource book of both commercially available and custom made equipment.

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June 1982

Resources Specifically for Adapted Clothing

Ability-Not Disability: With Clothing: Meldahl, Harriet and Wascoe, Joyce Extension Folder 316, No. 4, Agricultural Extension Service, University of Minnesota, St. Paul, Minn. 55101, 15 pp., 38 illus., price: n.a.

Clothing Designs for the Handicapped. Kernaleglien, Anne. University of Alberta Press, Edmonton, Alberta, Canada. 1978.

Clothing for Handicapped People - An Annotated Bibliography and Resource List. Compiled by Naomi Reick, Patricia Otten and Marie Negri Carvar, University of Arizona, Tucson, AZ 85721. Distributed by President's Committee on Employment of the Handicapped, Washington, D.C. 20210. 1979.

Clothing for the Handicapped, the Aged, and Other People with Special Needs. Hoffman, Adeline. Springfield, IL, Charles C. Thomas Publisher, 1979.

Clothing Ideas for the Handicapped. Accent Special Publications, Box 700, Bloomington, IL 61701.

Dressing with Pride: Clothing Changes for Special Needs. Kennedy, Evelyn 1981. 116 pp. PRIDE Foundation, 1159 Poquonnock Road, Groton, Connecticut

People Helping People: Clothing and Aids for the Physically Disabled. Vocational Guidance and Rehabilitation Services. Available through: Sewing Department, VGRS, 2239 E. 55th Street, Cleveland, OH 44103, cost: \$1.00.

TECHNOLOGY IN THE COMMUNITY

WHEELCHAIRS

NOTES

WHEELCHAIRS AND TOTAL MOBILITY

Samuel McFarland
Southwest Research Institute
San Antonio, Texas

The Total Mobility Concept:

- o Mobility for a rehabilitation client is a many-faceted problem. The barrier encounters begin when the person awakes in the morning and follow the individual to bed at night.
- o Mobility devices are not necessarily mobility aids.
- o Successful mobility rehabilitation is not a solo piece, it is an orchestration.
- o It changes with changes in physical condition, residence, work situation, and the weather, and should be reviewed periodically.

Wheelchair Selection:

1. Common Mistakes

- a. underaccommodating the need (inappropriate specification)
- b. overspecifying options (buying more than is needed)
- c. abandoning the client to the mercy of the salesman
- d. making no arrangements for service (expecting life-long durability)
- e. overlooking used chairs
- f. ignoring total mobility accessories
- g. expecting immediate delivery

2. Suggestions

- a. Carefully plot the total mobility needs.
- b. Rent or borrow a used chair for in-service trial.
- c. Discuss needs, options, and accessories with salesman.
- d. Think about it.
- e. Consider buying more than one chair (backup and versatility).
- f. Consider service policy.
- g. Avoid electric chairs as a luxury, but don't eliminate them because of expense.
- h. If trained service not available, pay for someone's education

NOTES

WHEELCHAIR RESOURCES

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 60130, 15 pp. 1979.

Functional Wheels. Garris, A.G. Dept. of Rehabilitation, 830 K Street, Sacramento, CA 95814, 73 pp. 1980.

The Professional Wheelchair Contact. Invacare, Inc. Elyrice, Ohio, 1980.

A Stitch in Time: Wheelchair Inspection and Maintenance

A Stitch in Time: Wheelchair Maintenance and Repair

Center for Occupational Curriculum Development, P.O. Box 7218, University of Texas at Austin, Austin, TX 78712

Things to Consider When Buying or Renting a Wheelchair. Pocket Catalog No. 3. 1976. Everest & Jennings, Inc., 1803 Pontius Avenue, Los Angeles, CA 90025

Wheelchairs and Accessories. Accent Special Publications, P.O. Box 700, Bloomington, IL 61701. 129 pp.

Wheelchair Prescriptions.

Booklet 1. Measuring the Patient

Booklet 2. Wheelchair Selection

Booklet 3. Safety and Handling

Booklet 4. Care and Service

Everest & Jennings, Inc. 1803 Pontius Avenue, Los Angeles, CA 90025, 1976.

The most current information about new wheelchair designs and prototypes is generally not in printed sources. Developmental information is exchanged informally through a "people network". Names and addresses of many of these people can be found in the Wheelchair I and II reports. These publications also have information on such things as the history and development of wheelchairs, and the state of the art information on wheelchair design and wheelchair surveys.

Wheelchair I - Report of workshop Dec. 6-8, 1977. Moss Rehabilitation Hospital, 12th Street and Tabor Road, Philadelphia, PA 19141, 173 pp., 1978.

Wheelchair II - Report of a workshop Dec. 13-16, 1979. Moss Rehabilitation Hospital, 12th Street and Tabor Road, Philadelphia, PA 19141, 186 pp., 1979.

The report on Wheelchair III - a workshop held March 25-27, 1982 in La Jolla, California, is expected to be available from RESNA, 4405 East West Highway, Bethesda, MD 20814 later this year.

MANUAL WHEELCHAIR MANUFACTURERS

Carters Rehabilitation Division
Rajowalt Company
Atwood, IN 46502

Summit Services, Inc.
535 Division Street
Campbell, CA 95008

Colson Equipment
Fair Boulevard
Caruthersville, MO 63830

Wheeler Dealers
P.O. Box 656
Avondale, AZ 85323

Equalizer
274 Buchon St.
San Luis Obispo, CA 93401

Everest & Jennings, Inc.
3233 E. Mission Oak Blvd.
Camarillo, CA 93010

Internat'l. Medical Equipment
Corporation
11000 Rush Street, #20
S. El Monte, CA 91733

Invacare Corp.
1200 Taylor Street
Elyria, OH 44035

Ja-Dik Corporation
9075-J 130 Avenue, N.
Largo, FL 33543

Orthopedia GMBH
D 2300 Kiel 15
P.O. Box 6407
Fed. Rep. of Germany

U.S. Dist.:
International Medical Equipment
6720 Stanford Way
Whittier, CA 90601

Production Research Corp.
10217 Southard Drive
Beltsville, MD 20705

Quadra Wheelchair, Inc.
31125 Via Colinas #903
Westlake Village, CA 91361

Sears & Roebuck Co.
c/o Leroy Meyer
1633 Broadway
New York, NY 10019

Stainless Medical Products
9386 Dowdy Drive
San Diego, CA 92126

SPORTS WHEELCHAIRS

See: TECHNOLOGY FOR RECREATION
"Sports Wheelchairs and Recreational Transport"

ELECTRIC WHEELCHAIR MANUFACTURERS

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90250

A-BEC
1815 W. 205th Street
Suite 206
Torrance, CA 90501

Amigo Sales, Inc.
6693 Dixie Highway
Bridgeport, MI 48722

E.F. Brewer Company
P.O. Box 159
Minomonee Falls, WI 53051

Coast Mobile Home Sales
12505 Beach Blvd.
Stanton, CA 90680

Colson Equipment
Fair Boulevard
Caruthersville, MO 63830

Everest & Jennings, Inc.
3233 E. Mission Oak Blvd.
Camarillo, CA 93010

E & J Canadian Ltd.
111 Snidercroft Road
Concord, Ontario Canada
L4K 1B6

Internat'l. Medical Equip.
Corporation
11000 Rush Street, #20
S. El Monte, CA 91733

Invacare Corporation
1200 Taylor Street
Elyria, OH 44035

Malden Care
Div. of Malden
Electronics, Ltd.
579 Kingston Road
Raynes Park
London, England SW20 85P

Mobility Engineering & Dev.
7131 Hayvenhurst Avenue
Van Nuys, CA 91406

L. Mulholland Corporation
P.O. Box 391
215 N. 12th Street
Santa Paula, CA 93060

Orthopedia GMBH
D 2300 Kiel 15
P.O. Box 6407
Fed. Rep. of Germany

U.S. DIST: (Orthopedia GMBH)
Internat'l Medical Equip.
6720 Stanford Way
Whittier, CA 90601

Oxford Orthopaedic Engineering
Center
Nuffield Orthopaedic Center
Headington, Oxford
England OX3 7LD

National Welded Products
2900 Spring Street, #6
Redwood City, CA 94063

Rosenthal Mfg. Co.
5033 N. Kedzie
Chicago, IL 60625

Saab-Scania of America, Inc.
Saab Drive, P.O. Box 697
Orange, CT 06477

Sears & Roebuck Co.
c/o Leroy Meyer
1633 Broadway
New York, NY 10019

Seidel Manufacturing
466 W. Market Street
Akron, OH 44303

Sherry Products, Inc.
1501 Pacific Coaxu Highway
Hermosa Beach, CA 90254

Small Electric Vehicles, Inc.
56 E. Walnut Street
Westerville, OH 43081

Summit Services, Inc.
535 Division Street
Campbell, CA 95008

Steven Motor Chair Co.
120 N. Gunter
Siloam Springs, AZ 72761

21st Century Scientific Inc.
7135 Hayvenhurst Avenue
Van Nuys, CA 91406

Voyager Ltd.
P.O. Box 1577
S. Bend, IN 46634

Zimmer Orthopaedic Ltd.
Bridgend, Mid Glam
CF31 3PY
Great Britain

EUROPEAN WHEELCHAIRS

Samuel R. McFarland, Chairman,
Subcommittee F-19.40, "Mobility Aids,"
American Society for Testing and Materials

This is a listing of major wheelchair brands manufactured and sold in Western Europe. European wheelchairs are not unlike those known to Americans except that use patterns in Europe demand certain characteristic variations. Many wheelchairs, for example, have placed the large drive wheels at the front and casters at the rear because of the need for better indoor and small space maneuverability. Dynamic hand brakes on manual wheelchairs are frequently seen in response to the hilly environment of many European cities. Electric wheelchairs tend to be more elaborate, more expensive vehicles capable of use on village streets and in limited competition with automobile traffic. In keeping with the European love of bicycles and motorcycles, electric wheelchairs tend to be larger, more powerful, and include such vehicle trappings as headlights, turn indicators and horns. The vast majority of wheelchairs purchased in Europe are provided by government health programs. Thus, government agencies tend to be very active in developing standards and quality assurance tests.

European Wheelchair Manufacturers:

<u>Company</u>	<u>Country</u>
Carters Everest & Jennings, Ltd. Newton Aids, Ltd. Rehab Invacare, Ltd. Remploy, Ltd. Vessa, Ltd. Zimmer Orthopaedic, Ltd.	United Kingdom
Deutsche Orthopadische Werke (DOW) Orthopaedia Wilhelm Meyer (Meyra)	Germany
Poirier, S.A.	France
Annastolen Oostwond R.T.C. Vermeiren	Netherlands
Saab (Permobil)	Sweden
Resource:	Basisboek Voorzieningen, Gemeenschappelijke Medische Dienst, Bos en Lommerplantsoen 1, Postbus 8071, 1005 AB, AMSTERDAM

NOTES

MOBILITY IN SWEDEN

Lars Augustsson
The Swedish Institute for the Handicapped
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S-161 26 BROMMA
Sweden

The development of wheelchairs in Sweden is at this moment very intensive. We experience a few very important trends in wheelchair design.

On the powered side modern electronics and computers are used to give the user a better wheelchair in terms of more flexible steering systems allowing the more severely handicapped persons a possibility to handle the chair with the kind of input he prefers. An example is the micro computer based control box to "hang on" ordinary elderly powered wheelchairs. Data programs give the chair orders to accelerate at any given rate, turn at a given ratio, etc. on command from suck-and-blow signals. This gives the user a much smoother ride than the older on/off systems. The company Permobil has developed and powered wheelchairs for children based on a micro computer to give a smooth ride but is also serves as a base for an environmental control. Via an infra-red link the driver can get in touch with a personal computer, e.g. in his apartment. With the wheelchair's joystick the driver can turn off/on the lights, the radio, etc. and also make telephone calls, type, write and so on.

The Besam has together with Mr. Sven-Olof Brattgard, Professor at the Department for Handicap Research at the University of Gothenburg, developed a wheelchair based on modern electronics. It has a true feedback system which means that the wheelchair goes where and at the speed you want it to regardless of slopes, curbs or ground structures, because of constant check-ups by the electronic system.

The company Mecanum has developed a spectacular omni-directional wheelchair based on the so called ILON-concept. Due to special wheels the chair can move freely to the floor forwards, backwards, sideways and rotating movements. Also combinations of these are possible. The chair enables the user to move on narrow areas, works in a proper ways at a bench e.g. in the kitchen. It also gives the user a fantastic feeling of freedom of movement - you drive it the way you walk.

Another important trend is the modern manual wheelchair based on the experiences from sport wheelchairs. Wheelchairs based on these concepts enables the user to move long distances at high speed. A child can coop with non-disabled friends when they are

playing or running, etc. For the first time, we can see kids who are not confined to a wheelchair but with leg injuries using the wheelchair as a tool for sports or to get a higher degree of mobility.

The wheelchair is no longer the aid you offer to persons where nothing else can be done, but a way to offer tremendous mobility.

These are a few examples of about 30 projects which the Swedish Institute for the Handicapped is involved in at this moment.

MOBILITY DEVICE EVALUATION GUIDE

User's Guide

General

This evaluation packet is a guide designed to provide a beginning therapist with a way to 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 NA 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. As much pertinent information that can be included should be.

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, M.A. 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.

DESCRIPTION

DEVICE: _____

Frame: _____

Seat and Back: _____

Wheels, Front: _____

Back: _____

Rims: _____

Brakes: _____

Arm rests: _____

Foot rests: _____

Power system: Motor _____

Battery _____

Charger _____

Controls _____

Other equipment: _____

Dimensions: In use: _____

For transport or storage: _____

Weight: Total: _____

Heaviest piece: _____

Cost: _____

Special functions: _____

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, reinforced

Arm rests: part of frame, detachable, adjustable, flared, desk style, full 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, 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 price 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

DEVICE: _____

FUNCTION		PERFORMANCE RATING							COMMENTS
		low			high				
MOBILITY	Indoors	NA	0	1	2	3	4	5	
	Outdoors	NA	0	1	2	3	4	5	
	Uneven terrain	NA	0	1	2	3	4	5	
	Ramps	NA	0	1	2	3	4	5	
	Curbs	NA	0	1	2	3	4	5	
	Distance	NA	0	1	2	3	4	5	
	Manuverability	NA	0	1	2	3	4	5	
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 breakdown	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 physical status	NA	0	1	2	3	4	5	
	Different disabilities	NA	0	1	2	3	4	5	

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 or to 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 distribution 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 transfers: Again, consider whether the user and/or any assistants find the device easy to get in and out of.

Access to tables: Table 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 or 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.

DEVICE: _____

FUNCTION		PERFORMANCE RATING										COMMENTS
		low					high					
TRANSPORT	Into car unassisted	NA	0	1	2	3	4	5				
	Into car with assistance	NA	0	1	2	3	4	5				
	Into van	NA	0	1	2	3	4	5				
	Use public transportation	NA	0	1	2	3	4	5				
	Can be carried upstairs	NA	0	1	2	3	4	5				
SAFETY	Stationary	NA	0	1	2	3	4	5				
	In motion	NA	0	1	2	3	4	5				
	Inclement weather	NA	0	1	2	3	4	5				
	Electrical system	NA	0	1	2	3	4	5				
DURABILITY	Expected lifetime	NA	0	1	2	3	4	5				
	Upholstery	NA	0	1	2	3	4	5				
	Frame	NA	0	1	2	3	4	5				
	Attachments	NA	0	1	2	3	4	5				
	Power system	NA	0	1	2	3	4	5				
MAINTENANCE	Washable	NA	0	1	2	3	4	5				
	Repair frequency	NA	0	1	2	3	4	5				
	Repair cost	NA	0	1	2	3	4	5				
	Downtime	NA	0	1	2	3	4	5				
SPECIAL FEATURES	APPEARANCE	NA	0	1	2	3	4	5				
		NA	0	1	2	3	4	5				
		NA	0	1	2	3	4	5				
		NA	0	1	2	3	4	5				

Evaluated by: _____

TRANSPORT

Into car unassisted: Give a high score if a user can get the aid in and out with no help quickly and easily. Indicate the smallest car that will accomodate 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 transportations: Specify whether equipment will fit on bus, train, plane, etc. and what special equipment (e.g. lifts) will be necessary.

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, and 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 montns.

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 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 is scored the 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.

Developed by Helen Tsuda, M.A. Candidate, Division of Physical Therapy, Stanford Medical School, April 1981.

SUMMARY

Device: _____

Date: _____

Picture

Brief Description: _____

Overall impression: _____

Advantages: _____

Disadvantages: _____

Appropriate users: _____

Availability: _____

Evaluated By: _____

Date: _____

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.

REFERENCES

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 LEVO 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. undated. 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, Inc., Downey, CA, on February 22-24, 1974, pp. 45-59. National Research Council, Washington, D.C., 1975. 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 need of the user are stressed. Fifteen aspects of good equipment are also included.

VAPC 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." In: Mobility for Spinal Cord Impaired People. pp. 136-145. National Research Council, Washington, D.C. 1975. This speaker addressed mobility about the home, neighborhood, and beyond. Issues of cost, versatility, cosmesis, safety, and private and public transportation were considered.

TECHNOLOGY IN THE COMMUNITY

PERSONAL VEHICLES

PERSONAL VEHICLES

"The achievement of independent mobility is of prime importance for the physically disabled individual. A person confined to a wheelchair is barred from most local public transportation and thus may be barred from employment, education, social activities and recreation. Driving an automobile, therefore, becomes especially important. In order to modify a vehicle for the use of a disabled driver, various adaptations must be made. To determine the type and degree of adaptation necessary a full analysis and study of the driving task, as well as a careful evaluation of the individual's functional limitations, must be undertaken."

Hand Controls and Assistive Devices for the Physically Disabled Driver Human Resources Center. Albertson, New York.

- I. Introduction
 - a) human resources - therapist, physician, engineer, driver trainer (psychologist)
 - b) equipment resources - assessment equipment, driver training car, van, adaptive equipment
 - c) information regarding parking privileges, funding sources, vendors and installers
- II. Client Assessment
 - a) medical and driving history
 - b) physical/functional evaluation
 - c) perceptual motor skills
- III. Vehicle Modification
 - a) commercially available
 - b) modification
 - c) special vehicles
- IV. Driver Training
 - a) initial learner
 - b) retraining following accident/illness
- V. Obligations
 - a) reliable, properly prescribed and installed, safe equipment
 - b) top-notch training
 - c) follow-up
 - d) sharing/exchange ideas
 - e) advertising services in places where disabled will see
 - f) public information
- VI. Summary

Margaret Young, OTR
Ontario Crippled Children's Centre
Toronto, Ontario, CANADA

NOTES

CAR SELECTION AND PURCHASE

Reproduced with permission from: Teaching Driver Education to the Physically Disabled. Human Resources Center, Albertson, New York.

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 1978 cars.
- 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 insure 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.

GUIDE TO THE USE OF HAND CONTROLS AND ASSISTIVE DEVICES

	COMPLETE HAND CONTROL	HAND CONTROL EXTENSION	COMPLETE FOOT CONTROL	SPINNER KNOB	SIERRA DRIVING RING	UPRIGHT QUAD SPINNER	FLAT QUAD SPINNER	TRI-PIN QUAD SPINNER	QUAD STEERING CUFF	SAGINAW STEERING VALVE (CANNOT BE SEEN)	RIGHT SIDE DIRECTIONAL	LEFT SIDE GEAR SHIFT	RIGHT GEAR SHIFT EXTENSION	LEFT FOOT GAS PEDAL	PARKING BRAKE EXTENSION	HAND CLUTCH	HAND BRAKE	HAND DIMMER SWITCH	BENDIX AVIATION ASSIST (CANNOT BE SEEN)	HORN EXTENSION	KNEE SEPARATOR	SLIDING BOARD	GUTTER HOOK	HELPER BAR AND STRAP	CARRY ALL	CHEST HARNESS	FULL VIEW MIRROR (NOT SHOWN)	PEDAL BLOCKS	PILLOWS (NOT SHOWN)	AUTOMATIC TRANSMISSION	POWER STEERING	POWER DISC BRAKES	6 WAY POWER BENCH SEAT	POWER WINDOW	TILT AWAY STEERING WHEEL	DEEP DISH STEERING WHEEL	TWO DOOR SEDAN	AIR CONDITIONING	BUILT UP REAR FLOOR	SPECIAL FACTORS TO CONSIDER	
LEFT LEG														X	X		X												X										1 IF TRANSFER IS IM- POSSIBLE A MODIFIED VAN IS RECOMMENDED.		
RIGHT LEG													X			OPERATES GAS, BUT CANNOT PIVOT OR CROSOVER	X												X												2 SELECTION OF ASSISTIVE DEVICES SHOULD ALWAYS CONSIDER DEGREE OF WEAKNESS OF INDIVIDUAL
BOTH LEGS	X			X						X POSSIBLY				X			X		X	X POSSIBLY	X CERTAIN CASES								X	X	X	X				X		X	3 IF THERE IS CONCURRENT BRAIN DAMAGE, PSYCHOLOGICAL FACTORS SHOULD BE CONSIDERED.		
RIGHT ARM				X							X																		X	X									4 IF INDIVIDUAL CANNOT OPERATE EXISTING SWITCHES, TOGGLE SWITCHES ARE RECOMMENDED		
LEFT ARM				X						X																			X	X											
BOTH ARMS			X ABOVE ELBOW	X BILATERAL AMPUTEE BELOW ELBOW																									X	X	X			X					5 VEHICLE SHOULD BE EQUIPPED AS DISCUSSED IN TEXT.		
LEFT LEG AND LEFT ARM				X						X				X POSSIBLY			X													X	X									6 AIRCONDITIONING IS NECESSARY FOR ALL INDIVIDUALS WITH LOW RESPIRATORY LEVEL	
RIGHT LEG AND RIGHT ARM				X							X		X				X													X	X									7 FOR INDIVIDUALS WITH SHORT ARMS, A HAND CONTROL EXTENSION MAY BE NECESSARY TO FACILITATE BRAKING AND ACCELERATING.	
LEFT ARM AND RIGHT LEG				X						X			X				X													X	X										
RIGHT ARM AND LEFT LEG				X							X			X POSSIBLY			X													X	X										
QUADRIPLEGICS ALL FOUR LIMBS INVOLVED	X NEARLY ABLE PUSH			X C7 POSSIBLY	X C7	X C7	X C7	X C8	X C8 POSSIBLY			X C8		X POWER			X	X C8 POSSIBLY	X	X POSSIBLY	X	X	X	X	X	X FUSED ELBOW				X	X	X	X	X	X	X C8	X WITH SAGINAW VALVE	X	X	X	
BALANCE HIGH PARAPLEGICS	X			X										X			X				X CERTAIN CASES				X	X		X	X	X	X	X				X					
NECK ROTATION ARTHRITIS																									X																
LACK OF HEIGHT	X	X		X POSSIBLY	X POSSIBLY												X										X	X	X	X	X										

MANUFACTURERS OF EQUIPMENT FOR ADAPTED DRIVING

ABC Enterprises
8905 Mentor Avenue
Mentor, Ohio 44060

Amigo Sales, Inc.
6693 Dixie Highway
Bridgeport, MI 48722

Blatnik Precision Control Inc.
1523 Cota Avenue
Long Beach, CA 90813

Braun Corporation
1014 S. Monticello
Winamac, IN 46996

Bud Industries, Inc.
100 Pulaski Street
West Warwick, RI

Chair Caddy, Inc.
P.O. Box 3149
Tempe, AZ 85281

The Cheney Company
3015 S. 163rd Street
New Berlin, WI 53151

Collins Industries
Box 58
Hutchinson, KS 67501

Continental Mobility System Inc.
4345 S. Santa Fe Drive
Englewood, CO 80110

Creative Controls, Inc.
1354B Combermere
Troy, MI 48084

Crow River Industries
1415 E. Wayzata Blvd.
Wayzata, MN 55391

Die-A-Matic
4004 5th Road, North
Arlington, VA 22202

Double D Industries
110 Fox Hill Road
St. Charles, MO 63301

Drive Master Corporation
16 Andrews Drive
W. Patterson, NJ 07424

Electro Van Lift, Inc.
744 N. Concord Street, South
St. Paul, MN 55075

Falcon Equipment Specialties
P.O. Box 481, 57 Tunxis Street
Windsor, CT 06095

Ferguson Auto Service
1112 N. Sheppard Street
Richmond, VA 23230

Ferno-Washington, Inc.
P.O. Box 826
70 Weil Way
Wilmington, OH 45177

Golden Bay Sales Corporation
2920 Central
Santa Anna, CA 92704

Gresham Driving Aids
P.O. Box 405 A
Wixom, MI 48096

Handicaps, Inc.
4335 S. Santa Fe Drive
Englewood, CO 80110

Hughes Hand Driving Controls, Inc.
P.O. Box 275
Lexington, Missouri 64067

Kroepke Kontrols, Inc.
104 Hawkins Street
Bronx, NY 10464

Mac's Power Lift Gate
2727 South Street
N. Long Beach, CA 90805

Manufacturing and Production Services
4664 Mercury Street
San Diego, CA 92111
(714) 292-1423

Math, Inc.
P.O. Box 2478
Satellite-Beach, FL 32937

Maxon Industries, Inc.
1960 E. Slauson Avenue
Huntington Park, CA 90255

Mobility Dynamics, Inc.
21020 Itasca
Chatsworth, CA 91311

Mobility Engineering & Development
7131 Hayvenhurst Avenue
Van Nuys, CA 91406

L. Mulholland Corporation
P.O. Box 391
215 N. 12th Street
Santa Paula, CA 93060

Nelson Medical Products
5690 Sarah Avenue
Sarasota, FL 33583-9510

Charles Olson & Sons
& Wheel Service Company, Inc.
P.O. Box 43011
St. Paul, MN 55164

P & Q Lifts
3226 Bayou Placido Blvd., NE
St. Petersburg, FL 33703

Para Industries, 1978 Ltd.
#7 4826 11th Street, N.E.
Calgary, AB Canada T2E2W7

Pulsar Digital Systems
P.O. Box 2706
Culver City, CA 90230

Ricon Corporation
11684 Tuxford Street
Sun Valley, CA 91352

Fred Scott & Sons
444 W. Rand Road
Des Plaines, IL 60016

Smitn Hand Control
1420 Brookhaven Hwy. 51 South
Southaven, MS 38671

Speedy Wagon Corporation
1700 A Scherer Pkwy.
St. Charles, MO 63301

Target Industries, Inc.
55 Newberry Road
Warehouse Point, CT 06088

Total Mobility Systems
and Designs, Inc.
4060 Stewart Road
Eugene, OR 97402

Trujillo Industries
5040 Firestone Blvd.
South Gate, CA 90280

The Two Dotson's Inc.
24 W. 7th Street
Tempe, AZ 85281

Wells-Engberg Co.
P. O. Box 6388
Rockford, IL 61125

Wright-Way, Inc.
P. O. Box 40907
Garland, TX 75040

PUBLICATIONS

Driver Education: Curriculum Guide for the Physically Handicapped. Des Moines Public Schools, 1800 Grand Avenue, Des Moines, Iowa 50307

Driver Education for the Severely Physically Disabled: Equipment and Adapted Methodologies for Teaching in a Fully Modified Van. Human Resources Center, Albertson, New York 11507. This instructional manual describes the special equipment and adapted methodologies used to teach severely disabled individuals to drive a van independently. The manual offers useful training techniques and illustrates many adapted devices for the severely physically disabled person.

Driving for the Physically Handicapped: Proceedings of a National Symposium 1981. Education and Training Centre, Rehabilitation Institute of Chicago, 345 E. Superior Street, Chicago, IL 60611.

Evaluation Driving Potential of Persons with Physical Disabilities. Less, Menahem; Colverd, Edward C.; DeMauro, Gerald E.; and Young, Judy. 1978, 36 pp. Human Resources Center, Albertson, NY 11507. 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.

Guide for Physicians in Determining Fitness to Drive a Motor Vehicle, revised 1981. The Canadian Medical Association, 1867 Alta Vista Drive, Ottawa, Ontario, CANADA K1G 0G8

Hand Controls and Assistive Devices for the Physically Disabled Driver. Less, M. et al. 1981, 52 p. This manual includes a practical evaluation of functional disabilities, a summary of hand controls, assistive devices and modified vans, and a guide to the use of hand controls and assistive devices. Human Resources Center, Albertson, NY 11507.

The Handicapped Driver's Mobility Guide, 3rd edition, 1981, 75 pp. Traffic Engineering and Safety Department, American Automobile Association, Falls Church, VA 22047. 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, van modification.

A Manual on the Driver Training Programme for the Physically Handicapped. Glenrose Hospital, 10230 11th Avenue, Edmonton, Alberta T5G 0B7 CANADA

Physicians Guide for Determining Driver Limitation. American Medical Association, 535 N. Dearborn, Chicago, IL 60610.

Perceptual Cognitive Skills and Driving: Effects of Brain Damage, January 1980. University of Michigan, Rehab. Engineering Center, Highway Safety Research Institute, Ann Arbor, Michigan 48109.

Preliminary Testing of Techniques to Improve Driving Performance of Persons with Brain Damage via Perceptual/Cognitive Training - Sivak, Hill, Olsen, 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. Memphis City School, 2687 Avery, Memphis, TN 38112

Teaching Driver Education to the Physically Disabled. Less, Menahem et al. 1978, 64 pp. Human Resources Center, Albertson, NY 11507. price: \$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 resented 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.

In general, the driver education 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.

Teaching the Handicapped to Drive - Resource Manual. Mills, Marvin, 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. Colverd, Edward C. et al. 1978, 40 pp. cost: \$4.25. This is a course outline for teaching

driver educators the art of teaching adapted driver education. It presents lesson 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, Kresge Hearing Institute, University of Michigan Medical School, Ann Arbor, Michigan 48109

GURGOLD, Gary, HARDEN, David, Assessing the Driving Potential of the Handicapped American Journal of Occupational Therapy - January 1978.

"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.

KENT, Herbert, M.D., et al, A Driver Training Program for the Disabled Archives Phys. Med. Vol. 60 June 1979.

KOPPA, 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.

MITTLEMANN, Michael, M.D., GREENFIELD, Walter, Jr. The Handicapped Driver: An Insurer's Point of View Archives of Phys. Med. August 1977 Vol. 58.

NEGRI, Barry, IBISON, Richard, Ph.D., Accidents Involving Handicapped Drivers Rehab. Literature May - June 1979 Vol. 40.

REGGER, S.I., et al. Aid for Training and Evaluation of Handicapped Drivers. Bulletin of Prosthetics Research, Fall 1981. Government Printing Office, Washington, D.C. 051-000-00157-5

REGGER, S.I., et al. Development of a Driver Evaluator - Trainer Aid for the Handicapped.

RISK, Harold, M.S. Driving Control and Equipment for a Quadruple Amputee Patient, Archives Phys. Med. Vol 61 January 1980.

SIVAK, Michael, Ph.D., OLSEN, D.J., Driving and Perceptual Cognitive Skills: Behavioral Consequences of Brain Damage, Archives of Phys. Med. Vol 62 October 1981.

SZETO, A.Y.J. and HOGAN, H.A. "An Evaluation Simulator for the Scott Van". Proceedings of the First Southern Biomedical Engineering Conference, June 1982. LSU Medical Center, Shreveport, LA

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
12 Street and Tabor Road
Philadelphia, PA 19141

- official publication of the Assoc. of Driver Educators for the Disabled
- published quarterly and distributed to ADED members

UM RECORDER
Jolan Cossairt, Editor
University of Michigan
Rehabilitation Engineering Center
208 Lay Automotive Laboratory
Ann Arbor, Michigan 48109

- published twice a year in February and October

DRIVER EDUCATION DIGEST
Virginia Anderson, Staff Editor
P.O. Box 5038
Southfield, MI 48037

- publication of the Chevrolet Motor Division

**ASSOCIATION OF DRIVER EDUCATORS
FOR THE DISABLED - ADED**

ADED Membership Form

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.
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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

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ANN ARBOR, MICH 48109**

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Affiliate Organization _____

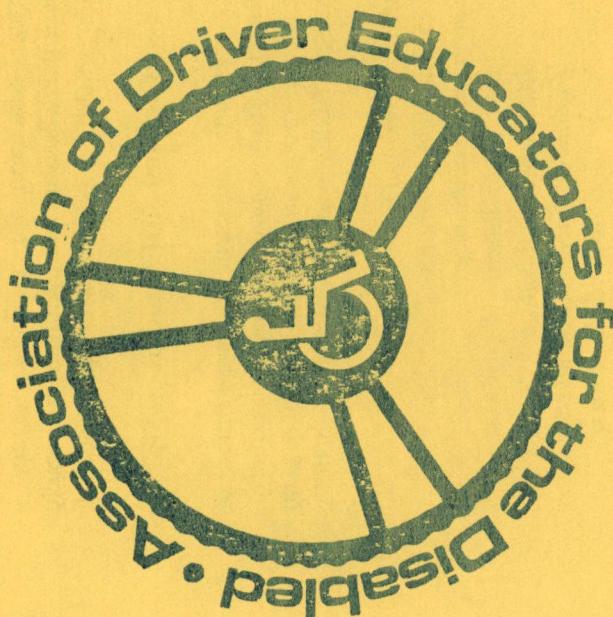
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Brief Description of Your Duties

INTRODUCING...



OBJECTIVES:

TO ASSIST IN THE INTERACTION
AND CONTINUING EDUCATION OF
INDIVIDUALS WORKING IN THE
FIELD OF DRIVER EDUCATION FOR
DISABLED PEOPLE.

Please send your articles for the ADED NEWSLETTER to:

Carmella M. Strano
Moss Rehabilitation Hospital
12th Street and Tabor Road
Philadelphia, PA. 19141

*If you wish, this space is provided for your convenience to list those problems of the disabled which concern you most.
Let us know how ADED may best meet and serve your needs.*

FILM RESOURCES

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28 minutes
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describing the
Driver Ed Program

Available from:
Co-ordinator
Driver Education Programme
Rehabilitation Medicine
Glenrose Hospital
10230 111th Avenue
Edmonton, Alberta T5G 0B7

"Driver Education for the
Handicapped"

Memphis City Schools
2687 Avery
Memphis, Tennessee 38112

"Vehicle Selection for the
Disabled Driver"

23 minutes

Supervisor of Physical
Education
Health and Safety
Des Moines Public Schools
1800 Grand Avenue
Des Moines, IA 50307

"Special Equipment for
Handicapped Drivers"

21 minutes

As above...

"Right of Way"

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Part I Assistive Devices
28.30 min.

3/4" video

Part II Applicants/30.15 min.

Mr. Michael Bloom
A/V Department
New York University Med.
Center
550 1st Avenue
New York, NY 10016
212/340-5449

16 mm film

c/o Mr. Bernie Macklin
Sales Department
Movielab Incorp.
619 W. 54th Street
New York, NY 10019

Organizations that provide driver evaluation and training
See: The Handicapped Driver s Mobility Guide

Hints on Operating a Successful Driver Education Program

- a. Be patient - let the students do things for themselves. They must become independent.
- b. Try to know as much about the students and their functional capabilities as possible.
- c. Be consistent - keep your commands simple and consistent throughout the training period.
- d. Keep in mind, to handicapped students driving is not a luxury; it is a necessity.
- e. Do not assume students can do something because others with similar disabilities can. Each student is an individual.
- f. You, as the instructor, must be fully acquainted with and able to operate all the assistive devices. It will make you a better teacher.
- g. Always check all assistive devices before you begin a lesson.
- h. Learn how to handle a wheelchair.
- i. Be firm - disabled students must be able to control the vehicle with the same efficiency and safety as able-bodied students.
- j. Try not to recommend more assistive devices than necessary.
- k. Encourage the students to be totally independent - they must do everything without your help.
- l. Ask the students for their recommendations and comments - after all, they are doing the driving.
- m. Try to be available when your students purchase cars. Make suggestions and recommendations based on their capabilities needs.
- n. Know all about the different disabilities you will encounter and the functional limitations they impose. Apply the knowledge in relation to the driving task.
- o. 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.

NOTES

TECHNOLOGY AT THE WORKSITE

IN THE CLASSROOM

TECHNOLOGY IN THE CLASSROOM

"For many students with handicaps, successful learning depends on the use of assistive devices--specialized aids, materials, or adaptive equipment that can improve the student's capability to learn and provide interaction with the environment.

Mobility, positioning, communication, and self-help devices are the primary types of aids in use. For example, a student with significant physical impairment may not have sufficient motor control to speak or gesture. Computerized synthetic speech or communication boards may make it possible for the student to communicate, an ability that is an integral part of the total educational environment. Mobility affects a child's concepts of space, movement, and distance. A motorized wheelchair thus may provide experience and independence for a student who is unable to walk unassisted.

But 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.

Providing an appropriate assistive device involves more than merely purchasing a commercial device from a catalog. Without careful, expert fitting of the appropriate device to the individual, precious learning time and limited dollars may be wasted. It is almost impossible for individual teachers and administrators to keep abreast of the rapid developments in technology that can enhance the lives of handicapped students. Unfortunately, inappropriate equipment may be purchased from catalogs or salespersons, resulting in frustration and failure.

The effective provision of a delivery system includes in-depth assessment of positioning, mobility, communication and educational skills, as well as an evaluation of the individual's potential in all of these areas. A device must be chosen or developed to meet needs in all areas of the student's environment. Extensive training and followup assessment services are also needed to encompass the student's home, school, community, and vocational activities.

In the past, a variety of agencies have been involved in securing assistive devices for handicapped children, ranging from Easter Seal Societies and the March of Dimes to service clubs 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 also 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--coordinate their efforts on a statewide and national basis."

an excerpt from the Introduction of:

Assistive Devices for Handicapped Students
A Model and Guide for a Statewide Delivery System

National Assoc. of State Directors of Special Education
1201 16th Street, N.W.
Washington, D.C. 20036
(202) 844-4193

PROJECT TEACH
Technical Educational Aids for Children with Handicaps
Rehabilitation Engineering Center
682 Court Avenue
Memphis, Tennessee 38163
(901) 528-6445

The provision of most aids should be preceeded by a multidisciplinary evaluation in which the abilities, the potential, and the comprehensive needs of the child are clearly defined.

A multidisciplinary engineering service team can be a most effective resource for the selecting and providing of specialized technical services, especially those related to the provision of modified commercial aids and/or custom designed devices.

Due to the need for additional head and trunk control, severely handicapped children should be provided specialized seating systems as a prerequisite for the provision of communication, mobility and personal care aids.

The more sophisticated the technology, the more essential the need for liaison personnel to explain the operation and features of each device to teachers and parents. Failure to provide this liaison support will almost invariably lead to rejection of the device.

Breakdowns with lengthy delays can severely interrupt a student's program: therefore, durability of equipment should be a major consideration in the evaluation and equipment selection process. Repairs to equipment must be provided in a timely manner to assure continuing student and teacher participation.

Technical aids should be provided within an educational setting according to a logical plan. The proposed model suggests a generalized operational approach which can be restructured to meet the needs of a specific locality. However, it is recommended that none of the components of the model be sacrificed if results as reported are to be achieved.

Continuing research on technical aids to supplement educational objectives is urgently required to improve the quality and effectiveness of devices available within special education classrooms. These studies should include expanded statistical evaluations with larger populations to better confirm the effects on student progress than has been possible in this preliminary effort.

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.

Technical aids can assist the handicapped child to actively participate in the educational program. Some of the findings of PROJECT TEACH include:

1. Seating Aids

Seating systems enable severely physically handicapped children to sit with greater stability in dynamic sitting posture in a classroom.

As a result of the more stable posture, severely handicapped children are better able to use available hand skills.

2. Communication Aids

With communication systems, children were able to increase expressive vocabulary.

Children increased sentence length and complexity. Communication systems enabled the students to express abstracts concepts and feelings.

Children were now able to respond to instructional tasks and participate in social interaction.

3. Mobility

Technical aids enabled children to become more independent in following their daily school routine thus freeing teachers and aids for other activities.

Mobility systems enabled children to independently initiate motion and so develop more initiative in general.

4. ADL (Activities of Daily Living)

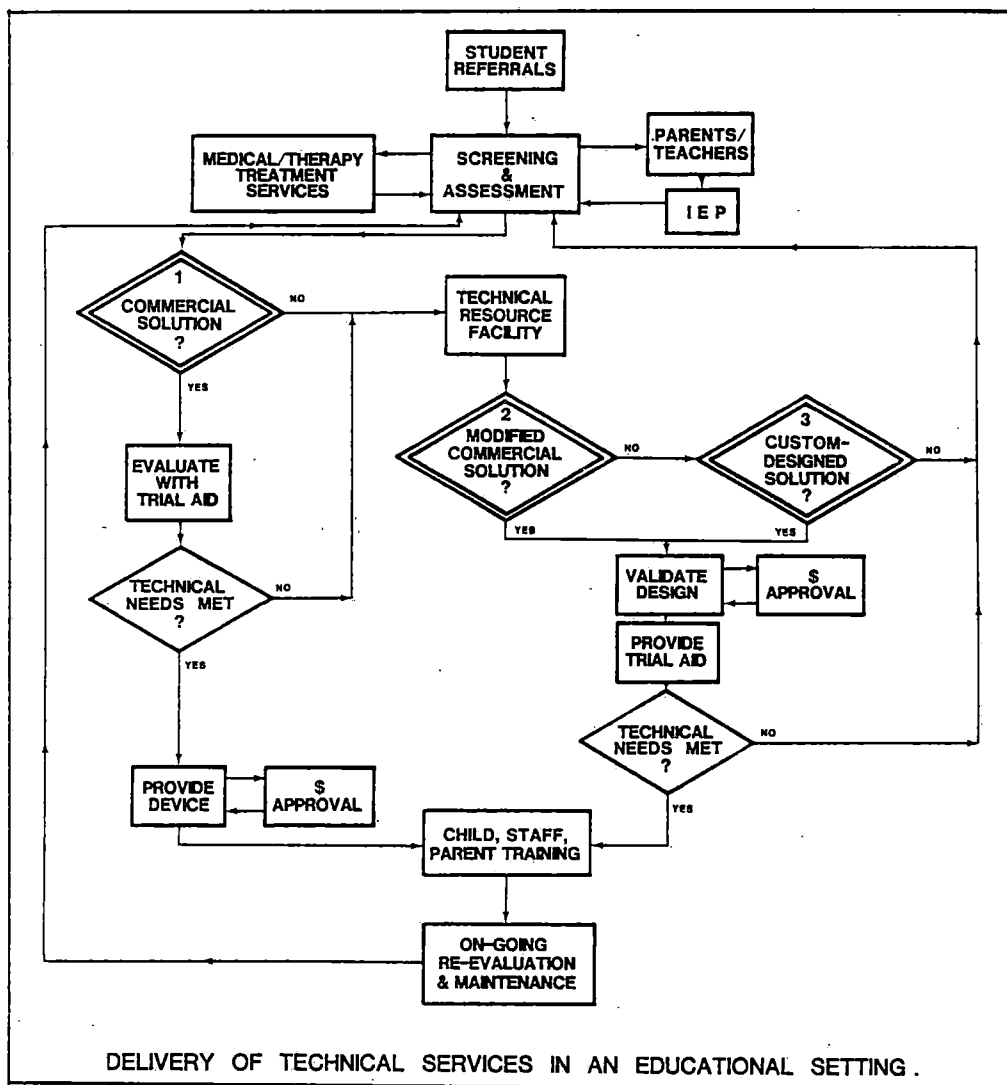
Feeding

Feeding aids enable several children to feed themselves and so free teacher aids for other responsibilities.

Toileting

Adapted commode seats made toileting easier and safer for the children. It enabled several children to become toilet trained.

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.



ORGANIZATIONS

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

Artificial Language Laboratory
Department of Computer Science
Michigan State University
East Lansing, Michigan 48824

Assistive Device Center
California State University-Sacramento
6000 J Street
Sacramento, CA 95819
(916) 454-6916]

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

The Communication Aids and Systems Clinic
University of Wisconsin-Madison
1300 University Avenue
Madison, Wisconsin 53706
(608) 263-2522

Educational Technology Center (ETC)
Box 64
Foster, RI 02825

The Non-Oral Communication Center
Plavan School
9675 Warner Avenue
Fountain Valley, CA 92708
(714) 964-2014

Ontario Crippled Childrens Centre
350 Rumsey Road
Toronto, Ontario, CANADA
(416) 425-6220

PAM Assistance Centre
110 Marshall Street
P.O. Box 21037
Lansing, MI 48909
(517) 371-5897

University of Tennessee
Rehabilitation Engineering Center
Project Teach
1248 La Paloma Street
Memphis, TN 38114
(901) 276-1752

Tufts University
Rehab. Engineering
Center
171 Harrison Street
Boston, MA
(617) 956-5036

TECHNOLOGY FOR CHILDREN

At Home and In School

Aids for Children. Technical Aids for Physically Handicapped Children. ICTA Information Centre, Fack S161 03, Bromma 3, Sweden. (ICTA) ISRD Committee on Technical Aids, Housing and Transportation). An international catalog of children's assistive devices.

Caring for Your Disabled Child. Spock, Benjamin, and Lerrigo, Marion O. New York: CollierMacMillan, 1965. \$1.95. Part VII-Tools and Techniques for Daily Living has information on selfhelp aids, crutches, braces, wheelchairs, etc., \$1.95.

Communication Outlook (an international information coordinator and resource newsletter) \$10.00 (\$12.00 overseas), Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824.

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 issues that include all children, regardless of their disabilities.

Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, England. 10 booklet series which provides guidelines to help in the selection of equipment. Pictures of commercially available and doityourself aids. Disabled Child.

Functional Aids for the Multiply Handicapped. Medical Department, Harper & Row Publishers, Hagerstown, Maryland, 1973. (The \$3.50 paper cover edition printed for and made available only through United Cerebral Palsy Association, Inc.) Editor/Isabel P. Roinault. A revised second edition is to be available soon.

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

Handicapped Children Strategies for Improving Services. Breuer, Gary D.; Kakalik, James S. McGraw Hill, 1221 Avenue of Americas, New York, NY 10020, 1979.

HandiSitters: How to Sit for the Handicapped Cohn, M.S.; Caffey, K.J. 1979, 63 pp. Melissa Cohn, OTR, 1812 Mapleleaf Blvd., Oldsmar, Florida 33557, 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.

Helping the Severely Handicapped Child: A Guide for Parents and Teachers. Doyle, P.B.; Goodman, J.F.; Jeffrey, G.N.; and Mann, Lester New York, Thomas Y. Crowell, Publishers, 1979. Chapter on Special Equipment. pp 93108.

How to Build Special Furniture and Equipment for Handicapped Children. Hofman, Ruth B. Springfield, Illinois: Charles C. Thomas, 1974, 100 pp., paperback, cost: \$6.50. Explicit instructions including pictures, measurements and materials for making a standing board, a cutout table, a standing table, chair inserts, a potty chair, etc.

Inexpensive Equipment for Activities of Daily Living. Cservenyansky, Kathryn S., C.O.T.A. George Washington University Hospital, Occupational Therapy Department, 1973, 18 pp. Illus., cost: \$1.00, available through: Job Development Laboratory, George Washington University Medical Center. Xeroxed manual of easily made aids for feeding, dressing, hygiene.

Let Me Do-It-Yourself: A Curriculum Guide for Teaching Daily Living Skills to Orthopedically Handicapped Children. 1978. Prepared by Joan McCollom. Available from Albert Schweitzer School, San Diego, CA. Pub #1B785. Includes suggestion for assistive devices and a checklist for daily living skills evaluation for school age and preschool children.

Manual for Cerebral Palsy Equipment. Easter Seal Society for Crippled Children and Adults, Inc., 2023 So. Ogden Avenue, Chicago, IL 60612.

Nonoral Communication System Project. Beverly Vicker, Editor. Campus Store Publishers, The University of Iowa, 17 W. College, Iowa City, Iowa 52242, 19641973. This publication has excellent program ideas.

Nonvocal Communication Resource Book. Edited by Gregg Vanderheiden. Baltimore: University Park Press.

NonVocal Communication Techniques and Aids for the Severely Physically Handicapped. Edited by Gregg Vanderheiden & Kate Grilley. Baltimore: University Park Press. This and the preceding publication provide lists of basic inventors of assistive devices for communication.

Occupational Therapy for Mentally Retarded Children Copeland, M.; Ford, L. and Solon, N. University Park Press, Baltimore, MD, 1976, 226 pp. Chapter 6, Adapted Equipment. Suggestions, sketches and construction details for low cost aids that can be constructed in the clinic classroom or home.

Physically Handicapped Children: A Medical Atlas for Teachers. Bleck, Eugene E., M.D.; Nagel, Donald A., M.D. Grune & Straton, Inc., 111 5th Avenue, New York, NY 10003, 2nd edition, 1982. Fundamental medical facts are accompanied by practical suggestions for teachers. Assistive devices are included where appropriate.

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

Products for People with Vision Problems. Twentysixth Edition 1980/1981. American Foundation for the Blind, Consumer Products Department 15 W. 16th Street, New York, NY 10011. Section on Pre School Products, as well as other devices used by children with vision problems.

Selected Equipment for Pediatric Rehabilitation. Bergen, Adrienne, R.P.T. 1975. Illus. Spiralbound paperback, available through: Blythdale Children's Hospital, Bradhurst Avenue, Valhalla, NY 10595, (914) 5927555. Well illustrated guide to equipment for positioning, transfers, ambulation, toileting and therapy.

Special Technology for Special Children. Goldberg, Paul University Park Press, Baltimore, MD. 1979. A publication which addresses technical needs of both cerebral palsy and hearing impaired children.

Teaching Individuals with Physical and Multiple Disabilities. Bigge, J.L.; O'Donnell, P.A. Charles E. Merrill, Columbus, OH, 1976, 279 pp. Assistive devices 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. This is a resource book of both commercially available and custom made equipment.

Sandi Enders, OTR
Children's Hospital at Stanford
Rehabilitation Engineering Center
June 1982

TECHNOLOGY IN THE CLASSROOM

Adapting vocational education for handicappers. Capital Area Career Center. Mason, Michigan: Author, 1980.

This is a series of 37 manuals which identify the physical skills and working conditions required in each of 34 occupations. The manuals also provide a method for comparing a student's physical abilities to the physical requirements of occupations, so he or she can choose a vocational program. In addition, they provide guidelines for making adaptations in the vocational classroom to help the student function in the program he or she chooses.

Aids for Handicapped Readers. Reference and Information Section, Division for the Blind and Physically Handicapped, Library of Congress, Washington, D.C. 20542. Devices and techniques for handling books, writing, and typing. Free.

Aids to Independent Living: Self-Help for the Handicapped. Lowman, Edward, M.D. and Klinger, Judith Lannefield, OTR. New York: McGraw-Hill Book Company, 1969.

Aids for the Severely Handicapped. Copeland, K. Spector Publishing Co., Ltd. London, England, 1974.

Assistive Devices for Handicapped Students, A Model and Guide for a Statewide Delivery System NASDI, 1201 16th Street, N.W., Washington, D.C. 20036.

Augmentative and Alternative Communication for the Severely Handicapped(a Bibliography). 1621 Greewich Lane, Janesville, Wisconsin 53545, 1977.

Bibliography of Children's Books About Disabilities. Pediatric Projects, Inc., P.O. Box 1399, Santa Monica, CA 90406. No charge.

Cerebral Palsy and Communication, What Parents Can do, Job Development Laboratory, George Washington University, Washington, D.C. 1977.

Communication Aids for the Non-Verbal Severely Handicapped Child -- A Multi-Dimensional Challenge. Abelson, Carol and Pfeiffer, David. Canadian Journal of Occupational Therapy, Winter 1975, 42(2).

Communication Assessment and Intervention Strategies. Lloyd, Lyle (Ed.). University Park Press, Baltimore, MD, 1976.

Communication for the Non-Verbal Child. Larson, Thalia. Pennsylvania: Majex Associates, Inc. 1975.

Communication Outlook. Artificial Language Laboratory, Michigan State University, East Lansing, MI 48824.

Communication Resources for the Developmentally Disabled: A Guide for Parents, Paraprofessionals and Professionals Job Development Laboratory, George Washington University, Washington, D.C. 20037, 1977.

(The) Directory of National Information Sources on Handicapping Conditions and Related Services. Clearinghouse for the Handicapped, Office for the Handicapped, 338 D.H. Humphrey Building, Washington, D.C. 20201.

Functional Aids for the Multiply Handicapped. Robinault, Isabel. Hagerstown, Maryland: Medical Department, Harper & Row, 1973.

Equipment for the Disabled. National Fund for Research into Crippling Diseases, 2 Foredown Drive, Portslade, Brighton, Sussex BN4 2BB, England. An illustrated series of booklets showing aids available in England; also, instructions for many aids that can be easily made. The booklets cover the following topics; wheelchairs, outdoor transportation, home management, disabled child, housing and furniture, hoist and walking aids, clothing and dressing for adults, disabled mother, personal care, leisure and gardening communication.

Handicapped...How Does it Feel. La More, Gregory. B.L. Winch & Associates, 45 Hitching Post Drive, Rolling Hills Estates, California. 1981, 70 pp. \$5.95. A program for the classroom teacher to help able-bodied students understand how it feels to be handicapped, written at the second/third grade level in large type with many pictures. Section on how special equipment helps disabled kids.

International Guide to Aids and Appliances for the Blind and Visually Impaired Persons. Clark, Leslie L., Ed. American Foundation for the Blind, 15 W. 16th Street, New York, NY 10011. 255 pp., price: \$3.00. Compilation of aids and appliances, listings for each item include name, manufacturer's address, price, availability, and description.

Learning to Live with Disability: A Guidebook for Families. Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046. 1980.

(A) Manual for Cerebral Palsy Equipment. Easter Seal Society for Crippled Children and Adults, Inc., 2023 So. Ogden Avenue, Chicago, IL 60612.

Mindstorms. Children, computers and powerful ideas. Papert, Seymour. Basic Books, New York, NY. 230 pp. 1980, \$9.25.

The Modification of Educational Equipment and Curriculum for Maximum Utilization by Physically Disabled Persons: Educational and school equipment for physically disabled students. Yunker, H.E.; Feldman, M.A.; Fracchia, J.F. and Young, J.H. Albertson, New York: Human Resources Center, 1967.

Nonoral Communication System Project. Vicker, Beverly, Editor. Campus Store Publishers, The University of Iowa, 17 W. College, Iowa City, Iowa 52242, 1964/1973.

Non-Vocal Communication--Resource Book. Vandenheiden, Gregg C., Editor. Baltimore: University Park Press. This and the preceding publication provide lists of basic inventories of assistive devices for communication.

Problems of Communication of Individuals with Cerebral Palsy. Christman, D., Cerebral Palsy Review, September/October, 1956.

Proceedings of Fourth Annual Conference on Rehabilitation Engineering, Washington, 1981. Northwestern University REC. 345 E. Superior Street, RM 1441, Chicago, IL 60611.

Proceedings of the International Conference on Rehabilitation Engineering, Toronto, Ontario, Canada, 198, NRC-RM 183, Building M50, Ottawa, Canada, K1A 0R8

Project TEACH (Technical Educational Aids for Children with Handicaps): A parent training manual. Memphis, Tenn., Memphis City Schools and Univ. of Tennessee Rehab. Engineering Program, 1981. 80 pp. A guide to involving parents in the care, maintenance, and creative utilization of the technical aids appropriate for their children's use. Areas covered: communication skills, physical and occupational therapy, educational activities, daily living activities, and environmentalization. The publication may be ordered for \$3.00 from the Division of Special Education, Memphis City Schools, 2597 Avery Ave., Memphis, Tenn. 38112.

Ready, Willing and Disabled. Kunc, Norman. Personal Library Publishers, Toronto, Canada 1981. 111 pp. \$7.95. Describes the process of integrating a physically handicapped student into the regular school system. Includes specific suggestions for equipment and adaptations for classes in math, social science, electives, etc.

Rehabilitation Engineering Sourcebook. Falls Church, VA 22046: Institute for Information Studies, 400 N. Washington St.

Special Technology for Special Children: Computers to Serve Communication and Autonomy in the Education of Handicapped Children. Goldenberg, E. Paul, Ed.D. University Park Press, 233 E. Redwood Street, Baltimore, MD 21202. 183 pp. 1979. \$12.95

(A) Study of Man-Machine Communication Systems for the Handicapped. Kafafas, H. 3 volumes (1970-73). Cybernetics Research Institute, Washington, D.C.

(A) Survey of Critical Factors in Evaluating Communication Aids. Harris, Deborah. The Trace Center, University of Wisconsin, Madison, Wisconsin 53706, 1975.

SEATING BIBLIOGRAPHY

For Children with Cerebral Palsy

Bergen, A. A Table and Chair Seat for Spastic Children. Physical Therapy, 51:1305-1306, 1971.

Bobath, B. Abnormal Postural Reflex Activity Caused by Brain Lesions. London: Heinemann Medical.

Bobath, Berta "The Very Early Treatment of Cerebral Palsy." Dev. Med. and Child Neuro., 9, No. 4: August 1967.

Carrington, Ellen G. A Seating Position for a Cerebral-Palsied Child. The American Journal of Occupational Therapy, 32, No. 3:179-181, March 1978.

Christopher, R.P. Recent Advances in Mechanical Aids in the Management of Children with Brain Damage. Southern Medical Journal, 67, 399-405.

Cristarella, Mary C. Comparison of Straddling and Sitting Apparatus for the Spastic Cerebral-Palsied Child. The American Journal of Occupational Therapy, 19, No. 5: 273-276, May/June 1975.

DeCarlo, Cheryl, B.S. and Forbis Adelle, B.A. Chair for the Child with Hypertonic CNS Dysfunction. Physical Therapy, 57:1151, October 1977.

Farber, S. Sensorimotor Evaluation and Treatment Procedures. 2nd Edn. Indiana University: Purdue University at Indianapolis Medical Center, pp. 100.

Finnie, N. Handling the Young Cerebral-Palsied Child at Home. New York, Dutton & Co. 1968.

Fulford, G.W. and Brown, J.K. Position as a cause of Deformity in Children with Cerebral Palsy. Develop. Med. and Child Neurol.: 18 1976.

Keegan, J. Jay, M.D. Alterations of the Lumbar Curve Related to Posture and Seating Journal of Bone and Joint Surgery, 35-A, No. 3: July 1953.

Montgomery, P. and Gauger, J. Dynamic Trunk Stabilizer for Children with Cerebral Palsy. Physical Therapy, 53, No. 4: April 1978.

Robinault, I. Functional Aids for the Multiply Handicapped. New York: Harper & Row. 1973

Slominski, A. and Hamant, C. In Willard, H.S., Spackman, C.S. (Eds.) Occupational Therapy, 4th Edn., Philadelphia Lippincott.

Trefler, Elaine; Hanks, Sam; Huggins, Paul; Chiarizzo, Sam; Hobson, Doug. A Modular Seating System for Cerebral Palsied Children. Develop. Med. Child Neurol. 20: 199-204, 1978.

Trefler, Elaine and et al: Seating for Cerebral Palsied Children.: Inter-Clinic Information Bulletin, 17, No. 1: 1-8, Jan/Feb 1978.

INFORMATION RESOURCES

AbleData, A New Computerized System on Aids and Devices.
Marian Hall.
National Rehabilitation Information Center
4407 8th Street, N.E.
Washington, D.C. 20017
(202) 635-5826

Accent on Living Buyer's Guide.
Bloomington, Indiana 61701
Cheever Pub. Co. 1979.

Green Pages REHAB Source Book.
Directory of Products and Services for Physically Disabled.
Sourcebook Publications
P.O. Box 1586
Winter Park, FL 32790
\$35.00. 1983. prepublication price

HEX,
HandicappedEducationExchange.
Richard Barth,
11523 Charlton Drive
Silver Spring, MD 20902,
(301) 681-7372.

The Handicapped Education Exchange (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 communications with, the handicapped. HEX serves as a means of exchanging ideas and information concerning application of technology (such as computers) to aid the handicapped. HEX can be reached by dialing 301-593-7033, 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 7 data bits, no parity and 1 stop bit. It should be equipped with a Bell 103 - type modem. Baudot callers should use a standard Telecommunication Device for the Deaf (TDD), also known as a TTY (teletypewriter).

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

HLMDC
Audio-Visual Center
Indiana University,
Bloomington, IN 47405
(812) 337-1511

The Handicapped Learner Materials Distribution Center (HLMDC) is a part of the Special Materials Project established by Indiana University. HLMDC loans free of charge, (except for return postage), selected media materials such as films, videotapes, kits, games and adaptive devices pertaining to the general special education population. Materials are divided into three collections represented by three separate catalogs: 1) teacher training materials in the area of special education and media production consisting mostly of 16 mm films; 2) handicapped learner collection consisting mostly of classroom curricular materials primarily for examination and evaluation; 3) videotapes that are duplicated into other formats at cost. These services are available to anyone in the U.S.A. involved with educating a handicapped learner.

The Association for the Severely Handicapped (TASH)
Information Department
1600 W. Armory Way
Seattle, WA 98119
(206) 283-5055

Information and materials requests on all aspects of education and services for people who are 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.

MANUFACTURERS OF CLASSROOM AIDS

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90250

American Foundation for the Blind
15 W. 16th Street
New York, NY 10011

American Printing House for
the Blind
1849 Frankfort Avenue
P.O. Box 6085
Louisville, KY 40206

Bailey Mfg. Co.
118 Lee Street
Lodi, OH 44254

Childcraft
22 Kilmer Road
Edison, NJ 08817

Cleo Living Aids
3957 Mayfield Road
Cleveland, OH 44121

Community Playthings
Rifton Equipment for the Handicapped
The Hutterian Society of Brothers
Rifton, NY 12471

Conco Industries
30 Water Street
W. Haven, CT 06516

Fairway King
3 E. Main Street
Oklahoma City, OK 73104

Fleetwood Furniture Co.
25 E. Washington Street
Zeeland, MI 49464

Hausman Industries, Inc.
130 Union Street
Northvale, NJ 07647

Help Yourself Aids
Box 192
Hinsdale, IL 60512

Medical Equipment Distributors
1701 S. 1st Street
Maywood, IL 60153

G.E. Miller, Inc.
484 So. Broadway
Yonkers, NY 10705

Phonic Ear/Phonic Mirror
250 Camino Alto
Mill Valley, CA 94941

Prentke Romich Company
8769 Township Road, 513
Shreve, OH 44676-9421

J.A. Preston Corporation
60 Page Road
Clifton, NJ 07012

Fred Sammons, Inc.
Box 32
Brookfield, IL 60513

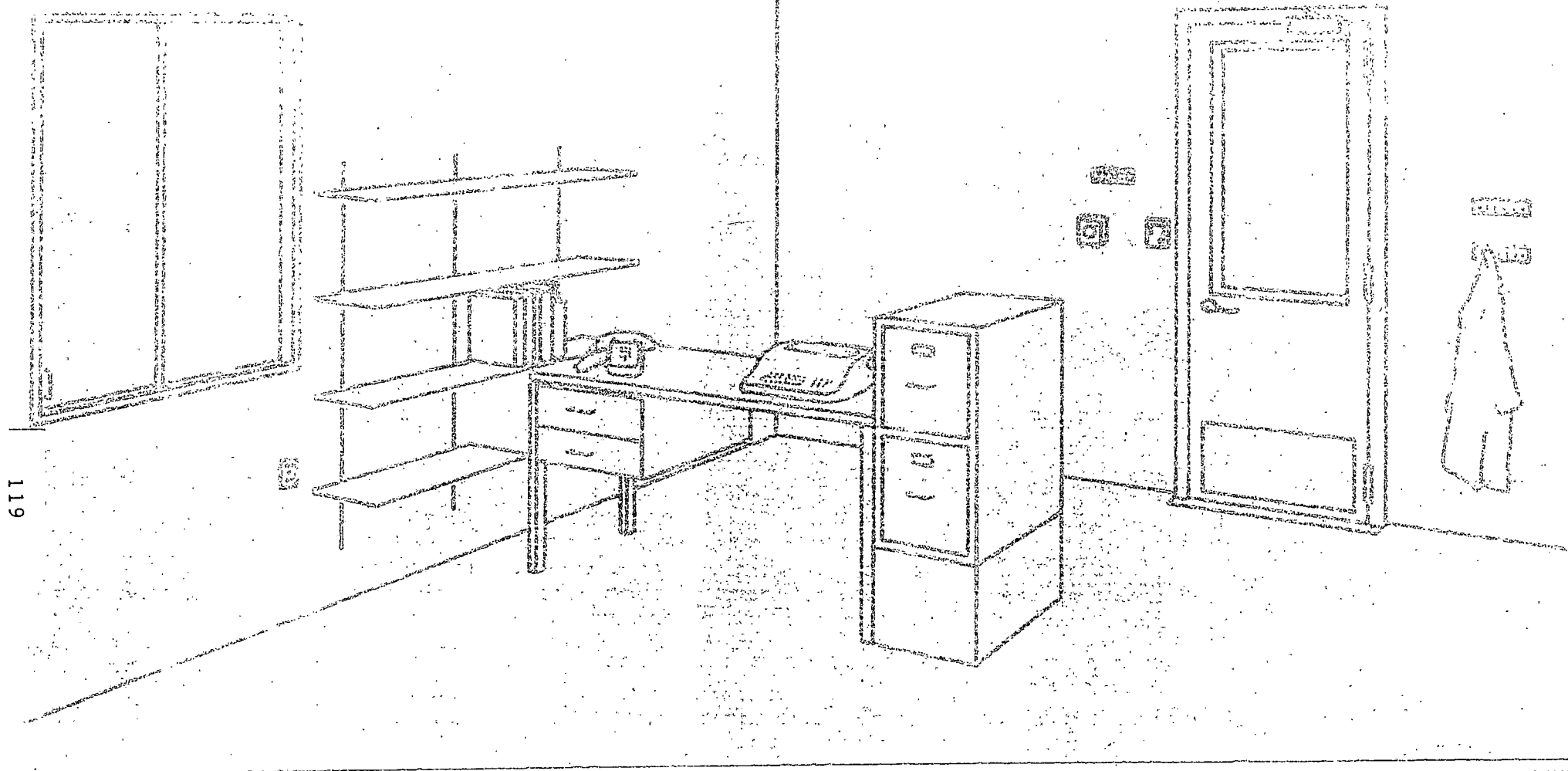
Skill Development Equipment Co.
1340 No. Jefferson
Anaheim, CA 92807

for more information on
Manufacturers & Distributors of equipment for children
and the classroom: See AbleData Information System

TECHNOLOGY AT THE WORKSITE

ON THE JOB

NOTES



119

DESIGNING FOR FUNCTIONAL LIMITATIONS

JAMES MUELLER

THE JOB DEVELOPMENT LABORATORY

THE GEORGE WASHINGTON UNIVERSITY REHABILITATION RESEARCH AND TRAINING CENTER
WASHINGTON, D.C., 1979

78 pp.

ACKNOWLEDGEMENTS

Many individuals of diverse backgrounds have contributed invaluable personal knowledge and insight to the development of this resource. They have demonstrated their commitment to the independence of disabled persons by offering their time and expertise. The ultimate usefulness of this resource owes much to their efforts.

Dr. Andy Bazar, Wichita State University
Mr. Mickey Berg, National Spinal Cord Injury Foundation
Ms. Judy Berland, District of Columbia Division of Vocational Rehabilitation
Mr. Clayton Boyd, U.S. Office of Personnel Management
Mr. Ted Brosnan, Chesapeake & Potomac Telephone Company
Ms. Susan Burns, U.S. General Accounting Office
Dr. W.S. Chiu, The George Washington University Medical Center
Dr. R.A. Dudek, Texas Tech University, Department of Industrial Engineering
Ms. Gerry Edwards, The George Washington University Medical Center
Mr. Rolf Faste, Syracuse University, Department of Design
Ms. Judith Frank, The Job Development Laboratory
Mrs. Marie Feingold, District of Columbia Division of Vocational Rehabilitation
Ms. Judy Gilliom, U.S. Office of Personnel Management
Ms. Edna T. Harris, Epilepsy Foundation of America
Ms. Ann Irving-O'Brien, The George Washington University Medical Center
Dr. Robert H. Jones, Eastman Kodak Company
Ms. Marian G. Knowles, Human Factors Society
Mr. Aaron Krute, Social Security Administration, Office of Research and Statistics
Mr. Kali Mallik, The Job Development Laboratory
Ms. Maggie Malsch, National Spinal Cord Injury Foundation
Ms. Anise Nelson, U.S. Office of Personnel Management
Mr. Raymond Nickerson, Bolt, Beranek, and Newman, Inc.
Dr. Carol Ann Peterson, University of Illinois, Department of Leisure Studies
Ms. Eileen Powers, The Job Development Laboratory
Ms. Judith Pustell, Arthritis Foundation
Ms. Elaine Shaver, The Job Development Laboratory
Mr. Edward Steinfeld, State University of New York at Buffalo
Mr. Joseph Traub, Rehabilitation Services Administration
Ms. Janet Williams, District of Columbia Division of Vocational Rehabilitation
Mr. Sheldon Yuspeh, The Job Development Laboratory

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. He has a high school diploma and some college experience. Paul has cerebral palsy. He is qualified for the job, but he and his prospective 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 reviewed 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 the aid of a microfilm viewer and a microfilm version of the directory. 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 been helpful.

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.

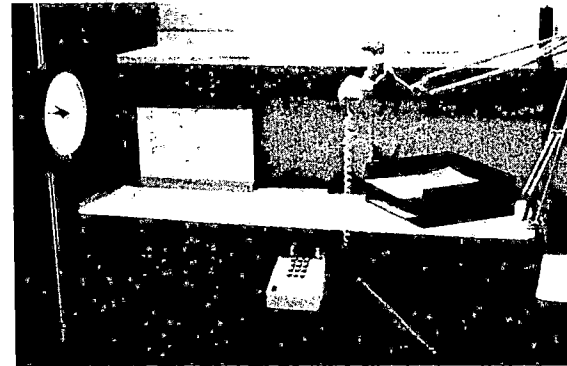
Guidelines presented in this resource should be freely adapted to the requirements of the worker and the worksite. Pictured below are actual worksites modified for disabled workers. In each case, the ideas of the worker, the employer, and the counselor were integrated to develop a more productive setting for disabled and non-disabled workers.

Photos by Innovative Services Unit,
Vocational Rehabilitation Division,
Portland, Oregon

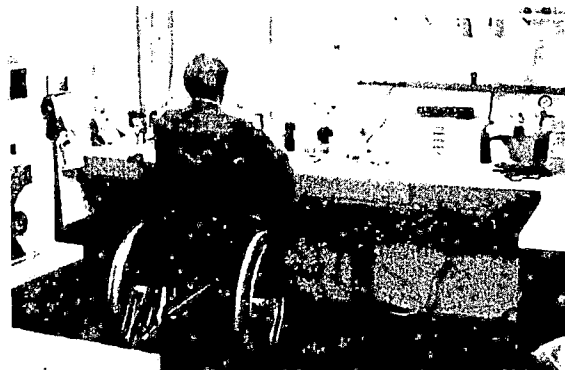
Photos by Job Development Laboratory
The George Washington University
Washington, D.C.



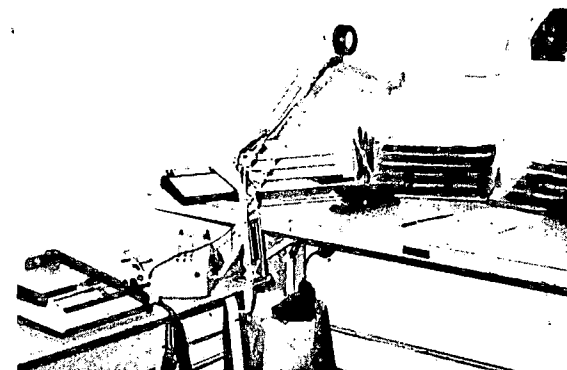
Preparation line at fish processing plant modified for reach-impaired person.



Telephone survey clerk desk modified for worker with muscular dystrophy.



Dental technician site modified for worker with spinal cord injury.

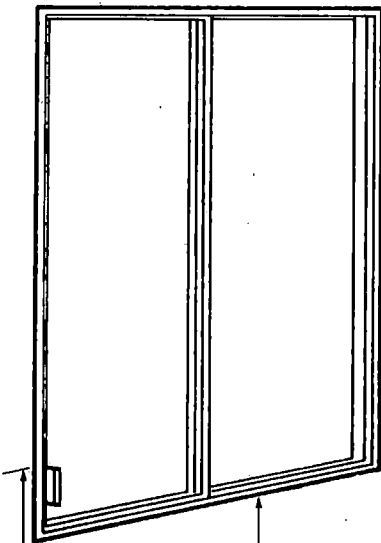


Home worksite for insurance claims adjuster with spinal cord injury.

WALLS

USE SLIP-RESISTANT, NON-GLARE SURFACES
AVOID ROUGH SURFACES AND PROTRUDING OBJECTS
AVOID TOTAL SOUND ABSORPTION

SLIDING WINDOWS PREFERRED



WINDOW CONTROLS
20-54" (508-1372mm)
MAX. OPERATING FORCE
5 LB (22.2 N)

18-48"
(457-1219mm)

23.5-35"
(598-889mm)

9-12" (227-305mm)
MAX. SHELF HEIGHT
63" (1600mm)

LOCATE BULKIEST OBJECTS
ON LEVEL WITH DESK

16.5" MIN.
(419mm)

TELEPHONES

RECEIVER WITH VOLUME CONTROL
HANDSET CORD 36" (914mm) MIN.



29-38"
(737-965mm)

WORK STATION

AVOID CENTER DRAWERS
24" (610mm) MIN. KNEE WELL WIDTH
AVOID SHARP EDGES AND CORNERS
NON-GLARE LIGHTING TO MINIMIZE FATIGUE

SEATING

ADJUSTABLE HEIGHT AND SUPPORT FOR LOWER BACK
(FEET SHOULD REST ON FLOOR OR OTHER SUPPORT)

INTERIOR SIGNS

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 54-66" (1372-1676mm)

DIAL THERMOSTAT



36-48"
(914-1219mm)

ROCKER SWITCH



36-42"
(914-1067mm)

ROUNDED LEVER



32-36"
(813-914mm)

KICKPLATE 12-18"
(305-457mm)

DOORS

CLEAR SPACE ON BOTH SIDES OF DOOR
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

EMERGENCY



DOOR CLOSER RESISTANCE

5-15 LB (22.2-66.7 N)
pref. adjustable
or automatic

GLAZING IN
UPPER HALF
OF DOOR



42-48"
(1067-1219mm)

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

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

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 1

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, Humanscale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 245-251, 315
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: Specially Adapted Housing, 43

DOORS AND HARDWARE

Cary, How to Create Interiors for the Disabled, 24-31
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26, 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; and 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: Specially Adapted Housing, 34-37

ELECTRICAL OUTLETS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3b
Goldsmith, Designing for the Disabled, 212-213
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 110, 118
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

EQUIPMENT CONTROLS

Bazar, Ergonomics in Rehabilitation Engineering, 55-71
Steinfeld, Barrier-Free Design for the Elderly and the 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, 85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112, 125
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 72

FLOORS

Diffrient, Tilley, Bardagjy, Humanscale 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, 34
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 75

INTERIOR SIGNS

Diffrient, Tilley, Bardagjy, Humanscale 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, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112-113

SHELVES

Diffrient, Tilley, Bardagjy, Humanscale 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, Accessibility: An Approach to the Development of Design Criteria, C12-C15
Veterans Administration, Handbook for Design: Specially Adapted Housing, 43

TABLES, DESKS, WORK STATIONS

Austin, Resources Handbook for Barrier-Free Design, 79
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a, 3b
Grandjean, Fitting the Task to the Man
Harkness, Groom, Building Without Barriers for the Disabled, 36
Mace, An Illustrated Handbook of the North Carolina State Building Code, 92-93
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 115
Trombly, Scott, Occupational Therapy for Physical Dysfunction, 391-392

TELEPHONES

Cary, How to Create Interiors for the Disabled, 110
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26, 3a
Goldsmith, Designing for the Disabled, 214
Mace, An Illustrated Handbook of the North Carolina State Building Code, 114-115
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 109, 125
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

THERMOSTAT

Mace, An Illustrated Handbook of the North Carolina State Building Code, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111

WALLS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26
Harkness, Groom, Building Without Barriers for the Disabled, 16

WALL SWITCHES

Diffrient, Tilley, Bardagjy, Humanscale 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: Specially Adapted Housing, 40

WINDOWS AND CONTROLS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a
Goldsmith, Designing for the Disabled, 178-180
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111, 124
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 106
Veterans Administration, Handbook for Design: Specially Adapted Housing, 38

EASIER DOCUMENT ACCESS
 USING BOOKSTAND,
 MICROFILM VIEWER,
 OR READING MACHINE
 (SEE "CONTROLS" AT RIGHT)



TELEPHONE AIDS:
 SPEAKERPHONE
 HEADSET RECEIVER
 ADJUSTABLE ARM FOR RECEIVER
 ENLARGED "TOUCHTONE" BUTTONS



PEN/PENCIL
 THROUGH RUBBER BALL OR
 HARD FOAM FOR EASIER GRASP

**ELECTRIC SELF-CORRECTING,
 AUTO-RETURN TYPEWRITER
 WITH KEYGUARD FOR GREATER
 HAND SUPPORT AND ACCURACY
 AND PAPER ROLL**

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

**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

AFFECTS APPROX. 1% OF U. S. POPULATION)

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 U.S. 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	Muscular Dystrophy
Arthritis	Myasthenia Gravis
Bilateral Hemiparetic	Parkinson's Disease
Cardiac Disorders	Polymyositis
Cerebral Palsy	Severe Burns
Cerebrovascular Accidents (Stroke)	Spinal Cord Injury
Congenital Deformities	Syringomyelia
Dupuytren's Contracture	
Multiple Sclerosis	

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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 listed in the appendix under the following product headings:

BOOKSTANDS	READING MACHINES
CASSETTE TAPE RECORDERS	TELEPHONE AIDS
MICROFILM VIEWERS	TYPEWRITERS
NON-SLIP MATS	TYPEWRITER KEYGUARDS, PAPER ROLLS
OPEN DESK-TOP FILES AND STORAGE	

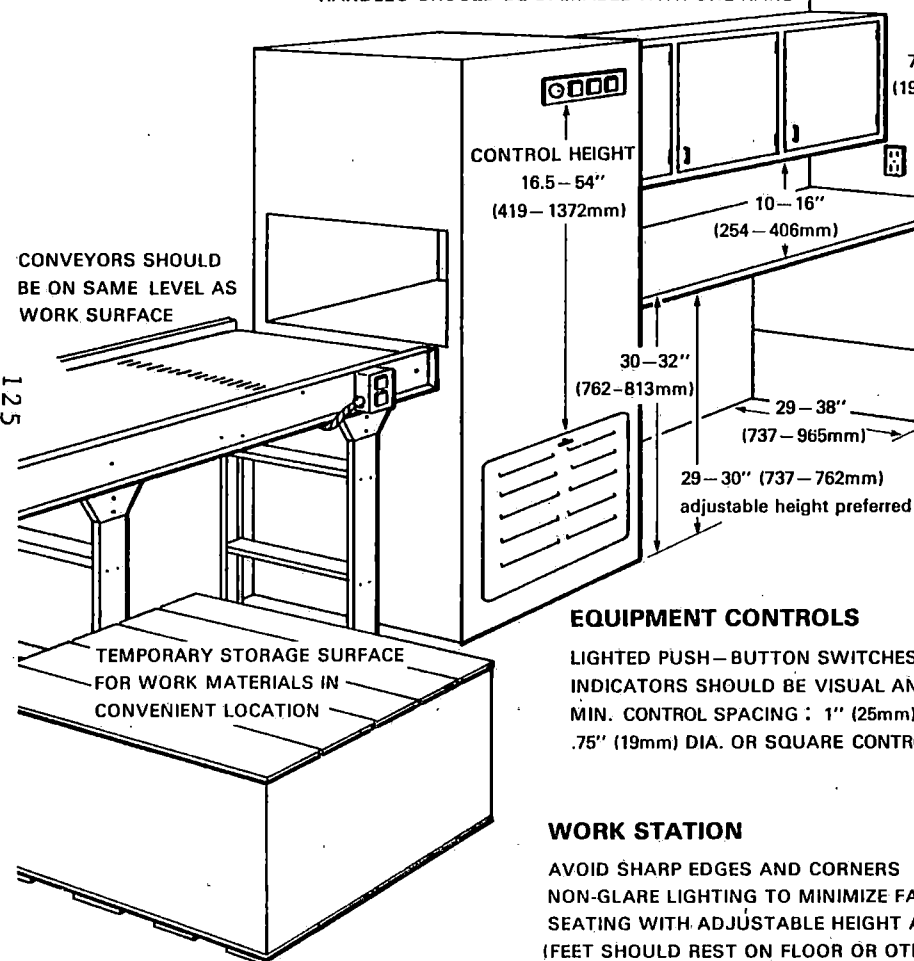
Further modifications to WORKSITE 1 for persons having this limitation are suggested on the illustration. Each one should be selected, amended, or rejected according to the expressed needs of the individual and the job.

WALLS

USE SLIP-RESISTANT, NON-GLARE SURFACES
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



INTERIOR SIGNS

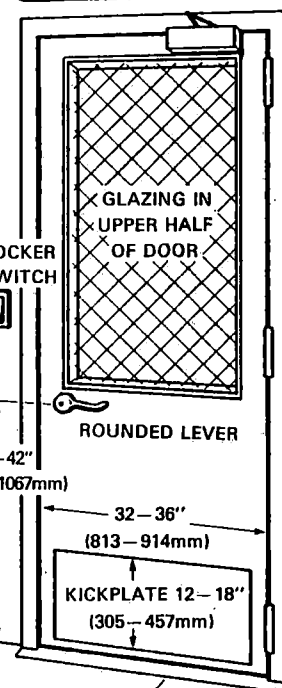
LOCATE NEAR DOOR FRAME ON LATCH SIDE
LABEL USABLE FACILITIES WITH SYMBOL

LETTERING

LIGHT-ON-DARK PREFERRED
0.625-1" (16-25mm) HELVETICA TYPE (ALL CAPS)
RAISED 0.03" (1mm)
MAY BE ACCOMPANIED BY BRAILLE

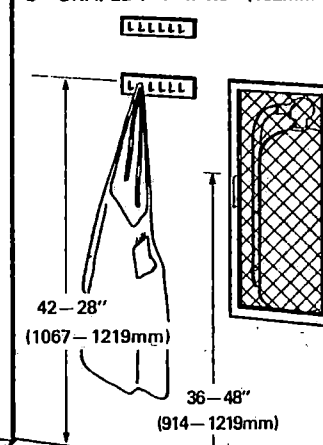
FLASHING VISUAL ALARM (less than 5 Hz)
8000 Hz AUDITORY ALARM (120 db max.)

EMERGENCY



DOOR CLOSER RESISTANCE
5-15 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)



TELEPHONES

RECEIVER WITH VOLUME CONTROL
HANDSET CORD 36" (914mm) MIN.

EQUIPMENT CONTROLS

LIGHTED PUSH-BUTTON SWITCHES PREFERRED
INDICATORS SHOULD BE VISUAL AND AUDITORY
MIN. CONTROL SPACING: 1" (25mm)
.75" (19mm) DIA. OR SQUARE CONTROL SHAPE

WORK STATION

AVOID SHARP EDGES AND CORNERS
NON-GLARE LIGHTING TO MINIMIZE FATIGUE
SEATING WITH ADJUSTABLE HEIGHT AND SUPPORT FOR LOWER BACK
(FEET SHOULD REST ON FLOOR OR OTHER SUPPORT)

DOORS

60" (1524mm) SIDE-HUNG PREFERRED TO SLIDING TYPE
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.

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, Humanscale 1/2/3, 3a, 3b
Goldsmith, Designing for the Disabled, 245-251, 315
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: Specially Adapted Housing, 43

DOORS AND HARDWARE

Cary, How to Create Interiors for the Disabled, 24-31
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26, 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; and 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: Specially Adapted Housing, 34-37

ELECTRICAL OUTLETS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3b
Goldsmith, Designing for the Disabled, 212-213
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 110, 118
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

EQUIPMENT CONTROLS

Bazar, Ergonomics in Rehabilitation Engineering, 55-71
Steinfeld, Barrier-Free Design for the Elderly and the 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, 85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112, 125
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 72

FLOORS

Diffrient, Tilley, Bardagjy, Humanscale 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, 34
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 75

INTERIOR SIGNS

Diffrient, Tilley, Bardagjy, Humanscale 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, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 112-113

SHELVES

Diffrient, Tilley, Bardagjy, Humanscale 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, Accessibility: An Approach to the Development of Design Criteria, C12-C15
Veterans Administration, Handbook for Design: Specially Adapted Housing, 43

TABLES, DESKS, WORK STATIONS

Austin, Resources Handbook for Barrier-Free Design, 79
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a, 3b
Grandjean, Fitting the Task to the Man
Harkness, Groom, Building Without Barriers for the Disabled, 36
Mace, An Illustrated Handbook of the North Carolina State Building Code, 92-93
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 115
Trombly, Scott, Occupational Therapy for Physical Dysfunction, 391-392

TELEPHONES

Cary, How to Create Interiors for the Disabled, 110
Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26, 3a
Goldsmith, Designing for the Disabled, 214
Mace, An Illustrated Handbook of the North Carolina State Building Code, 114-115
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 109, 125
Veterans Administration, Handbook for Design: Specially Adapted Housing, 41

THERMOSTAT

Mace, An Illustrated Handbook of the North Carolina State Building Code, 84-85
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111

WALLS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 26
Harkness, Groom, Building Without Barriers for the Disabled, 16

WALL SWITCHES

Diffrient, Tilley, Bardagjy, Humanscale 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: Specially Adapted Housing, 40

WINDOWS AND CONTROLS

Diffrient, Tilley, Bardagjy, Humanscale 1/2/3, 3a
Goldsmith, Designing for the Disabled, 178-180
Ohio Governor's Committee on Employment of the Handicapped, Access for All, 111, 124
Steinfeld, Barrier-Free Design for the Elderly and the Disabled, 106
Veterans Administration, Handbook for Design: Specially Adapted Housing, 38

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.

Aiello, James and Edward Steinfeld. Accessible Buildings for People with Severe Visual Impairments, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

American Mutual Liability Insurance Company. Physical Abilities to Fit the Job, Boston: American Mutual Liability Insurance Company, 1956.

American Society of Landscape Architects Foundation. Barrier-Free Site Design, Washington, D.C.: U.S. Department of Housing and Urban Development, 1976.

Austin, Richard L. Resources Handbook for Barrier-Free Design, Manhattan, Kansas: Theraplan, Inc., 1978.

Bazar, Andy R. Ergonomics in Rehabilitation Engineering, Wichita: Cerebral Palsy Research Foundation of Kansas, 1978.

Chasin, Joseph. Home in a Wheelchair, Washington, D.C.: Paralyzed Veterans of America, 1977.

Chasin, Joseph and Jules Saltman. The Wheelchair in the Kitchen, Washington, D.C.: Paralyzed Veterans of America, 1978.

er, Roger W. Mobile Homes: Alternative Housing for the Handicapped, Laurinburg: St. Andrews Presbyterian College (funded by U.S. Department of Housing and Urban Development), 1977.

Diffrient, Niels, Alvin R. Tilley, and Joan C. Bardagjy. Humanscale 1/2/3, Cambridge, Massachusetts: The MIT Press, 1974.

Gerontological Society. Barrier-Free Design for the Elderly and the Disabled, Syracuse, New York: Syracuse University, 1975.

Goldenson, Robert M., Jerome R. Dunham, and Charlis S. Dunham (eds.). Disability and Rehabilitation Handbook, New York: McGraw-Hill Book Company, 1978.

Goldsmith, Selwyn. Designing for the Disabled, London: RIBA Publications, Ltd., 1976.

Grandjean, Etienne. Fitting the Task to the Man. London: Taylor and Francis, Ltd., 1969.

Harkness, Sarah P. and James W. Groom, Jr. Building without Barriers for the Disabled, New York: Watson-Guptill Publications, 1976.

Lewin, Thord and Sven-Olaf Bratgard. Functional Anthropometry and Hand Grip Strength in Wheelchair Subjects, University of Göteborg, 1969.

Mace, Ronald I. Accessibility Modifications, Raleigh, North Carolina: North Carolina Department of Insurance, 1976.

Michigan Center for a Barrier Free Environment. Barrier Free Design Equipment and Aids Catalog, West Bloomfield, Michigan: Michigan Center for a Barrier Free Environment, 1979.

National Research Council. Accessibility: An Approach to the Development of Design Criteria and Applicable Design Solutions, Washington, D.C.: National Academy of Sciences, 1976.

National Spinal Cord Injury Foundation. National Resource Directory, Newton Upper Falls, Massachusetts: National Spinal Cord Injury Foundation, 1979.

The Ohio Governor's Committee on Employment of the Handicapped. Access for All: An Illustrated Handbook of Barrier-Free Design for Ohio, Columbus, Ohio: The Ohio Governor's Committee on Employment of the Handicapped, 1977.

Peterson, Carol Ann and Peg Connolly. Characteristics of Special Populations: Implications for Recreation Participation and Planning, Washington, D.C.: Hawkins Associates, 1978.

Sorenson, Robert James. Design for Accessibility, New York: McGraw-Hill Book Company, 1979.

Steinfeld, Edward, Steven Schroeder, and Marilyn Bishop. Accessible Buildings for People with Walking and Reaching Limitations, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Steinfeld, Edward, Steven Schroeder, and Marilyn Bishop. Adaptable Dwellings, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Steinfeld, Edward, Steven Schroeder, James Duncan, Rolf Faste, Deborah Chollet, Marilyn Bishop, Peter Wirth, and Paul Cardell. Access to the Built Environment: A Review of Literature, Washington, D.C.: U.S. Department of Housing and Urban Development, 1979.

Suazo, Antonio C. Job Redesign, Washington, D.C.: Goodwill Industries of America, 1974.

Texas Tech University. Human Rehabilitation Techniques, Vol. II, Springfield, Virginia: National Technical Information System, 1977.

Trombly, Catherine Anne and Anna Deane Scott. Occupational Therapy for Physical Dysfunction, Baltimore, Maryland: The Williams and Wilkins Company, 1977.

Veterans Administration. Handbook for Design: Specially Adapted Housing, Washington, D.C.: Veterans Administration, 1978.

NON-SLIP MATS

"Dycem", Fred Sammons, Inc., Box 32, Brookfield, IL 60513
"Vikem", Maddak, Inc., Pequannock, NJ 07440

ONE-HAND TYPEWRITERS

Typewriting Institute for the Handicapped, 3102 West Augusta Ave.,
Phoenix, AZ 85021

OPEN DESK-TOP FILES AND STORAGE

Atlantic Office Supply, Inc., 4907 Annapolis Road,
Bladensburg, MD 20710
The Highsmith Co., Inc., P.O. Box 25, Highway 106 East,
Fort Atkinson, WI 53538
Wilson-Jones, 6150 W. Touhy Ave., Chicago, IL 60648

READING MACHINES

The Ealing Corp., 22 Pleasant St., South Natick, MA 01760

RISING-ASSIST CHAIR

Economy Easy-Lift Chair, American Stair-Glide Corp.,
4001 East 138th St., Grandview, MO 64030
Vela Catapult Seat #S-1560, Maddak, Inc., Pequannock, NJ 07440

SENSORY PENS

Mechstat, Inc., 830 N.E. Loop 410, Suite 210, San Antonio, TX 78209

SOUND-OPERATED AND OTHER REMOTE SWITCHES

Lewis & Conger, 39-25 Skillman Ave., Long Island, NY 11104
Markline, P.O. Box 1750S, Waltham, MA 02154
Vibralite Products, Inc., 83 S. Highland Ave., Ossining, NY 10562

SPEECH COMPRESSOR/RECORDERS

A-6 Speech Controller, Variable Speech Control, Dept. A1,
2088 Union St., San Francisco, CA 94123
Lexicon Varispeech II, Lexicon, Inc., 60 Turner St.,
Waltham, MA 02154
Superscope C-104 Portable Cassette Recorder, Superscope, Inc.,
20525 Nordhoff St., Chatsworth, CA 91311

SPEECH SYNTHESIZERS, COMMUNICATORS

Phonic Mirror Handi Voice, HC Electronics, Inc., 250 Camino Alto,
Mill Valley, CA 94949
Canon Communicator, Telesensory Systems, Inc., 3408 Hillview Ave.,
P.O. Box 10099, Palo Alto, CA 94304

"TALKING" CALCULATOR

"Speech Plus", Telesensory Systems, Inc., 1889 Page Mill Road,
Palo Alto, CA 94304

TELEPHONE AIDS

local Bell System representatives
Fred Sammons, Inc., Box 32, Brookfield, IL 60513
Lewis & Conger, 39-25 Skillman Ave., Long Island, NY 11104
Maddak, Inc., Pequannock, NJ 07440
Markline, P.O. Box 1750S, Waltham, MA 02154

TELEPHONE AIDS FOR NON-VERBAL PERSONS (TTY)

Micon MCM, Micon Industries, 252 Oak St., Oakland, CA 94607
Porta-tel, Specialized Systems, Inc., 215 South Highway 101,
Suite 203, Solana Beach, CA 92075

TYPEWRITER KEYGUARDS, PAPER ROLLS

Fred Sammons, Inc., Box 32, Brookfield, IL 60513
IBM Office Products Division, One Gateway Center Plaza,
Newton Corner, MA (or local IBM representative)

TYPEWRITERS

IBM Correcting Selectric II, IBM Office Products Division, One
Gateway Center Plaza, Newton Corner, MA
Smith-Corona Sterling Electric 12, SCM, Consumer Products Division,
299 Park Ave., NY, NY 10017

VIDEO READING AIDS

Apollo Lasers, Inc., 6357 Arizona Circle, Los Angeles, CA 90045
Visualtek, 1610 26th Street, Santa Monica, CA 90404

WHEELED CARTS, SHOULDER BAGS, CARRYING AIDS

Atlantic Office Supply Co., Inc., 4907 Annapolis Road,
Bladensburg, MD 20710
FashionAble, Rocky Hill, NJ 08553
G.E. Miller, 484 S. Broadway, Yonkers, NY 10705
Global Equipment Co., 6556 Hemlock Drive, Hempstead, NY 11550
Maddak, Inc., Pequannock, NJ 07440

REHABILITATION ENGINEERING FOR WORKSTATION DESIGN

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A. INTRODUCTION

In the Third Wave, Alvin Toffler 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 floorspace. To change is 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 tends to be 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 if 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 assure 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. An arthritic 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.

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 usefully 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 workpiece 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.

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 gaged 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 is 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:

- o Custom workstations optimize performance (but are expensive to produce)
- o 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:

- o modular furniture
- o movable partitions
- o adjustable furniture (drafting tables...)
- o electric carts
- o intercoms and speaker phones
- o microcomputers
- o horizontal files
- o 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

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The Rehabilitation Engineering Center at Wichita, Kansas has a mandate to provide 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, the 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.

1. 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 \$20.00.

- C. The Outcome

1. Using this device, the individual performing the task was totally productive on a plateau equal to his able-bodied counterparts.
 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.
2. 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 \$4,000.
 3. The adaptation was relatively simple and could be performed by local technical personnel.

3. Case Study Three-The operation of a three-axis crimper by a severely handicapped cerebral palsied individual.
 - A. Definition of 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 individual selected for the job had very little functional capability, either handling material or placing the tubes within the punch press.
 3. The volume of production was such that 1,800 units per day was needed.
 - B. 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.
 - C. 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 a day criteria.
 2. After working on the job for approximately two years, his posturing 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.

ORGANIZATIONS

These groups focus on employment for the disabled; they can provide information and/or publications on employment related technology.

Human Resources Center
Albertson, NY 11507
(516) 747-5400

IMPART - Innovative Matching of Problems to Available
Rehabilitation Technology
2203 Babcock Road
San Antonio, TX 78229
(512) 699-8988

Job Development Laboratory
George Washington University
2300 Eye Street, N.W.
Room 420
Washington, D.C. 20037
(202) 676-3847

Mainstream, Inc.
1200 15th Street, N.W.
Washington, D.C. 20005
(800) 424-8089 also for TTY
(202) 833-1136

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout
Stout, Wisconsin

President's Committee on Employment of the Handicapped
1111 20th Street, N.W., 6th floor
Washington, D.C. 20210
(202) 653-5044

Rehabilitation Engineering Center
Cerebral Palsy Research Foundation of Kansas
P.O. Box 8217
Wichita, KS 67208
(316) 688-1888

SOURCES OF ENGINEERING PERSONNEL
TO CONDUCT STUDIES OF ADAPTIVE DEVICE NEEDS AND DESIGN OF SAME

1. Four year colleges or universities which have a formal engineering program. Senior students in accredited engineering curriculum are required to undertake a senior program in which they attempt to solve a "real" problem. In many cases, students thrive on problems related to independent living and the employment of severely disabled persons.
2. Two year junior colleges or community colleges often have pre-engineering programs and can provide student/faculty assistance through activities associated with these two year programs.
3. High school vocational education teachers and their classes make excellent resource groups to solve problems confronting handicapped people in the vocational realm, particularly problems that do not require a high degree of engineering design sophistication.
4. In large cities, professional societies are available to offer design advice in the development of adaptive devices. These organizations would include: the American Institute of Industrial Engineers, the American Society of Mechanical Engineers, the Institute of Electrical Electronic Engineers and the Society of Manufacturing Engineers.
5. The publications of the National Institute of Handicapped Research can be utilized as an excellent source of material to identify significant research in the area of devices for independent living and vocational application. A particular solution may not be indicated, however, the publication will identify those professional engineers working in the field who might be available for consultation.

PROFESSIONAL RESOURCES

American Institute of Independent Engineers
25 Technology Park-Atlanta
Nor 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
(312) 692-4121

International League of Electrical Assoc.
2101 L Street, N.W.
Washington, D.C. 20037
(202) 457-8452

National Tool and Die Makers
75 Airport Road
Hartford, CT 06114
(203) 522-7279

SELECTED PUBLICATIONS - TECHNOLOGY FOR EMPLOYMENT

An Annotated Bibliography of Literature Related To The Employment of Deaf Persons, National Center on Employment of the Deaf, Rochester, NY; 1981. \$1.00. Available from: National Technical Institute for the Deaf, Rochester Institute of Technology, Rochester, NY 14623

The Assertive Job Seeker, Lilly Bruck, A 3-cassette series: Technology in the Workplace; Employer Attitudes; The Civil Rights of Disabled Employees, New York, NY; 1981 \$9.00. Available from: In Touch Networks, Inc., 322 W. 48th Street, New York, NY 10036.

Assisting the physically handicapped: An identification and development of apparatus for laboratory shop phase I. Bruwelheide, K.L. Bozeman, Montana: Montana State University, Department of Agricultural and Industrial Education, 1979. Through the Montana Office of Public Instruction.

Designing for Functional Limitations. Mueller, J. The George Washington University Rehabilitation Research and Training Center, Job Development Laboratory, Washington, D.C., 1979.

Employing the Disabled: What are self-help groups and what assistance can they offer the employer?, 1981. Rabby, Rami, 136 E. 55th Street, Suite 8E, New York, NY 10022, (212) 371-7766. Available from: author. \$5.00 plus \$.50 postage and handling.

Employment of the handicapped--the goal of integration and safety in the workplace, Proceedings of the Rehabilitation International Vocational Seminar, Toronto, Canada; 1980. \$9.00. Available from Secretariat, Vocational Commission, 1323 Forbes Avenue, Pittsburgh, PA 15219.

A Guide to Job Site Evaluation. Botterbusch, K.F. Menomonie, Wisconsin: Materials Development Center, Stout Vocational Rehabilitation Institute, University of Wisconsin-Stout. How to use different types of job site evaluations, how to set up a job site and evaluate the client. Sample evaluation forms included.

Home Operated Business Opportunities for the Disabled, Accent Special Publications, Cheever Publishing Inc., P.O. Box 700, Bloomington, IL 61701, 109 pp. 1977.

Human Scale 1/2/3, 4/5/6, 7/8/9. Cambridge, MA 12142 The MIT Press, Massachusetts, Institute of Technology. Anthropometric charts for men, women, and children. Guideline requirements for physically disabled and elderly.

Job Redesign, Suazo, Antonio, 1974. Goodwill Industries of America, Washington, D.C.

Job Related Physical Capacities Project. Final Report, Florida International University, Miami, Florida. Refers to an aids and accomodations catalogue compiled as part of the project.

Managing and employing the handicapped: The Untapped Potential, Pati, G.C., Adkins, J.I. and Morrison, G. Brace-Park Press, Lake Foret, IL; 1981 \$19.95 hardcover, \$14.95 softcover.

Rehabilitation Engineering: A Counselor's Guide, Report on the Sixth Institute on Rehabilitation Issues, San Antonio, Texas, June 5-8, 1979, Research & Training Center, Stout Vocational Rehabilitation Institute, University of Wisconsin - Stout, Wisconsin, 141 pp.

Rehabilitation engineering source books. Institute for Information Studies, 1979.

Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide, compiled by Sensory Aids Foundation, American Foundation for the Blind, New York, NY 1978, 210 pp.

Speaking of Employment: A Symposium on Disabled People in the Workplace, Mainstream, Inc., Washington, D.C.; 1981 \$9.00.

Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People, Wisconsin Vocational Studies Center, University of Wisconsin-Madison, Madison, WI; 1981 \$30.00.

Vocational and Educational Aids, Smith Kettlewell Rehabilitation Engineering Center, Smith Kettlewell Institute, San Francisco, CA 1982, 31 pp.

Work Independence and the Severely Disabled: A Bibliography, Bilotto, G. and Washam, V., Research and Utilization Institute, National Center on Employment of the Handicapped, Human Resources Center, Albertson, NY, 1980 \$7.95.

Working with Cerebral Palsy, Shaver, E.M. and Mallik, K. George Washington University, Rehabilitation Research and Training Center, Washington, D.C. 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.

PERIODICALS

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

MacClean - Hunter Publishing Corp.

300 W. Adams Street

Chicago, IL 60606

Biomedical Technology and Human Factors Engineering

U.S. 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

1515 Massachusetts Avenue, NW

Washington, D.C. 20005

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

Computerworld, 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.
221 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

Homecare/Rehab Product News

Miramar Publishing Company
2048 Cotner Avenue
Los Angeles, CA 90025
Subscription: \$15.00/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

Ames Publishing Company
1 West Olney Avenue
Philadelphia, PA 19120
Subscription: \$35.00/yr or Free to Controlled Circulation

In the Mainstream, Mainstream, Inc., Washington, D.C.; bimonthly newsletter \$40.00. Available from:
Mainstream, Inc.
1200 15th Street, N.W.
Washington, D.C. 20005

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

Midland, MI 48640

Subscription: No Charge to Controlled Circulation

Measurement and Control News

Measurements and Data Corporation

2994 West Liberty Avenue

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

1282 Old Skokie 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: \$18.00/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

Report

National Center for a Barrier Free Environment
Suite 1006
1140 Connecticut Avenue, NW
Washington, D.C. 20036

Rx Home Care

Barrington Publications, Inc.
825 S. Barrington Avenue
Los Angeles, CA 90049
Subscription: \$40.00/yr or Free to Controlled Circulation

Technical Aid to the Disabled Journal

c/Royal Ryde Rehabilitation Hospital
227 Morrison Road, P.O. Box 108
Ryde, N.S.W. 2112
Australia
Subscription: Free to Controlled Circulation

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
614 Superior Avenue, W.
Cleveland, OH 44113
Subscription: \$24.00/yr

COMMERCIAL EQUIPMENT VENDORS

A. Liss and Co.
35-03 Bradley Avenue
Long Island City, NY 11101

Air Technical Industries
7501 Clover Avenue
Mentor, Oh 44060
(216) 951-5191

B.E. Wallace Products Corp.
Box 70
Exton, PA 19341
(215) 647-1400

Black & Decker
U.S., Inc.
626 Hanover Pike
Hampstead, MD 21074

BOSCH
P.O. Box 2217
Hwy. 55 West
New Dern, NC 28560

Brodhead - Garret Company
4560 E. 71st Street
Cleveland, OH 44105

Brookstone
127 Vose Farm Road
Peterborough, NH 03458

C&H Distributors, Inc.
400 S. 5th Street
P.O. Box 04499
Milwaukee, WI 53204

CM Hoist
Division Columbus McKinnon Corp.
Tonawanda, NY 14150

Enerpac
Division of Applied Power, Inc.
13000 W. Silver Spring Drive
Butler, WI 53007

Graves Humphreys Inc.
1948 Franklin Road
P.O. Box 13407
Roanoke, VA 24083

Herbach & Rademan, Inc.
401 E. Erie Avenue
Philadelphia, PA 19134

J.C. Penney Company, Inc.
1301 Avenue of the Americas
New York, NY 10019

Jensen Tools, Inc.
1230 S. Priest Drive
Tempe, AZ 85281

Keuffel and Esser Company
20 Whippany Road
Morristown, NJ 07960

Leichtung, Inc.
701 Beta Drive
Cleveland, OH 44143

Leviton Manufacturing Co., Inc.
59-25 Little Neck Parkway
Little Neck, NY 11362

Mark Industries
Agricultural/Industrial Division
P.O. Box 1120
Long Beach, CA 90801

Markson Science, Inc.
Box 767
Del Mar, CA 92014

Milwaukee Electric Tool Corp.
13135 W. Lisbon Road
Brookfield, WI 53005

Powers Industrial Equipment Co., Inc.
5713 Kenwick
San Antonio, TX 78238

Republic Steel Corp.
Industrial Products Division
1038 Belden Ave. NE
Canton, Ohio 44705

Rockwell International/
Industrial Tool Division
400 No. Lexington Avenue
Pittsburgh, PA 15208

Sears, Roebuck & Company
Sears Tower
Chicago, IL 60684

SKIL Corporation
4801 W. Petersen Avenue
Chicago, IL 60646

Snap - On Tools
5811 Business Park Drive
P.O. Box 18868
San Antonio, TX 78218 (local)

Turnkey Material Handling, Inc.
P.O. Box 2000
36 Letchworth Street
Buffalo, NY 14213

U.S. General
100 Commercial Street
Plainview, NY 11803

W.W. Grainger, Inc.
5959 W. Howard Street
Chicago, IL 60648

PRODUCT/EQUIPMENT DIRECTORIES

Best's Safety Directory

A.M. Best Company, Inc.
Ambest Road
Oldwick, NJ 08858

Electronic Engineers Master Catalog

United Technical Publications, Inc.
645 Stewart Ave.
Garden City, NY 11530

Product Inventory of Hardware, Equipment and Appliances for
Barrier - Free Design, Second Edition, 1981.

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. 1981. \$30.

Wisconsin Vocational Studies Center
University of Wisconsin - Madison
Madison, WI 53706

Yellow Pages of Industrial Equipment and Supplies

Industrial Research/Development
1301 S. Grove Avenue
Barrington, IL 60010

Also see ABLEDATA

SOURCES FOR WORK CAPACITY EVALUATION ASSESSMENT PACKAGES

EvaluationSystems, Inc. (HESTER)
640 North LaSalleStreet
Suite 698
Chicago, IL 60610

Cardiac Rehabilitation Resources
P.O. Box 3804
Downey, CA 90242

Materials Development Center
Stout Vocational Rehabilitation Institute
University of Wisconsin-Stout
Menomonie, Wisconsin 54751

MaCarron-Dial Systems
P.O. Box 45628
Dallas, TX 75245

Micro-TOWER
ICD Rehabilitation and Research Center
340 E. 24th Street
New York, NY 10010

Rehabilitation Institute of Southern California
P.O. Box 7
Coto de Caza
Trabuco Canyon, CA 92678

Singer Educational Division
Career Systems
80 Commerce Drive
Rochester, NY 14623

Valpar Corporation
3801 E. 34th Street
Tucson, AZ 85713

VDARE Service Bureau
P.O. Box 1945
Athens, Georgia 30603

Vocational Research Institute (JEVS)
Jewish Employment and Vocational Service
1700 Sansome Street
9th Floor
Philadelphia, PA 19103

Work Evaluation Systems Technology (WEST)
16400 Pacific Coast Highway
Huntington Beach, CA 92649

TECHNOLOGY FOR RECREATION

TOYS

NOTES

THE VALUE OF TOYS

Howard C. Shane
The Children's Hospital Medical Center
Boston, Massachusetts

Reprinted from: "Communication Outlook", Vol. 3, #1, April 1981

"I have little data to support many claims that will be made in this paper. I offer only empirical support. I will consider toys as a means of fun and enjoyment and, when age appropriate and safe, should be available to all children. Unfortunately, despite their obvious benefits, toys do not provide enjoyment to all. All children do not have the opportunity to interact with toys for multiple reasons. This paper will address only children with physical and/or cognitive handicaps who are often deprived of the benefits offered through toys.

Most likely, cognitive deficits, physical limitations, the cost of adaptively designed toys and unconscious negative societal attitudes toward differentness are the principal reasons why toys are largely unavailable to handicapped children. Many physically impaired children are simply unable to perform the fine motor movements necessary to operate commercially available toys. Although they mentally understand the mechanics, they are bound by their physical limitations and cannot independently operate these toys. Still other children have difficulty understanding how to activate toys, although their bodies are capable of carrying out its manipulative requirements. The child who fits the latter description may potentially develop cognitive schemes with continued exposure to these toys, thus illustrating that toys provide valuable learning opportunities for children.

In recent years, the growing interest in modifying toys to accommodate motorically and/or cognitively impaired children has been encouraging. This trend, should it continue, may provide opportunities for these children to significantly advance in their overall development. That is to say, the opportunity to play independently with toys could facilitate physical and cognitive development. That is to say, the opportunity to play independently with toys could facilitate physical and cognitive development in ways we have not yet begun to explore.

I would like to discuss a personal experience since it exemplifies many of the problems inherent to the adaptation of toys for the handicapped, as well as underscore benefits which can be derived from modified toys.

In the mid 1970s, Dr. Richard Absher from the University of Vermont and I modified the popular toy (manufactured by Kohner Bros., Inc.) the Surprise Box. We did so after discovering the paucity of toys for persons with cognitive and/or physical handicaps. To operate the Surprise Box, manipulative skills of a child of about one year old are required. The child must turn a dial, bang a button, slide, flip or slip a lever. Cognitively,

the child must recognize the casual relationship between the turning, banging, sliding, flipping, or slipping and the appearance of a small animal or human form from the posterior aspect of the Surprise Box. Many of the children that Dr. Absher and I were involved with at the time were either incapable of physically manipulating such a toy in its commercial form or unable to comprehend its cognitive requirements or both. The modification was aimed at simplifying the physical requirements needed to make the human or animal forms pop up. With the addition of touch sensitive pads, a mere touch of one of the six pads would operate the releasing action.

We introduced the modified Surprise Box ("Prop Box") to several children and observed their play. We found patterns of behavior which changed after daily interaction for several weeks. Patterns, incidentally, not unlike the patterns which we have also seen in typical children interacting with the same toy in its unmodified condition. Initially, children inadvertently hit the touch sensitive pads which released the "pop up" figure. Facial expression at this stage was that of surprise or no demonstrable reaction. Gradually, the child became more purposeful and directly selected specific target pads. In a final phase we observed that children would look in the vicinity of the hidden figures, then look towards certain touch pads and finally hit the pad and direct their attention to the pop up figure. This final phase was termed "anticipatory".

Our experience with the Prox Box has led to several conclusions. In the cognitive realm, to use a Piagetian model, the children were improving their sensori-motor intelligence schemas of causality and object permanence. The modification made the toy more accessible and thus allowed the children to form cause-effect relationships. This modification of the Surprise Box is unlikely to be mass produced. Commercial modification and distribution would be unlikely since the cost of adaptive designs would reduce profit potential. The high cost of toy modification and limited availability parallels the high cost of communication aids. (See M. LeBlanc's comment in Communication Outlook, Vol. 1, No. 2, p. 4.) Although an individual with basic electronic abilities could construct the necessary adaptations, the effort and time involved is considerable. We estimated that at least a full week of graduate student labor was expended on creating the Prox Box.



Prox Box

There seems to be a growing realization that toys should be an intricate 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. In the Communication Enhancement Clinic at the Children's Hospital Medical Center, Boston, for example, switch fitting is initially accomplished by interfacing a child with a toy.

In summary, 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.

NOTES

TOY LIBRARIES

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 would provide access to a wide variety of high quality playthings for children, and especially for infants and pre-school children.

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.

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?

Because the library's inventory contains over 2000 toys, books, puzzles, and reference materials this need for variety can be accomplished.

Some toy libraries also have TOYMOBILES, mobile vans that bring the collection to the community.

For more information on toy libraries:

TOY LIBRARIES ASSOCIATION
Seabrook House
Wylllyotts Manor, Darkes Lane
P.O. Herts Bar, Herts
ENGLAND EN6 ZHL

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, Wylllyotts Manor, Darkes 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, and professionals.

One project pursued by ACTIVE is the publication of worksheets which contain designs for a range of play, leisure and communication aids not available commercially. The designs are submitted by ACTIVE members.

For further information, contact ACTIVE, Seabrook House, Darkes Lane, Potters Bar, Herts EN6 2HL, ENGLAND.

Canadian Toy Libraries Association
50 Quebec Ave., Suite 1207
Toronto, Ontario M6P 4B4
CANADA

U.S.A. members of Canadian Toy Libraries Association include:

Dr. Caroline Bauer
6535 S.W. Chelsea
Portland, Oregon 97223

Bellevue Public Library
1003 Lincoln Road
Bellevue, Nebraska 68005

Ms. Janet Cahill
3611 37th Ave. N.E. #209
Minneapolis, MN 55421

Chicago Public Library
Children's Services Spec.
425 N. Michigan
Chicago, Illinois 60611

Children's Services
Champaign P.L. & Info. Ctr.
505 So. Randolph
Champaign, Illinois 61820

Daisy Toy Lending Library
890 Morse Avenue
Sacramento, CA 95608

Door County Toy Library
c/o Kathy White
833 Michigan
Sturgeon Bay, Wisconsin 54235

Ms. Nancy Elsmo
75 7th Street
Racine, Wisconsin 53403

Glenview Public Library
1930 Glenview Road
Glenview, Illinois 60025
Attn: M. Kraut

Harford County Library
100 Pennsylvania Avenue
Bel Air, Maryland 21214
Attn: M. Jaugstetter

Indiana State Library
Serials Section
140 N. Senate Avenue
Indianapolis, Indiana 46204

Mead Public Library
710 Plaza 8
Sheboygan, Wisconsin 53081

Mentor Public Library
8215 Mentor Avenue
Mentor, Ohio 44060

Moorhead Public Library
Lake Agassiz Regional Library
P.O. Box 699
Moorhead, MN 56560

Ms. Helen L. Orringer
2151 Evansdale Avenue
Toledo, Ohio 43607

PAM Assistance Centre
110 Marshall Street
P.O. Box 21037
Lansing, Michigan 48909

Pittsburgh Toy Lending
Library
5410 Baum Boulevard
Pittsburgh, PA 15232

Mrs. Geri Schumann
5 Amherst Place
Upper Montclair, NJ 07043

Tallahassee Toy Library
410 1/2 N. Bronough Street
Tallahassee, Florida

The Toy Chest
2371 Stanwell Drive
Concord, CA 94520

Toys 'n Things
906 North Dale
St. Paul, Minnesota 55103

Toys of Love
201 Wick Avenue
Youngstown, Ohio 44503

Worcester County Library
307 N. Washington Street
Snow Hill, MD 21863

Click Industries Ltd.
66b Rolling Ridge Road
Stamford, CT 06903]
Attn: Mr. Anderson

SELECTED PUBLICATIONS: TOYS

Choosing Toys and Activities for Handicapped Children. Norris, Jill, 1974. Toy Libraries Association, Seabrook House, Wyllyotts Manor, Darkes Lane, Potters Bar, Herts, England ENG 2HL

Clinically Adapted Instruments for the Multiply Handicapped. Clark, Cynthia; Chadwick, Donna, 1979. Modulations Company, 9 Sawmill Drive, Westford, MA 01886

"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 the International Action Group for Communication Enhancement. Subscriptions are \$10 (\$12 outside North America). Subscriptions are for whole volumes (4 issues). Single copies are available for \$3.00.

Educational Games for Physically Handicapped Children. A 90 page booklet by Cratty and Breen of recreational games which involve the 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. Paperback.
BK-4003 Educational Games for Physically Handicapped Children \$4.95

The Good Toy Guide. The Toy Library Association, Herts, England 1980. Available in U.S.A. from Carrier Pigeon, 75 Kneeland Street, Room 309, Boston, MA

Guidelines for Adapting Battery Operated Toys. revised 1982. Higgins, Jayne. \$2.00. 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 (i.e. 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

Guide to Homemade Innovative Play Equipment for Activities in Physical Education and Recreation for Impaired, Disabled and Handicapped Participants. Council on Exceptional Children. Reston, VA, NA

Hear and Say: Toys for Children with Hearing, Speech and Language Difficulties. Knowles, Susan. Noah's Ark Publication. Available from: Toy Libraries Association. Herts, England. 1978

Homemade Battery Powered Toys and Educational Devices for Severely Handicapped Children. second edition. Burkhart, Linda. 1982, 50 pp. 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.

To order, send \$5.00 plus \$1.00 postage and handling to:
Linda J. Burkhart, 8315 Potomac Avenue, College Park, MD 20740

Lets Make Toys. McCorkey, Roy; Jeffree, Dorothy. Human Horizons Series, 1981. Souvenir Press Ltd., 43 Great Russell Street, London, England. Provides parent and teachers with simple instruction on how to make toys especially designed to stimulate the development of mentally and physically handicapped children.

Let Me Play. Jeffree, Dorothy; McCorkey, Roy and Hewson, Simon. 1977. Souvenir Press, London, England.

Play Helps-Toys and Activities for Handicapped Children. Lear, Roma. 1977. William Heinemann Medical Books, London, England.

Toy Modification Note: Build It Yourself Battery Interrupter. Vanderheiden, Gregg. TRACE Center, University of Wisconsin, Madison, Wisconsin. 13 pp.

Toys and Playthings. Newson, John & Elizabeth. 1979. Penguin Books, New York.

Toys Help: A Guide To Choosing Toys For Handicapped Children. Canadian Association Toy Libraries, 1981. \$7.00. Toys Help is a five-part information kit which introduces the therapeutic and educational uses of toys and also offers the basic information needed to set up a toy/play based therapeutic project. The kit contains a rationale and model for conceptually understanding toy-based therapy (unit 1); criteria for selecting potentially beneficial toys (unit 2); a chart listing 100 toys and their uses (unit 3); administrative and practical suggestions for the storage and cataloging of toys, including basic information for starting a toy library (unit 4); and a number of suggestions for modifying commercially available toys (unit 5). Also included are the titles of several books and articles, names and addresses of toy suppliers and agencies or organizations involved with and interested in helping children through the use of toys.

The kit was prepared for use by special educators, occupational therapists and physiotherapists, nurses, child-life workers and others working primarily in hospitals, residential and day treatment centers and clinics. It can also be useful to teachers, social workers, toy libraries, and parents. The self-contained package contains four separate booklets and a wall chart, all in a folder which can be used as a poster. The cost is \$7 plus 50 cents for postage. Payment must accompany order.

The kit may be obtained by contacting the Canadian Association of Toys Libraries, 1207-50 Quebec Avenue, Toronto, Ontario, Canada M6P 4B4.

The Use of Current Technology in the Design and Construction of Simple Inexpensive Teacher Made Response-Contingent Educational Materials for the Severely and Profoundly Handicapped Population. Wethered, Chris E. 1978. Master's Thesis, University of Miami. Available from -Chris Wethered, c/o University of Tennessee, Rehabilitation Engineering Center, 1248 La Paloma, Memphis, TN

Wobble Switch Toy Control Switch: A Do It Yourself Guide. Brown, Ben. 1980. 3 p. TRACE Center, University of Wisconsin, Madison, Wisconsin.

Sandi Enders, OTR
Children's Hospital at Stanford
Rehabilitation Engineering Center
1982

NOTES

SOME MANUFACTURERS AND DISTRIBUTORS OF SPECIAL TOYS

You can obtain toys from:

Abbey Medical
3216 El Segundo Blvd.
Hawthorne, CA 90250

Brad's Toys
P.O. Box 12
Prospect Height, IL 60070

Education Technology Center
Foster, Rhode Island

Equipment Shop
P.O. Box 33
Bedford, MA 01730

Exceptional Play, Inc.
P.O. Box 1015
Lawrence, Kansas 66044

G.E. Miller, Inc.
484 S. Broadway
Yonkers, NY 10705

Prentke-Romich Co.
8769
Shreve, Ohio 44676

J.A. Preston Corporation
60 Page Road
Clifton, NJ 07012

Special Friends
P.O. Box 1262
Lowell, MA 01853

DO-IT-YOURSELF

You can make adapted toys, there are instructions in several of the books and pamphlets listed in publication section.

Sources of Supplies for Modifying Homemade Battery Powered Toys and Switches

Local Radio Shack stores are convenient places to buy electrical supplies. Electronic stores also sell these parts; they are listed in the yellow pages under "Electronic Equipment and Supplies". Parts can be mail ordered from catalogs such as these:

Active Electronic Sales Corp.
P.O. Box 401247
Framingham, MA 01701

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002

Barbey Electronics
333 N. 4th Street
Reading, PA 19603

Micro Switch
A Division of Honeywell
Freeport, IL 61032

Chaney Electronics, Inc.
P.O. Box 27038
Denver, CO 80227

Olson Electronics
Dept. R-1
260 S. Forge Street
Akron, OH 44327

Digi-Key Corporation
Quality Electronic Components
P.O. Box 677
Thief River Falls, MN 56701

Poly Paks
P.O. Box 942 El
S. Lynnfield, MA 01940

Digital Research Parts
P.O. Box 401247
Garland, TX 75040

Quest Electronics
P.O. Box 4430C
Santa Clara, CA 95054

Godbout Electronics
Bldg. 725
Oakland Airport, CA 94614

ADAPTED TOYS AND GAMES FOR BLIND PEOPLE

Products 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 (AMPHBI)
1839 Frankfort Avenue
P.O. Box 6085
Louisville, KY 40206

Science for the Blind (SFB)
P.O. Box 385
Wayne, PA 19087

A list of currently available products:

TOYS FOR THE YOUNG

Science for the Blind:

Alphabet and Numerals. Tactile plastic shapes. R-6D \$1.40

Animal Voices. Tilt the can to make them "talk". R-6G \$1.55

Talking Animal Blocks. ("Talking" is used loosely here!)
R-6H \$1.95

Build a Sound. Interchangeable tubes with holes along sides, fit together in various ways. R-6L \$3.25

Creeping Caterpillar. R-6A \$2.75

Curly Caterpillar. You put it together. R-6M \$2.50

I Can Do It Clown. Gives practice in zipping, tying, snapping, buttoning and buckling. R-6P \$1.25

Clowns. Stuffed toys.
R-6RA Large Clown \$8.50
R-6RB Little Brother \$6.25

Monkeys. Stuffed toys. R-6S \$5.50

Toot Toot Locomotive. A wind-up toy reported to travel a long distance, and to be audible the entire time.
R-6T \$2.95 or 2/\$5.50

Citi Cars. Pull these metal cars backward and they'll run forward. R-6V \$2.00 or 4/\$7.00

Magnetic Egg. Eight magnetic ring-like shapes form the egg.
R-6W \$2.00

Circus Puzzle. R-6WC \$2.95

School House Puzzle. R-6WS \$2.95 (2 puzzles \$5.50)

Although good for working on manual dexterity and shape matching skills, these actual shapes have little to do with circuses or schools if you can't see them.

Match Mates. A timed shape-matching game. R-6X \$1.95 or 2/\$3.75.

GAMES

American Printing House for the Blind Incorporated

BASEBALL GAME. Polyurethane plastic game board measures 23" x 11 1/2" and weighs 3 1/2 pounds. Spinners are labeled in braille and large type. Pegs included represent runners. A Styrene Inning Scoreboard is included to record outs, balls, and strikes. Play follows actual baseball or softball rules. Abacus included for keeping score. 1-0810 \$35.00 each.

THE GAME OF SQUARES. A playing board is divided in 16 small squares. "Sides" and "markers" are included. Players alternate placing "sides" on the board to enclose a small square. When a player completes a square, he claims it with his "marker" and places the next "side". The player who has claimed the most squares at the end of the game is the winner. 1-0843 \$24.00 each.

STALEY SPORTS FIELD KIT. Consists of six boards showing the play areas in braille and large type for baseball, basketball, bowling, football, tennis, and volleyball. Included are colored, variously shaped magnets for representing players, balls, spectators, etc. 1-0357 \$30.50 each.

"TAKE AWAY" GAME. Square board has spinner numbered in braille and large type. There are seventeen each of black, rough-textured and blue, smooth-textured playing pieces. The spinner tells the child how many pieces he may "take away" from his opponent. When one player has no pieces left, the other player is declared the winner. 1-0890 \$20.00 each.

"TEN SPOT" GAME. Square playing board has numbered spinner labeled in braille and large type. There are four 14-holed "ladders", and four playing pegs which move the ladder as determined by the number obtained on the spin. The player adds up the numbers he lands on. If the play score totals more than ten, he starts over. If he reached the top of the board before "ten spot" is called he reverses and moves down the ladder. When the play score is ten, he calls "ten spot" and scores one point.

All pegs remain in the same position on the board, and the next game is started. The first player to get a score of ten wins the game. 1-0892 \$27.50 each.

Science for the Blind

R-11A	Voice Bridge	\$330.00
R-11B	Voice Chess Challenger	\$325.00
R-15B	Mini Mind. Hand-held electronic memory game.	\$20.00
R-15A	Mimic. Hand-held electronic memory game.	\$28.00
L-10B	Jumbo Print Playing Cards	\$ 1.95
R-14A	Braille Playing Cards	\$ 2.50

American Foundation For The Blind

MONOPOLY. All necessary parts brailled. Properties clearly marked for easy identification.

GS 605 \$30.00

DELUXE SCRABBLE. Modified by the manufacturer to allow both sighted and blind persons to play.

GM 74 \$18.00

MASTERMIND. Tactual version.

GS 500 \$7.50

ERGO. Playing pieces notched for tactual use and good color contrast for low vision.

GS 270 \$17.00

POINT BLANK. Playing pieces have raised dot on point for tactual identification and good color contrast for low vision.

RGM 4100 \$8.75

OTHELLO. Marked for tactual identification.

RGC 4101 \$15.00

CONNECT FOUR. Black pieces have holes for tactual identification.

GS 250 \$10.00

SCORE FOUR GAME. Tactually marked and contrasting color for blind and low vision.

GS 301 \$10.25

RACK-O. Tactually marked card game.

GM 77 \$10.25

ROOK. Brailled edition.

GM 72 \$6.50

BACKGAMMON SET. Tactually marked and contrasting color for blind and low vision.

GS 655 \$20.00

DICE SET. Plastic dice with raised dots.
GS 90 \$2.00

CHECKER SET. Tactually marked.
GS 83 \$25.00

CHESSE SET. Tactually marked.
GS 291 \$25.00

AFB CRIBBAGE SET. Tactually marked.
GS 85 \$10.25

PARCHEESI. Tactually marked.
RGM 4102 \$15.00

CHINESE CHECKERS. Six different shaped pegs allow for easy
identification.
RGM 4103 \$18.00

DOMINOES. Prominent raised black dots identify the blocks. Good
color contrast.
GS 101 \$7.50

INDIVIDUAL PLAYER BINGO BOARD. Braille.
RGS 4104 \$5.75

SOLITARE BOARD WITH BRAILLE CARDS.
GS 328 \$7.75

HI Q PUZZLE. Peg board game for one player.
GC 60 \$3.00

TIC-TAC-TOE. Pegboard version.
GC 415 \$4.00

FISH PUZZLE. Tactually marked and color contrast.
GC 417 \$2.50

SPORTS

Science for the Blind

PILLO POLO. A game similar to hockey in fun and competition
without the hazards of puck and stick. Pillo Polo involves 12
players, but variations may be devised for as few or as many
players as are available.

R-5E PILLO POLO \$89.50

R-5EP AUD-A-SWAT \$130.00 (Pillo Polo set with Aud-a-Sphere T-2P.
Full set includes 12 sticks and one foam beeper ball (T-28R),
along with 2 sportfoam 8 1/2" balls)

ROCKET PASS. A tapered cyclinder suspended on two cords whizzes

from one end of the 20 ft. cords to the other when you separate the cords at one end. Can be used by 1 to 4 players for fast action competition or for arm and shoulder exercise.

R-5A ROCKET PASS \$15.00

SCOOTER BOARD HOCKEY SET. Short sticks are designed for use from a kneeling, sitting/scooter board position for a limited play area.

R-5H SCOOTER BOARD HOCKEY SET \$27.00

SCOOTER BOARD HOCKEY SET with 8 1/2" Aud-a-Sphere

R-5HP AUD-A-SQAT SWAT \$67.00

Rechargeable Aud-A-Ball. Balls will operate continuously for about 3 hours between charges. Fourteen hours are required to recharge the battery fully.

T-2RS SOCCERBALL \$95.00

T-2VS VOLLEYBALL \$90.00

BELL BALL. Soft, foamy, 4" diameter felt-covered foam ball with bell inside--bell remains audible while the ball is in motion.

R-6U4 BELL BALL \$2.25 each

R-6U6 LARGE BELL BALL \$3.30 each

AUD-A-FIND BEACON. Mounted in a small black box. Beeps at a regular frequency variable from once every 2 seconds to once every 20 seconds. Audible to about 100 feet in a relatively quiet environment.

T-20A \$40.00

AUD-A-FIND BALL BEACON. Beacon mounted in a 4" foam ball with cord. May be suspended from hook, nail, etc.

T-20B \$35.00

BALL CALL TARGET GAME. Thirteen inch diameter target is mounted on wall or backdrop. Velcro-covered balls stick to the target. Three ping pong size balls are included. A beeper at the center of the target provides location by sound.

T-15A \$45.00

AUD-A-TOSS RING TOSS. Post emits a burst of sound every 5 or 6 seconds so that it can be located by ear. Set includes post and four rings.

T-22 \$45.00

SCOOTER BOARD. Boards have double ball bearing swivel casters--children can sit or lie on board and propel themselves with hands or feet.

R-5KA 12" SCOOTER BOARD \$13.00

R-5KB 12" BOARD w/HANDLES \$17.00

AUD-A-BALL. Electronic battery operated beeping system. The sound source is activated by pulling a string in the side of the ball.

T-2 AUD-A-BALL

T-2F FOOTBALL

T-2S SOCCERBALL

T-2V VOLLEYBALL

AUD-A-NERF. Spongy play-ball beeps continuously when turned on--switch is activated by pull-string. Always audible during play. Seven inches in diameter.

T-2N

T-2NF AUD-A-NERF FOOTBALL

T-2NS AUD-A-NERF SOCCERBALL

American Foundation for the Blind

MAHLER'S STANDARD BOWLING RAIL. Serves as a bannister guide for blind bowler.

GS 81 \$46.00

AUDIBLE BASKETBALL. Official size and weight with bell inside.

GS 200 \$11.50

GOAL BALLS. Bell inside ball.

GB 38 \$62.50 (men's)

GB638 \$50.00 (women's)

VOIT SMALL AUDIBLE BALL. Bell inside ball.

GS 445 \$1.60

GS 100 \$5.00 (large ball)

MISCELLANEOUS

American Foundation for the Blind

FRANZ ELECTRIC METRONOME. Scale adapted for tactual reading.

MUM 173 \$38.00

NU-SUEDE FASHION CRAFT SET. Includes materials for suede-finish wallet, billfold, pen and pencil holder and key case.

GC 405 \$6.25

TECHNOLOGY FOR RECREATION

SPORTS

SPORTS

"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 1970'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. For example, people who are paraplegic can ski using a specially designed sled and shortened ski poles; a blind person can run by keeping in physical contact with another runner; and those persons who are quadriplegic can enjoy camping or canoeing with the aid of properly trained attendants.

The key to a successful sports program is to find activities that are of interest to the disabled person and that provide opportunities for the individual to learn the necessary skills and related concepts. If guides or companions are needed, their role should be minimized as much as possible so that there is a joint effort between disabled and nondisabled persons. For example, both blind and sighted persons can enjoy cross-country skiing together when the blind person has learned to use the skis and poles properly and is give accurate trail direction both before and during the run. However, an activity should not be adapted to the extent that it loses its identity.

In addition to participating in sports and recreational activities with family members or friends, the disabled person may want to join a local club. However, real integration into

such a group usually means more than just going to meetings. Demonstrations of a willingness to engage in related activities would help convince other club members of the disabled person's sincerity in participating in outings. For example, a disabled individual can volunteer to arrange for one of the meals, serve as the coordinator of the trip, or offer to arrange for transportation and make necessary reservations for motels and camp sites. Clubs need leadership and workers, and if a disabled person can bring such skills to a group, other members would be more willing to provide the moderate amount of assistance or accommodation needed by the disabled person to participate in the activity."

Sports for Disabled Individuals
Rehab Brief, Vol IV. No. 3
Jan. 26, 1981

Sports and Recreation Information Sources

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

OUTDOOR RECREATION TECHNICAL ASSISTANCE
CLEARINGHOUSE
Heritage Conservation and Recreation
Service
Department of the Interior
Washington, D.C. 20240
202/343-7962

THERAPEUTIC RECREATION INFORMATION
CENTER (TRIC)
School and Business and Public Administration
Department of Recreation and Park Administration
California State University, Sacramento
Sacramento, CA 95819
916/454-6752

To find out what national organizations or what programs are available in your area, write to the National Handicap Sports and Recreation Association, Capitol Hill Station, P.O. Box 18604, Denver, CO 80218.

WHEELCHAIR SPORTS

"Wheelchair sports were initiated in the mid-1940's among disabled servicemen in Veteran's Administration (VA) hospitals throughout the United States. These young, healthy and energetic men, with varying types of disabilities, sought to regain the vigorous lives they had enjoyed prior to the onset of their disabilities. They bowled, swam, and played table tennis, catch, pool, volleyball, waterpolo, softball, football, and basketball. This movement grew to include extramural basketball contests among VA hospital teams. Soon the movement had crossed the Atlantic, and on July 29, 1948, Sir Ludwig Guttman directed Europe's first wheelchair sports competition at Stoke-Mandeville Hospital as an outgrowth of the use of sports in his treatment program. In 1952, he invited a group of Dutch ex-servicemen to compete with the British veterans in the First International Stoke-Mandeville Games".

Basketball was the only nationally organized wheelchair sport in the United States until the First National Wheelchair Games were initiated in 1957. These games (for both male and female) include such events as shotput, javelin, discus, and such swimming events as breaststroke, butterfly, individual medley, and team medley relay. Also, track events are offered, such as 40-, 60-, and 100-yard dashes, 220, 440, 880, and mile relays. Weight lifting is another one of the many events held at the Games.

Rehab Brief, Jan. 26, 1981

Q. How important is the wheelchair to the disabled athlete?

A. "The same question may be asked, how important are skates to a hockey player, shoes to the runner, or horse to a jockey? The wheelchair merely constitutes a means for getting around in the same way as comparable methods are irrevocably installed in the rules peculiar to each sport or activity. The question in wheelchair sports is often raised, "Is it the athlete that makes the chair, or the chair that makes the athlete?" The answer may have been summed up by Sir Ludwig Guttman when he once stated, "It is no exaggeration to say that the paraplegic and his chair have become one, in the same way as a first class horseman and his mount". The truth is that, for the disabled person, the wheelchair represents the only authentic means for participating in a realistic way in university accepted sports".

"Everything You Always Wanted To Know About Wheelchair Sports
But Did Not Know Who To Ask"

Frank Burns
Master's Thesis
University of Kentucky
1978

NOTES

SPORTS WHEELCHAIRS AND RECREATIONAL TRANSPORT

Reprinted with permission from: Rx Home Care, "Scoring in the Sports Wheelchair Market", William Corcoran, Richard Salzberg, Vol. 4, No. 5, May 1982.

"The following directory is a representative guide to major manufacturers and distributors of sports wheelchairs and other recreational transport for the handicapped. The companies listed are not necessarily limited to the manufacture or distribution of these products exclusively.

Everest & Jennings Sportsman-Used by wheelchair teams, two models are available with a variety of options. Special features include 24 x 1 1/4-in. treaded pneumatic tires, 5-in. or 8-in. casters, antiflutter caster bearings, choice of two 24-in. wheel locations, and detachable back assembly. Standard back heights (11 1/2 in above seat) or 13 1/2-in. and 16 1/2-in. heights are available, as are sloped detachable wraparound arms, optional full-length or desk-length arms, a roller bar under the front foot plates to prevent floor scuffing, a rear antitipping attachment, and front and rear flip-arm locks. The two models weigh 37 and 38 lb., respectively, without front rigging. Two new sports chairs are under development. Everest & Jennings, Inc., 1803 Pontius Avenue, Los Angeles, CA 90025; (213) 879-1131.

Motion Designs, Inc., Quickie-Incorporating a 6061-T6 aluminum alloy frame, this chair is TIG welded, comes with blue or red aircraft paint, and weighs 27 lb. It features sealed precision bearings, polyurethane 5-in. front casters, 1/2-in. caster stem, 17-4 stainless steel releasing rear axle, 8 degree back angle adjustment, 4-in. back height adjustment, 4-in. foot plate adjustment, 10 degree caster stem adjustment, 3 1/4-in. horizontal axle adjustment, 2 1/4-in. double-density foam pad, 8 degree wheel camber spacing, adjustable seat sling, aluminum alloy 24-in. wheels, 22-in. aluminum hard anodized hand rims, and front impact guards. Options include armrests, brakes, spoke protectors, folding back locks, seat pouches, custom back heights, and wet-weather guards. Other features include universal foot plate adjustment and universal backrest height adjustment. The seat moves 2 in vertically in four increments, with 3-in. center-of-gravity adjustment in three positions. Negative or positive wheel camber is available. Front caster plates are adjustable to 10 degrees. Wheels detach by pushing an exterior button on each wheel hub. The backrest folds forward and down. The Quickie's price is quoted at \$1,200 from the factory. Motion Designs, Inc., 1143 Barstow, Clovis, CA 93612; (209) 298-1718.

Production Research Corporation, TR, BB-S, BB-L-Model TR, designed for long distances, is intended for use on sidewalks, bikepaths, etc. It features low seat rail height of approximately 16 in so that the user is close to the hand rims for a long or continuous power stroke. The center of gravity is low. Wheels are 24 in., 26 in., or 700c, with high-pressure

pneumatic tires. Hand rims are 12 in. to 18 in. Foot plates available are high at rear (7 in.) or low (3 1/2 in.) Casters are 8 x 1 1/4 in., with pneumatic tires. Forks have steering levers. Seat rail height is 18 in. in front, 16 in. in rear.

Model BB-S, equipped for basketball, also can be used for tennis, table tennis, slalom, field events, and other sports. This chair has a tall 21-in. seat rail height. Wheels are 24 in., with protectors. Hand rims are 21 3/4 x 3/4-in. stainless steel. Casters are polyurethane; 5-in. or 8-in. sizes can be ordered. Newly designed forks are 5-in. stainless steel with antiflutter bearings and O-rings. A roll bar/floor protector is included with an antitipping caster assembly.

Model BB-L is identical to BB-S except that the seat rail height is lower (19-in. front, 18-in. rear).

All three chairs are available in frame widths from 15-in. to 19-in. and in seat back heights from 5-in. to 16-in. Real wheel chamber is built-in. All use a high-strength stainless steel frame and have quick-release clamps, removable foot plate, and removable back tubes so that the chair breaks down to extremely small components. Torison-bar design assists in keeping all wheels in contact with uneven surfaces. Forward caster positions enhance maneuverability and stability. Rear axle positions are cambered caster housings, resulting in easier pushing and rapid pivoting. Position adapters are available for additional rear axle settings. Bearings are all sealed and precision ground. Prices are quoted at \$1,000 to \$1,300. Production Research Corporation, 10217 Southard Drive, Beltsville, MD 20705; (301) 937-9633.

Quadra Wheelchairs, Inc. - A variety of sports chairs include the Quadra Chair, Quadra Fold, four versions of the Quadra Racer, and the Quadra Snow, plus options. Chair weights range from 18 lb. to 24 lb. Features include axle plates with 16 different wheel positions, quick-release rear axles, and a universal front fork accommodating either a 4-in. polyurethane tire or an 8-in. pneumatic tire. Back heights are adjustable from 7-in. to 11-in., 11-in. to 15-in., or 15-in. to 19-in. Seat cushion inserts range from 2-in. to 4-in. All chairs are corrosion-free and come in ten colors. Custom features include padded and removable armrests, handles, brakes, front and rear antitipping devices, and spoke protectors. A wide variety of choices for wheels, rims, spokes and nipples, hubs, axle plates, forks and components, bearings, upholstery and associated equipment, foot plates and platforms, push handles, brakes, armrests, antitipping devices, reinforcements, steering handles, frame components, protectors and guards, and tires, tubes, and casters make it possible to adapt the basic Quadra Chair to many sports uses. The same is true of the Quadra Fold, which has a special basketball reinforcement bar.

Quadra Racer models come in four types: the Road Racer, a heavy-duty marathon chair, 24-lb. to 27-lb.; the Spring, for marathon/track, 21-lb. to 24-lb.; the Silver Streak; for track, 17-lb. to 20-lb.; and the TI, made of all titanium, for marathon/track, 14-lb. to 17-lb.

The Quadra Snow is intended for but does not include skis.

All racers come with 27 x 1-in. wheels, 12-in. to 17-in. friction-coated rims, and low-profile clinch tires as standard features. Prices are quoted at \$1,055 and up. Quadra Wheelchairs, Inc., 31115 Via Colinas, Westlake Village, CA 91362; (213) 991-6302.

Stainless Medical Products, Inc. - Among the most experienced makers of sports chairs, this company introduced two new models in 1981: the Stainless Racer and the Stainless Basketball Chair, the later a single-purpose chair. The Racer's stainless steel frame weighs 9 lb. Assembled with wheels and casters, the chair weighs approximately 24 lb.; disassembled, it fits into a suitcase. Six quick-release bolts enable quick assembly. These plus 14 axle positions, lightweight upholstery made of waterproof, nontearing, extra-durable material, and precision bearings throughout are standard. Camber angle is adjusted by varying the distance of wheels from the frame. A 4-in. extension to the footrest and a wheelbase adjustable from 16-in. to 24-in. also are standard. Seat widths are obtainable from 11-in. to 18-in., with back heights of 9-in. and 12-in. Wheels are offered in a choice of 24-in. or 700c. Standard hand rim size is 15-in., and the rim is plastic-coated. Standard seat depth is 16-in. Pneumatic casters (8 x 1 1/4-in.) are standard with steering rods. The Basketball Chair, which weighs 18 lb. minus wheels, has 14 axle positions, back heights of 6-in. to 12-in., quick-release axles, spoke protectors, antitipping devices, and a floor protector.

A variety of options are available for both chairs, including four different types of special cushion foam formulations in several colors. Nonslip cushions and sheepskin cushions are also available. Prices are quoted at \$799 complete for the Racer and \$995 for the Basketball Chair. Stainless Medical Products, 9389 Dowdy Drive, San Diego, CA 92126; (714) 578-6920. Janssen, a major "handcycle" manufacturer, offers seven models, including children's chairs. The most deluxe is the Gran Sport, designed for long-distance comfort but with the quick response needed for competition. It weighs 44 lb. and features a breakaway center tube connection for transport. It has a five-speed derailleur and side-pull rim brakes with 1 1/4-in. tires and thornproof inner tubes. Safety equipment includes belts and leg straps. Other features allow the cycle to be mounted easily from a wheelchair. Janssen USA, 2885 S. Santa Fe Drive, Englewood, CO 80110; (303) 781-8589.

Para-Bike - A new idea in paraplegic cycles, the Para-Bike has a hand-cranked chain wheel instead of handlebars and a chain arrangement which combines steering and propulsion. The pedaling axis is not aligned with the steering axis, increasing steering control. Backpedaling activates the rear-wheel caliper brakes. The seat is very low-slung, enabling the use of skateboarding or motorcycle gloves for push-off and stopping. Training wheels of polyurethane are available; they limit operation somewhat and can be removed as desired. The seat is a plastic net with a downhill ski/sled cushion atop a web. The cushion is designed to help prevent decubitus ulcer formation. The device weighs 42 lb. and is constructed from high-strength chromium-molybdenum tubing. The rear wheel is a quick-release 27-in. high-pressure unit, and the 24-in. front wheel is lightweight. The bike is approximately 20 in. wide, so it is not a problem in doorways. Doug Schwandt, Mail Stop 153, VA Medical Center, 3801 Miranda Avenue, Palo Alto, CA 94304.

Ratcliffe & Co. Sidewinder - An off-road motorized six-wheeler, the "freedom machine" negotiates mud, gravel, snow, and rough terrain and is easily entered from a wheelchair. It is being considered by the Swedish government as its official off-road vehicle for the handicapped. Features include custom hand controls, open roll cage, bucket seats with harnesses and belts, removable panels, breakaway steering sticks, special lighting, and single-control steering with hydraulic assist. It can be winterized with the addition of a top and heater. Forty-seven available accessories and options include snowplow, snow blower, trailer hitches, winches, and lifts. Dual controls are available. Ratcliffe & Co., 31233 Highway 40, Evergreen, CO 80439; (303) 674-8790.

Trike - This three-wheeler is steered, propelled, and stopped by arm use. It can be mounted easily from crutches or a wheelchair. Seat height is adjustable over a 6-in. range. Width is under 27-in., allowing passage through most doorways. Wheelbase is 50-in. and overall length 74-in. The Trike has a 24-in. track. Steering is neutral. Daniel Gould Cycles, 723 Jackson Street, Missoula, MT 59801; (406) 721-2427. "

---Richard Salzberg

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

Arroya: a downhill skiing system specially designed for persons with physical disabilities. Arroya User/Instructor Manual available from: Peter W. Axelson, Rehabilitative Engineering Research & Development/153, 3801 Miranda Avenue, Palo Alto, CA 94304, (415) 493-5000 x4473.

Colorado Outdoor Education Center, P.O. Box 697, Breckenridge, CO 80424; (303) 453-6422.

Kick the Handicap, Learn to Ski: A Handbook of Information for the Physically Handicapped. Stieler, William E. Marlette, Michigan. Adapted Sports Association, 1977, 123 pp.

National Amputee Ski Technique. National Amputee Skiers Association. Carmichael, CA 1970, 91 pp.

Pulk Skiing: Sled skiing and ice sledding for persons with mobility impairments. 1981. Larry Orr, Vinland National Center, P.O. Box 308, Loretto, Minnesota 55357.

The Winter Park Amputee Ski Teaching System, O'Leary, H.
Available from: Winter Park Ski School, Winter Park, CO 80482

Winter Park Handicap Program
P.O. Box 313
Winter Park, CO 80482
(303) 726-5514, x179

Training programs and events related to pulk skiing, sled skiing,
ice sledding and dog sledding:

Vinland National Center
3675 Ihduhapi Road
P.O. Box 308
Loretto, MN 55357
(612) 479-3555 Voice or TTY
(alpine and cross country skiing)

Ski for Light - HEALTHsports, Inc.
1455 W. Lake Street
Minneapolis, MN 55408
(612) 827-3611
(Annual February week-long X-C
Ski event with blind/sighted/mobility impaired
also regional events)

Colorado Outdoor Education Center
For the Handicapped, Inc.
P.O. Box 697
Breckenridge, CO 80424
(303) 543-6422
(Alpine skiing)

Lynx Track - Will Steger
Box 785
Ely, MN 55731
(Interdisciplinary programs in dog-sledding and winter travel)

Courage Alpine Skiers
c/o Courage Center - Duluth
Duluth, MN 55802
(218) 727-6817
(Alpine skiing)

Ed Lucks
P.O. Box 5429
Snowmass Village, CO 81675
(303) 923-3294
(Alpine)

Skiing - Programs with Arroyas

Alpine Alternatives
1634 W. 13th
Anchorage, Alaska 99501
(907) 276-7526
Marty Decker/Director

Rick Amber
6222 Royal Lane
Dallas, TX 75230
(214) 361-0031

Personal Use

Colorado Outdoor Education Center
P.O. Box 697
Breckenridge, Colorado 80424
(303) 453-6422
Bruce Werber/Director

Breckenridge Ski Area
Breckenridge, CO

Courage Center Services
2400 Minnesota Avenue
Duluth, Minn 55802
(218) 727-6874
Mary Schmitz/contact

Pat Collister
Powderhorn Ski Corporation
1119 N. 1st Street
Grand Junction, CO 81501
(303) 242-5637

Easter Seals School And Treatment
3575 Donald
Eugene, Oregon 97405
(503) 344-2247
John Smith/Director

Hoo-doo Mountain

Marilyn Hamilton
10535 S. Englehart
Reedley, CA 93654
(209) 638-1629

Personal Use
China Peak
John Crofut/Director
(201) 896-3318

Horizons for the Handicapped
P.O. Box 2143
Steamboat Springs, CO 80477
(303) 879-4466

Werner Mountain
Steamboat Springs, CO

Karsten Inde
Maraton Produkter
Ekbacka 19700BRO
SWEDEN 0758140522
Postgro 878391-2
Barkgiro 289-8500

Stockholm, SWEDEN

Winter Park Recreational Assoc.
Box 36
Winter Park, CO 84082
(303) 726-5514, ext. 179
(Alpine)

Chris Colb, Executive Director
Ski for All Foundation
521 Wall Street, Suite 326A
(Snoqualmie Ski Summit)
Seattle, WA 98121
(206) 623-2714
(Alpine)

Larry Young
NHYSRA Lake Tahoe Chapter
Box 1636
Truckee, CA 95734
(Incline Village, Lake Tahoe)
(916) 587-3911
(Alpine)

Laura Canfield
Horizons for the Handicapped
P.O. Box 2143
(Werner Mountain)
Steamboat Springs, CO 80477
(303) 879-4466
(Alpine)

Peter Mandler
2273 Aubur Lane, Apt. 6
Salt Lake City, UT 84117
(Snowbird)
(801) 272-7420
(Alpine)

Mike Young
P.O. Box 5603
Tahoe City, CA 95730
(916) 448-6987 (evenings)
(Alpine)

Wilderness Inquiry II
111 E. Franklin Avenue, Suite 200
Minneapolis, MN 55404
(612) 871-7861
(612) 374-4468
(Summer and winter travel programs)

Rick Isom
1170 E. 5th Street
Delta, CO 91416
(303) 874-9957

Personal Use

Linda Kennedy
P.O. Box 11464
Aspen, CO 81612
(303) 925-7886/925-3414

Ajax
Aspen, CO

Ed Luchs, Director
P.O. Box 5429
Aspen, CO
(303) 923-3294

Snowmass Ski Resort
Snowmass Village, CO

Peter Mandler/Director
2274 Arbur Lane
Salt Lake City, UT 84117
(801) 272-7420

Snowbird
Salt Lake City, UT

Stephen J. Mead
Pat Spencer
Recreation Department
749 Veterans Memorial Drive
(702) 334-5686

Vic Mettler
16441 N. Locust Tree
Lodi, CA 95240
(209) 334-5686

Mt. Reba
Bear Valley, CA
(209) 753-2301

Gary McDaniel
4325 W. Emerson
Seattle, Washington 98199
(206) 283-9059

Personal Use

New Zealand Assoc. for
Disabled Skiers
P.O. Box 2417
Christchurch, New Zealand
Gillian Hall/Director

New Zealand

ReRAND Center/153
V.A. Medical Center
3801 Miranda Avenue
Palo Alto, CA 94304
(415) 493-5000 ext. 4473

Exhibit, demo, clinic

Saint Josephs Hospital
400 Walter, N.E.
Albuquerque, New Mexico 87102
(505) 848-8169

Sandia Ski Area

Services to the Blind
Rehabilitation
1050 Natley Lane
Reno, Nevada 89502

Incline Village
Incline Village, Nevada

Ski For All Foundation
10040 Aurora Avenue
Seattle, Washington 98133
(206) 232-8210
Chris Colb/Director

Snoqualmie Summit Ski Area

Tahoe Handicapped Ski School
P.O. Box 2633
Olympic Valley, CA 95730
(916) 583-7584
Katherine Hayes/Director

Vinland National Center
3675 Induhapi Road
Loretto, Minnesota 55357
(612) 479-3555
Larry Orr/Director

Bill Warner
228 Winchester Street
Cambridge, Mass. 02139
(617) 494-0262

Personal Use

Winter Park Recreational Assoc.
P.O. Box 36
Winter Park, CO 80482
(303) 726-5514 ext. 179
Hal O'Leary/Director

Winter Park Ski Area
Winter Park, CO

Mike Young
P.O. Box 5603
Tahoe City, CA 95730
(916) 583-2184

Squaw Valley
Lake Tahoe, CA

BOATING

Adams, R.C., Daniel, A. & Rullman, L. "Para-Canoeing", Games, Sports and Exercises for the Physically Handicapped. 2ed. Philadelphia: Lea and Febiger. 1975, 207-211.

Advisory Panel on Water Sports for the Disabled, The Sports Council. Water Sports for the Disabled. Uxbridge, England: The Hillingdon Press, n.d.

American Red Cross. Adapted Aquatics: Swimming for Persons with Physical or Mental Impairments. Garden City, New York: Doubleday & Co., Inc., 1977.

American Red Cross. Methods in Adapted Aquatics: A Manual for the Instructor. Washington, D.C.: American Red Cross, 1977.

Camp Confidence, Waterfront Program-Summer, 1973. Brainerd, Minnesota: The Camp (Box 349, 56401).

Chartres, John & Hurndall, Douglass. 'They Said We Couldn't Do It.' Victoria Way, Working, Surrey: GUL2 IEQ Engl RYA Seamanship Foundation, 1981.

Cruse, Nany. "Wheelchair Boating". Sports 'n Spokes, November-December 1975, 1 (4), 11-14.
describes various types of boats suitable for people in wheelchairs.

Duryea, Diane. "Another Kind of Handicap". Yachting. October 1976, 86-87.

Guidry, Matthew. "The Challenge-Expanding Horizons of Aquatic Programs for the Handicapped," Presentation at Project Aquatics Workshop; Seattle, Washington and Columbia, Missouri, November, 1975.

Handicapped Boaters Association. 'Boating World, Unlimited' New York, New York: Handicapped Boaters Association, January - February 1981, Vol. 1, No. 1.

Hawkes, Bob. "Sailing: If One Paraplegic Sails - Others Surely Can Too!" Sports 'n Spokes, November - December, 1977, 3 (4), 8-9.

Hayes, Harold. "Sailing Blind." The New Beacon, December, 1970. London: Royal National Institute for the Blind.

Hedley, Eugene, Ph.D. Boating for the Handicapped: Guideline for the Physically Disabled. Albertson, New York: Human Resources Center, 1978.

Hogan, Carol. "She Took Her Wheels to Sea". Sail, Boston, Mass.: United Marine Publishing, Inc., December 1977, 88-90.

Human Resources Center. National Recreational Boating for the Physically Handicapped: Strategy Paper and Annotated Bibliography. Albertson, N.Y.: Human Resources Center, 1978.

Jacobs, Syd. Information on whitewater kayaking for the handicapped, 209 Columbus, Port Angeles, WA 98362, 206/452-4253.

Lynch, Wallace J. "Canoeing for Recreation and Rehabilitation". Parks and Recreation, 1972, 7 (7); 20-21, 46.

Marshall, Tim. 'Solo Sail Racing: The Challenger - a Tri-maran that's fast, safe and accessible.' Sports 'n Spokes, March - April 1980 5(6), 5-6.

Mielzarek, Lee Anna & Mielzarek, Rolf H. "Reaching Out + Reasonable Risk = Growth Adventure". Challenge, November 1975, 11 (1); 1, 3.

Miller, Oral O. Four Years at the Oars. Washington, D.C.: The Author (3701 Connecticut Avenue, N.W.), n.d.

National Easter Seal Society for Crippled Children and Adults: Year-Round Recreation Programs for the Handicapped. Chicago, IL: National Easter Seal Society, 1973.

Park, David C. "Recreation". The White House Conference On Handicapped Individuals, Vol. I: Awareness Papers. Washington, D.C.: May 1977, 119-131.

Reed, Joan. 'Sightless Sailing...a Reality in Seattle'. Nor' Westing, December 1977, 13(2), 7-13.

Water Safety and Boating Program for the Disabled
Office of Parks and Recreation
Sailboat House
1520 Lakeside Drive
Oakland, CA 94612

FITNESS

Adams, Ronald; Alfred Daniel and Lee Rullman. Games, Sports, and Exercises for the Physically Handicapped. 2 ed. Philadelphia. Lea and Febiger 1975

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 Resources Development Press, 1976.

Iron Athlete Training Center
Mark Lescoe, Manager
1940 E. University Avenue

Tempe, AZ 85281

Write for information about a personalized weight lifting program.

Milligan, G. Timothy. Fitness is Free, But You Have To Work For It. A physical fitness program for spinal cord injured persons. June 1979. Arkansas Rehabilitation Research and Training Center. University of Arkansas, Little Rock.

Milligan, Tim. Physical Fitness Training for Rehabilitation Clients. University of Arkansas, Little Rock, 1975.

Pollock, Dr. Michael L. "Arm Pedaling as an Endurance Training Regime for the Disabled." Archives of Physical Medicine and Rehabilitation, Volume 55. #9, September 1974, pp. 418-424.

FLYING

Wheelchair Pilots Assoc.
11018 102nd Avenue, N.
Largo, FL 33540
(813) 393-3131

Bill Blackwood
1117 Rising Hill Way
Escondido, CA 92025

Paraplegic flight instructor
Information on planes, instruction,
hand controls, cockpit accessible
wheelchairs

Ed Stadleman
P.O. Box 207
Sturgis, Kentucky 42459
AIRCRAFT HAND CONTROLS

Union Aviation Inc.
Sturgis Airport - G
Sturgis, Kentucky 42459
In residence pilot training for
disabled people

portable aircraft hand controls

American Wheelchair Pilots Association
Attn: Dave Graham
P.O. Box 1181
Mesa, AZ 85201
(602) 831-4262

California Wheelchair Aviators
Attn: Bill Blackwood
1117 Rising Hill Way
Escondido, CA 92025
(714) 746-5018

Soaring Society of America, Inc.
Box 66071
Los Angeles, CA 90066
(213) 390-4448

FOOTBALL

University of Illinois
Rehabilitation-Education Center
1207 So. Oak
Champaign, IL 61820
(217) 333-4600.

The Silver Wheels Wheelchair Football, Inc.
President Patrick Rowe
109 Florence Avenue
Buffalo, NY 14214
(716) 835-1549

The Third Wheelchair Football Blister Bowl
Andy Fleming
P.O. Drawer P-P
Santa Barbara, CA 93102
(805) 962-1474

WHEELCHAIR SQUARE DANCING

Barb Cramer, 525 Meadowlark Drive, Lakewood, Colorado 80226,
(303) 232-8942.

Dance for Physically Disabled Persons: A Manual For Teaching Ballroom, Square, and Folk Dances to Users of Wheelchairs and Crutches. Kathleen Hill. American Alliance for Health, Physical Education and Recreation, Washington, D.C. 128 pp., price \$7.95

Supervisor of Recreation and Athletics
University of Illinois
136 Rehabilitation Education Center
Oak Street at Stadium Drive
Champaign, IL 61820 217/333-4606

Wheelchair Square Dancing. Delta Sigma Omicron. Champaign, IL: Rehabilitation Center/University of Illinois Publications, 1963, 17 pp.

PLAYGROUNDS

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

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 pp.

Play and Play Equipment for Handicapped Children
Center on Environment for the Handicapped

24 Nutford Place
London W1H 6AN, ENGLAND

This booklet describes how to make playground equipment from tires, and activities for handicapped children who use it.

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, 245 pp.

These three booklets pertain to 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.

ADAPTED EQUIPMENT

Publications

Adapted Equipment for Physical Activities. American Alliance for Health, Physical Education and Recreation. Washington, D.C., Practical Pointers, Vol. 1, No. 5, 1977, 6 pp.

An Adaptive Surfing Apparatus (master's project). Bond, Gregory. Long Beach, CA: California State University, January 1975. Article, An Adaptive Surfing Device. Journal of Physical Education and Recreation, September 1975, 46(7), 57-58.

Games, Sports and Exercises for the Physically Handicapped, second edition. Ronald Adams, Alfred David and Lee Rullman. Lea & Febiger, Philadelphia. 1975. 308 pp. \$14.50.

Handbook of Adapted Physical Education Equipment and Its Use. Soshe, Michael. Springfield, IL: Charles C. Thomas, 1972, 210 pp.

Source Book for the Disabled. Hall, Gloria. Paddington Press, New York, 1979. 288 pp. Chapter on Leisure and Recreation

Teacher-Made Adapted Devices for Archery, Badminton, and Table Tennis. Cowart, Jim. American Alliance for Health, Physical Education and Recreation, Washington, D.C., Practical Pointers, Vol. 1, No. 13, 1978, 16 pp.

Manufacturers

American Foundation for the Blind
15 W. 16th Street
New York, NY 10011

AFW Co. of North America
Bank of New York Building
Olean, NY 14760

Aristera Organization
9 Rice's Lane
Westport, CT 06880

Bandwagon, Inc.
54 Industrial Way
Wilmington, MA 01887

Beneficial Designs, Inc.
5858 Empire Grade
Santa Cruz, CA 95060

Bill Blackwood
1117 Rising Hill
Escondido, CA 92025

Cleo Living Aids
3957 Mayfield Road
Cleveland, OH 44121

Coastline Controls Corporation
414 E. Inman Avenue
P.O. Box A
Rahway, NJ 07065

Roy Dodgen
Roy Dodgen Shop
Blue Eye, MO 65611

Dumark Manufacturing Co.
P.O. Box 268
543 Timothy Street
Newmarket, Ontario
(Archery Equipment)

Fashionable
Rocky Hill, NJ 08553

Flaghouse
18 W. 8th Street
New York, NY 10011

Hein-a-Ken Corporation
P.O. Box 56
Thief River Falls, MN 56701

Art Javes Designs
4914 17th Avenue
Gulfport, FL 33707
The "Row Cat" and the adapted seat.

Jayfro
P.O. Box 400
Waterford, CT 06385

Lee s Roll-a-Ball
(Easter Seal Society)
525 1st N.E.
Mason City, IA 50401

Lo-Rich Enterprises Inc.
Corner 1st Street & Central Avenue
Suite 112
Miamisburg, OH 45342

Maddak, Inc.
6 Industrial Road
Pequannock, NJ 07440

G.E. Miller, Inc.
484 South Broadway
Yonkers, NY 10705

Miya Epoch U.S.A., Inc.
P.O. Box 5191
1635 Crenshaw Blvd.
Torrance, CA 90503

Mountainsmith Inc.
12790 W. 6th Place
Golden, CO 80401
(303) 238-5823
(Skiing equipment)

Muir Ski Machines
11287 Weber Street
Sunnymead, CA 92388

Nelson Medical Products
5690 Sarah Avenue
Sarasota, FL 33583-9510

North American Recreation Equipment
P.O. Box 758
Bridgeport, CT 07701

Paul's Sports, Inc.
Route 1, Box 615P
Excelsior, MN 55331
(Flipski Outriggers)

Precision Grinding & Manufacturing Co.
80019 Flood Road
Baltimore, MD 21222

PSI
125 Columbia Court
Chaska, MN 55318
(outrigger skis)

J.A. Preston Corporation
60 Page Road
Clifton, NJ 07012

Recreation Unlimited
330 Woodend Road
Stratford, CT 06497
(203) 384-0802
(Bowling Aids)

Fred Sammons, Inc.
Box 32
Brookfield, IL 60513

Science for the Blind
Box 385
Wayne, PA 19087

Snitz Manufacturing Co.
2096 S. Church Street
East Troy, WI 53120

George Snyder
5809 N.E. 21st Avenue
Ft. Lauderdale, FL 33308
(Bowling Aids)

Ed Stadleman
P.O. Box 207
Sturgis, Kentucky 42459
(Aircraft Hand Controls)

Techni-Flair Corporation
Box 40
Cotter, AR 72626

Things From Bell, Inc.
4 Lincoln Avenue
P.O. Box 706
Cortland, NY 13045

Union Aviation Inc.
Sturgis Airport - G
Sturgis, Kentucky 42459
(portable aircraft hand controls)

Vargas Fishing and Rodholder
5453 Norwalk Boulevard
Whittier, CA 90601

Wilson Wheel & Tire Co.
20969 Ventura Blvd., Suite 9
Woodland Hills, CA 91364

SPORTS AND RECREATION ASSOCIATIONS & ORGANIZATIONS

ADAPTED SPORTS ASSOC., INC.
Communications Center
6832 Marlette Road
Marlette, Michigan 48453

ADAPTIVE RECREATION PROGRAM
Andy Fleming, Coordinator
City of San Barbara
620 Laguna Street
Santa Barbara, CA 93102
(scuba diving for paraplegics)

ADAPTIVE SPORTS PROGRAM
Kinesiotherapy Clinic
University of Toledo
2801 West Bancroft Street
Toledo, Ohio 43606

ALBERTA AMPUTEE SKI ASSOC.
Box 1373
Banff, Alberta
Calada TOL OCO

ALL SEASONS RIDING ACADEMY
Therapeutic Riding Program
43510 Osgood Road
Fremont, CA 94538
(415) 651-7390

AMERICAN ASSOC. FOR HEALTH,
PHYSICAL EDUCATION AND RECREATION
PROGRAMS FOR THE HANDICAPPED
1201 16th Street, N.W.
Washington, D.C. 20036]

AMERICAN ATHLETIC ASSOCIATION OF
THE DEAF
3916 Lantern Drive
Silver Spring, MD 20902
301/942-4042

AMERICAN BLIND BOWLING ASSOC.
150 N. Bellaire Avenue
Louisville, KY 40206
502/896-8039

AMERICAN CAMPING ASSOC.
Bradford Woods
Martinsville, IN 46151
317/342-8456

AMERICAN WHEELCHAIR BOWLING ASSOC.
2424 N. Federal Highway, #109
Boynton Beach, FL 33435

AMERICAN WHEELCHAIR BOWLING ASSOC.
2635 N.E. 19th Street
Pompano Beach, Florida 33540

AMERICAN WHEELCHAIR BOWLING ASSOC.
Robert Moran, Executive Secretary
6718 Pinehurst Drive
Evansville, IN 47711

AMERICAN WHEELCHAIR PILOTS ASSOC.
Dave Graham
P.O. Box 1181
Mesa, AZ 85201
(602) 831-4262

AMERICAN WHEELCHAIR PILOTS ASSOC.
Jerry Babcock
3001 Black Canyon Hwy, Apt. 83-A
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THE AMPUTEE GOLFERS ASSOC.
Lakeview Terrace
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AMPUTEES IN MOTION (AIM)
Pam Stahl, President, San Diego
1539 W. 11th Avenue
Escondido, CA 92025
(714) 747-6054
Jerry Bahlquist, Coordinator
(714) 729-9403
(Local chapters in San Diego & L.A.)
Social & sports get-togethers;
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AMPUTEE SPORTS ASSOC.
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BERKELEY OUTREACH RECREATION PROGRAM
605 Eshleman Hall
University of California
Berkeley, CA 94720

BLIND OUTDOOR LEISURE DEVELOPMENT
(BOLD)
533 E. Main Street
Aspen, CO 81611
303/925-8922

CALIFORNIA WHEELCHAIR ATHLETIC ASSOC.
P.O. Box 26483
San Jose, CA 95159-6483

CALIFORNIA WHEELCHAIR AVIATORS
Fritz Krauth, President
12570 Brookhurst, Suite #5
Garden Grove, CA 92640

CANADIAN ASSOC. FOR DISABLED SKIING
(Local chapters in Ontario, B.C.,
& Alberta)
Box 2077
Banff, Alberta
Canada T01 0C0

CANADIAN WHEELCHAIR SPORTS ASSOC.
333 River Road
Ottawa, Ontario
Canada K1L 8B9

COLLEGE OF MARIN
Adaptive Physical Education
Sir Francis Drake Highway
Kentfield, CA 94904
Laurie Lanham, R.P.T.
(415) 485-9654
Disabled Student's Office
(415) 485-9406

COLORADO OUTDOOR EDUCATION CENTER
FOR THE HANDICAPPED
P.O. Box 697
Breckenridge, CO 80424

COMMITTEE FOR THE PROMOTION OF
CAMPING FOR THE HANDICAPPED
2056 South Bluff Road
Traverse City, MI 49684

COURAGE CAMPING PROGRAMS
Courage Center, Camping Dept.
3915 Golden Valley Road
Golden Valley, MN 55422

DE ANZA JUNIOR COLLEGE
Adaptive Rehabilitation
Physical Education
21250 Stevens Creek Blvd.
Cupertino, CA 95014
(408) 996-4873

DISABLED SKIERS ASSOC. OF
BRITISH COLUMBIA
Box 3433
Main Post Office
Vancouver, B.C.
Canada V6B 3Y4

DISABLED SPORTSMEN OF AMERICA, INC.
P.O. Box 26
Vinton, Virginia 24179

ENVIRONMENTAL TRAVELING COMPANIONS
Fort Mason, Building C
Room 3 B
San Francisco, CA 94123

HANDICAPPED BOATERS ASSOC.
P.O. Box 1134
Ansonia Station, NY 10023
(212) 877-0310

HANDICAPPED UNBOUND, INC.
P.O. 1044
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(602) 445-5076

HEALTHsports, INC.
Leslee Lane
1455 W. Lake Street
Minneapolis, MN 55408
(612) 827-3611

INDOOR SPORTS CLUB
1145 Highland Street
Napoleon, OH 43545
419/592-5756

INDOOR SPORTS, INC.
3445 Trumbull
San Diego, CA 92106

INTERNATIONAL COMMITTEE OF THE
SILENT SPORTS
Gallaudet College
Florida Avenue and 7th St., N.E.
Washington, D.C. 20002
202/447-0343 (TTY)
202/447-0841 (Voice)

INTERNATIONAL COUNCIL ON
THERAPEUTIC ICE SKATING
P.O. Box 13
State College, PA 16801

INTERNATIONAL FOUNDATION FOR
WHEELCHAIR TENNIS
Peter Burwash, International
1909 Ala Wai Blvd., Suite 1507
Honolulu, HI 96815
(808) 946-1236

INTERNATIONAL SOCIETY FOR REHAB
OF THE DISABLED (Rehabilitation
International)
219 E. 44th Street
New York, NY 10017

INTERNATIONAL SPORTS ORGANIZATION
FOR THE DISABLED AND INTERNATIONAL
STOKE MANDEVILLE GAMES FEDERATION
Stoke-Mandeville Spinal Injury Center
Aylesbury, England

INTERNATIONAL WHEELCHAIR ROAD RACERS CLUB
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202/554-9067

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(Los Angeles Hospital Visitation Program)

NATIONAL AMPUTATION FOUNDATION
Whitestone, NY 11357

NATIONAL AMPUTEE GOLF FOUNDATION
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New Haven, CT 06525
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NATIONAL ASSOC. OF SPORTS
FOR CEREBRAL PALSY
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66 E. 34th Street
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NATIONAL BEEP BASEBALL ASSOC.
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NATIONAL INCONVENIENCED SPORTSMAN'S
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NATIONAL PARK GUIDE FOR THE
HANDICAPPED
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

NORTH AMERICAN RIDING FOR THE HANDICAPPED
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NORTH AMERICAN RIDING FOR THE HANDICAPPED
ASSOC. (NARHA)

Whitepost, VA 22663

ORANGE COUNTY RIDING CENTER, INC.

Therapeutic Riding Program
Stables: Lake Forest Riding Club
25201 Trabuco Road
El Toro, CA

Office: 23011 Moulton Parkway, Ste C-6
Laguna Hills, CA 92653

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OUTDOOR EXPERIMENTAL EDUCATION FOR THE
HEARING IMPAIRED

National Technical Institute for the Deaf
Rochester Institute of Technology
1 Lomb Memorial Drive
Rochester, NY 14623

OUTDOOR WILDERNESS PROGRAM

Crotched Mountain Center
Greenfield, NH 03047

PARALYZED VETERANS OF AMERICA

National Office
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Bethesda, MD 20814
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PROSTHETICS RESEARCH STUDY

1102 Columbia St., Room 409
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RECREATION CENTER FOR THE HANDICAPPED

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TORONTO BULLDOGS WHEELCHAIR SPORTS CLUB

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SPORTS 'N SPOKES

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UNITED STATES DEAF SKIERS
ASSOCIATION

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UNITED STATES GYMNASTICS FEDERATION

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UNITED STATES SKI ASSOCIATION

Central Division
Amputee Skiers Committee
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WINTER PARK HANDICAP SKI PROGRAM
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SELECTED PUBLICATIONS: SPORTS AND RECREATION

Access to Recreation. Architectural and Transportation Barriers Compliance Board. Washington, D.C., 1977, 70 pp.

Annotated Listings of Films: Physical Education and Recreation for Impaired, Disabled, and Handicapped Persons. AAHPER, 3rd edition, 128 pp., ann. bibl. (314), price: \$7.95

Bibliography on Recreation, Play and Sports. Rehabilitation International. Postfach, Federal Republic of Germany, 1975, NA.

Competitive Athletic Programs for Impaired, Disabled and Handicapped Persons. American Alliance for Health, Physical Education and Recreation. Washington, D.C., 1973, 18 pp.

"Competitive and Recreational Wheelchair Sports". Paralyzed Veterans of America. Washington, D.C. 1978, 8 pp. (Brochure)

Constitution and Rules, Training Techniques and Records. National Wheelchair Athletic Association. Woodside, NY, 1977, 131 pp.

Crystal Productions Catalog, Box 12317, Aspen, CO 81612, (303) 925-8160. List of sports & rehabilitation films: about amputee, C.P. & blind skiing, spinal cord injuries.

Developmental Games for Physically Handicapped Children. Cratty, Bryant J. Palo Alto, CA: Peek Publications, 1971, 52 pp.

Directory of Recreation & Leisure Services - For the physically handicapped in the Los Angeles area. 132 page directory \$7.95 + tax & mailing. Christianson, Mickey A., 11066 Gonsalves Place, Cerritos, CA 90701, (213) 924-2159. Available from: author

Educational Games for Physically Handicapped Children. Cratty, Bryant J. and Breen, James E. Denver: Love Publishing Company, 1972, 91 pp.

Equipment for the Disabled, Vol. 6, Leisure and Gardens. National Fund for Research into Crippling Disease. Sussex, Great Britain, 3rd edition, 1973.

Games, Sports and Exercises for the Physically Handicapped, 2nd edition. Adams, R.C., Daniel, A. & Rullman, L. Philadelphia: Lea and Febiger, 1975. \$14.50. 308 pp.

The Humanistic and Mental Health Aspects of Sports, Exercises and Recreation. Craig, Timothy T. Chicago, American Medical Association. 1977, 137 pp.

"A Look at Wheelchair Sports and What's Happening in the Northwest". Stotts, Kathleen and Warren, G. Model Systems SCI DIGEST, Spring 82

Outdoor Pursuits for Disabled People, Croucher, Norman. 1981, xii, 180 p. Woodhead-Faulkner Ltd, 8 Market Passage, Cambridge CB2 3PF, England, 4.75 pounds

Outdoor Recreation Planning for the Handicapped. Department of Interior, Bureau of Outdoor Recreation. Fishing and Boating. Washington, D.C.: U.S. Government Printing Office, 1967.

Paraplegia News, 5201 N. 19th Avenue, Suite 111, Phoenix, AZ 85015, (602) 246-9426. Monthly magazine published by Paralyzed Veterans, August 1981, Vol. 35, No. 8: special issue on wheelchair sports "The Sporting Life"

Physical Activities for the Handicapped. Vannier, Mary Helen. Englewood Cliffs, NJ: Prentice Hall, Inc., 1977, 338 pp.

Physical Activities for Individuals with Handicapped Conditions. London: C.V. Mosby, 1974, 108 pp.

Physical Education and Recreation for Handicapped Children: Proceedings of a Study Conference on Research and Demonstration Needs. American Alliance for Health, Physical Education and Recreation. Washington, D.C., 1970, 81 pp.

Playing and Coaching Wheelchair Basketball. Owen, Edward. Champaign, IL: University of Illinois Press, 1979, 400 pp.

"The Psychology of Wheelchair Sports". Labanowicz, Stan, Ph.D., Therapeutic Recreation Journal, Vol. 11, No. 1, pp. 11-17, 1978.

Recreation and Leisure for Handicapped Individuals Resource Guide. U.S. Department of Education, Office of Human Development Services, Office for Handicapped Individuals, DHEW Publication No. (OHDS) 79-22004

Recreation for Physically Handicapped. Pomeroy, Janet. Macmillan Publishing Company, 866 3rd Avenue, New York, NY 10022

Scuba Diving for the Handicapped Project. Beeman, Michael. Veterans Affairs Office T-808. University of California, Irvine, Irvine, CA 92717 (714) 833-6477, June 1978, 21 pp.

Scuba Diving for Physically Handicapped Program. Cesario, James. Institute of Rehabilitative Medicine. 400 E. 39th Street, New York, NY 10016, (212) 679-3200, Ext. 217.

So Get On With It: A Celebration of Wheelchair Sports. Weisman, Marilee and Godfrey, Jan (1976: Doubleday and Co.) Available from: Doubleday and Co., Garden City, NY 11530 (159 pages, cost: \$8.95)

Sports Centers and Swimming Pools. Walter, Felix. Disabled Living Foundation, 346 Kensington High Street, London W14, England, 39 pp., illus., price: 2.00 pounds. This booklet recommends design standards for sports facilities and swimming pools, and ancillary equipment for use by disabled persons.

Sports'n Spokes, 5201 N. 19th Ave., Suite 111, Phoenix, AZ 85015, (602) 246-9426, FTS 8-261-3900. Magazine published bi-monthly on wheelchair competitive sports & recreation

Textbook of Sport for the Disabled. Guttman, Sir Ludwig. Great Britain: Alden Press, 1976, 184 pp.

Therapeutic Recreation and Adapted Physical Education within Rehabilitation. Collingwood, Thomas R. Hot Springs, Ark., Arkansas Rehabilitation Research and Training Cener, 1971, 44 pp.

Wheelchair Bowling. Lane, Jim and Schaaf, Dick (eds.) Available from: Wheelchair Bowlers of Southern California, 6512 Cadiz Circle, Huntington Beach, CA 92647 (Softcover, 96 pages, cost: \$7.95 plus \$1.00 shipping)

INFORMATION RESOURCES

NOTES

INFORMATION RESOURCES

from an Editor's Note by Eugene Murphy, Editor
Bulletin of Prosthetics Research BPR 10-36 Fall 1981

"The importance of prompt access to current, accurate, and reasonably comprehensive information on assistive devices for disabled persons has been stressed repeatedly by both professionals and groups of disabled individuals. Nevertheless there seems to be very little literature in either rehabilitative engineering or information science on the different users, the types of information each category of user needs, or the variety of approaches available or being developed. Objective evaluations are needed of the effectiveness of the different approaches.

Workers in research and development certainly do not want to duplicate efforts or "re-invent the wheel". Treatment teams, counsellors, and agencies or other third-party payers would like to be aware of the rapidly growing array of devices available, their sources of supply, the respective indications and contraindications, durability, purchase and life-cycle costs of each, and the expanding body of reports on user experience. Manufacturers, too, need feedback on such user experience. Disabled individuals would like to feel confident that they are using satisfactory, economical devices and that they somehow learn of genuine improvements. Legislators, budgeters, and many others seek demographic data on numbers and characteristics of actual and potential users of assistive devices.

Realistically, such ambitious goals are not fully attained even in fields with mass markets, though many sources of information exist....

In the specialized yet very diversified area of rehabilitative engineering, a variety of publications (and in some cases their advertising) provide portions of the information needed on assistive devices for the disabled. Some are published by groups of disabled individuals. A few examples may suggest the range that is available. Examples of commercial ventures are the magazine *Accent on Living*, edited by Raymond C. Cheever, and the annual compilation *The Green Pages*. The newsletter *Inform*, numerous pamphlets, and the looseleaf *Information Sheets* are published by ICTA (the International Committee on Technical Aids, Housing, and Transportation of Rehabilitation International). Each annual *Rehabilitation Gazette* provides information on numerous devices and publications. Specialized periodicals like *Archives of Physical Medicine and Rehabilitation*, *Orthotics and Prosthetics*, or *Journal of Speech and Hearing Research* provide valuable information, primarily for professionals. The American Foundation for the Blind publishes an annual revision of its catalog of technical aids. Unfortunately, none of these inkprint documents enjoys the circulation it deserves, and that would be needed to reach the widespread body of professionals and disabled consumers.

The existing services provided by libraries, and by abstracting and indexing services, help to store, diffuse, and retrieve information. A useful recent survey is presented in the April 1980 issue of the Drexel Library Quarterly, which has the theme "Information Services to Disabled Individuals". The final paper describes international activities.

Major texts (like Lowman and Klinger's Aids to Independent Living--Self-Help for the Handicapped) take years of devoted effort to compile; they can provide wise advice and define stable principles, but editions quickly become incomplete and even obsolete on specific devices. Each individual consumer typically owns a few useful catalogs, but widespread diffusion to all concerned by constantly revised "hard-copy" texts or catalogs seems utterly impractical and uneconomical.

Because of the mass of data, the frequent changes, and the numerous modifiers or limitations, computers seem appealing. Computer systems include Cheever's Accent on Information (a private venture), the newly emerging NIHR-supported ABLEDATA, the University of Washington STORPROD system serving Federal Region 10, and certain computerized aspects of the National Rehabilitation Information Center (NARIC) compilation (primarily of RSA and NIHR reports). The Clearing House on the Handicapped specializes in referring inquiries to the most appropriate agency or reference center. There are numerous other clearinghouses and data banks which include devices for the disabled, though usually incidentally in connection with primary coverage of some other aspects.

The rapid evolution of information science and technology parallels that of computers. Decreasing costs of computers and of memory are encouraging. Increasingly sophisticated programs should reduce the load on the user and sharpen the focus on devices particularly relevant to a clearly stated need.

Though answers to many questions are simple, an intermediary expert may often be needed to interpret or rephrase lay questions and technical output, to use imagination in finding sources or simply in trying synonyms, and to winnow potential useful information from a large body of partially irrelevant information retrieved by inevitably incomplete coding systems. But the seeker of information, too, must be active and ingenious.

The substantial sources, plus the challenges, have led to an attempt to organize an Information Roundtable. Informal meetings were held in 1980 and 1981 in conjunction with the President's Committee on the Handicapped.

Past history has shown that some publications cease, texts rapidly become obsolete but are rarely revised, and projects tend to disintegrate when contracts or grants terminate. A major concern is to preserve easy retrieval of expensive information through accessible, stable, self-supporting systems."

THE ABLEDATA SYSTEM

Marian Hall, AbleData System Manager
NARIC, Washington, D.C.

The ABLEDATA System is a computerized data retrieval system for rehabilitation products, funded by the National Institute for Handicapped Research of the U.S. Department of Education. During the past several years development activities for ABLEDATA were based at the University of Virginia Rehabilitation Engineering Center in Charlottesville, Virginia. Effective October 1, 1981, the ABLEDATA System merged as a service of the National Rehabilitation Information Center at the Catholic University of America in Washington, D.C.

The ABLEDATA System is designed as a national database in the United States. It is maintained by a database vendor, Bibliographic Retrieval Services (BRS) in Latham, New York. It may be accessed anywhere in the country, or potentially internationally, by persons with subscriptions to BRS and approved ABLEDATA passwords, through special telecommunications lines (i.e., Telenet, Tymnet). In addition to the BRS subscription each subscriber or member must agree to participate with the national network, including attending training sessions and compiling use statistics.

As an integral component with the actual database, the ABLEDATA System includes the concept of a network of Information Brokers. The network of Information Brokers is essential to the operation and the services provided by ABLEDATA, providing personal interface between the computer hardware and the client needing information. The Information Broker provides interpretation of the clients' requests or needs for obtaining information from the national database and provides local or regional vendor resources and other related services for the products.

Requests for information about equipment may be directed to the Information Brokers by anyone, including disabled individuals or family members, rehabilitation professionals, manufacturers or vendors, educators, public or private agencies, or researchers. The national database lists only manufacturers, sole distributors or national distributors with unique mail-order product catalogs. 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.

The ABLEDATA product database lists rehabilitation products in the following categories; bibliographic materials and organization information are available through BRS by the National Rehabilitation Information Center (NARIC) and the Office for Handicapped Individuals.

- I. Personal Care
- II. Home Management
- III. Vocational-Educational Management
- IV. Seating
- V. Mobility
- VI. Transportation
- VII. Communication
- VIII. Recreation
- IX. Sensory Disability Aids
- X. Ambulation
- XI. Orthotics
- XII. Prosthetics
- XIII. Therapeutic Aids

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

- AN Accession number (Computer record identification number; includes code for year and month data is 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 evaluative data, contraindications, limitations, etc. (from disabled individuals, rehabilitation professionals, etc.)
- EV Evaluation--formally documented test results, etc.
- ID Identifiers--index terms from controlled vocabulary.

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 in which all rehabilitation equipment, aids and devices are divided into 13 categories, with appropriate sub-categories. It is this terminology which forms the basis of the thesaurus, and is also used for initial searches of broad equipment categories.

The thesaurus for ABLEDATA is being developed simultaneously with the data entries. The Thesaurus includes all controlled vocabulary, or Identifiers, and all generic or common product names listed by category. In addition, all terms will be indexed alphabetically with alternative terms (or synonyms) and references for appropriate searching terms.

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. Any of the fields or paragraphs may be searched but consistency of terminology within the data entries is particularly critical with free text searching.

SAMPLE DATA ENTRY

AN 81-03-000231.
NM Automatic Memory Dialer.
BN Hi Tek Autotouch.
MN Hi Tek.
CD 258.
AV Local; Markline Co. Inc.
CT \$219.95, \$179.95, \$149.95, 1980.
DE A module which plugs in as an accessory to a conventional telephone or speakerphone to provide light touch push button dialing of all digits and one button push button dialing of numbers which have been stored into the memory. One button provides automatic redialing of last number dialed. Operable by mouth stick or typing stick. Requires a 110VAC power supply. Available in 3 memory capacities: 20, 40 or 60 numbers.
ID Communication. Telephone accessories.
CM Memory access is especially easy since it does not require learning of a memory code, however the keyboard arrangement of one button for each number increases the range of motion required for the user, especially for the 40 and 60 number models. Generous labeling area is provided for each button. Does not produce tone signals, therefore not suitable for electronic banking or other computer access applications.

NOTES

August 1982

ABLEDATA INFORMATION BROKERS

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Washington, D.C. 20017-2299
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Center for Rehabilitation Technology
Georgia Institute of Technology
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Independent Living
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So. Bend, IN 46601
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Minnesota Division of Vocational Rehabilitation
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OTHER U.S. REHABILITATION 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 \$.08 for every additional citation. Photocopies can be provided for some products. Each data entry lists the product name, address, cost and a brief description. Accent Buyer's Guide lists manufacturers, distributors and organizations classified by product type or function. Information listed includes names and addresses only. Cost is \$10.00.

ARIAD-Automatic Retrieval of Information on Assistive Devices

Louisiana Tech University

Rehabilitation Engineering Research Center

P.O. Box 4875 - T. S.

Ruston, LA 71272

A computerized product database with entries organized by disabilities and by product function. Total number of data entries is approximately 750, representing 25 companies. Information is provided at no cost to anyone, by either telephone or mail. Each data entry provides the manufacturers' or distributors' names and addresses, price and a 100 word description of the product.

Assistive Devices for People with Disabilities

Clinical Convenience Products

2066 Helena Street

Madison, WI 53704

A computerized product database with entries organized by disabilities and product function. Information is provided at no cost to anyone through the mail by completion of a questionnaire. Each data entry provides the name and address of the manufacturer only.

Catalog of Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People

Wisconsin Vocational Studies Center

University of Wisconsin - Madison

Publications

265 Educational Sciences Building

Madison, WI 53706

Looseleaf catalog has 787 pages with 283 entries of equipment indexed by disabilities, function and products. Additional resources and organizations are listed in the appendices. Cost is \$30.00 per copy. The catalog was published in early 1981. There are no provisions for updating the existing catalog or future publications.

Design for Accessibility: Equipment and Aids Catalog

Michigan Center for a Barrier Free Environment

6869 Heather Heath

West Bloomfield, MI 48033

Catalog of design aids useful to disabled persons. Each aid is sketched with a brief description and source of supply. Includes information on 180 products and names and addresses of 500 manufacturers and distributors. Published 1979, available for \$20.00.

Green Pages

P.O. Box 1586

Winter Park, FL 32790

Directory with 176 pages provides names and addresses for approximately 1,500 manufacturers and distributors of products, indexed by product function. Organizations and other service resources are included in the listings. Published annually, \$25.00 in the U.S., \$32.00 overseas.

IMPART

Texas Rehabilitation Commission

118 E. Riverside Drive

Austin, TX 78704

IMPART is a rehabilitation engineering service delivery program which serves Texas, Oklahoma, New Mexico and Louisiana. It provides solutions to individual problems in home, educational or vocational settings, either providing information on commercially available equipment or designing custom devices. IMPART is not a database but will provide professionals with information about equipment, including photocopies of catalogs if available.

Job Related Physical Capacities System (JRPC)

Florida Occupational Information Coordinating Committee

Suite L-500

325 John Knox Road

Tallahassee, FL 32303

The JRPC project analyzed the job activities of 110 occupations with a system for a person with physical disabilities to compare existing abilities with actual physical requirements. An Aids and Accommodations Manual has been developed which describes aids available to overcome the specific job limitations.

NARIC - National Rehabilitation Information Center
The Catholic University of America
4407 8th Street, N.E.
Washington, D.C. 20017-2299

A rehabilitation research library including a collection of rehabilitation related documents and audiovisual materials. The computerized database contains bibliographic data and abstracts on reports and audio-visuals in the Center's collection. For a charge, NARIC will provide customized searches on it's database and other relevant commercial databases. Copies of documents may be obtained for a nominal photocopying fee. The NAEIC Thesaurus and newsletter, Pathfinder, may also be purchased. Prepared bibliographies for topics of high interest are available at no charge.

National Clearinghouse for the Handicapped, Office for Handicapped Individuals
Office of Special Education & Rehabilitative Services
Washington, D.C. 20202

Provides information on agencies and organizations which assist with services or specialized information for disabled persons. Special publications are produced for resource information on specific topics, including publications about equipment for disabled persons. In addition, a resource database is being developed for public access by subscription.

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

A computerized product database with data entries organized by disabilities and by product function. The system has approximately 2,000 product data entries. Data is stored on an in house computer, and information is supplied at no cost to persons by mail or telephone. Each data entry includes product name, manufacturer's name and address, price, brief description and disabilities for which product is appropriate.

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

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. Published in 1979, available for \$25.00.

STORPROD

University of Washington
Department of Rehabilitation Medicine
BD - 805 H.S.B. Room 30
Seattle, WA 98195

A computerized product database with data entries organized by individual companies or developers. Total number of companies and developers included in the system is 1,050. Data is stored on an in house computer, and the information is supplied at no cost to persons in the Pacific Northwest. Each data entry lists the manufacturers' or distributors' names and addresses only.

VAREC Information Storage and Retrieval System

Veteran's Administration REC
Information & Education Service
252 7th Avenue
New York, NY 10001

A computerized database documents reports of clinical evaluations completed by the VA. Printout includes abstracts only and presently has approximately 150 reports. Total documents are anticipated to be approximately 500. Searches are provided free of charge.

REHABILITATION ENGINEERING CENTERS

National Institute of Handicapped Research

Center, Project Director(s), Core Study Area(s)

RANCHO LOS AMIGOS HOSPITAL
7601 East Imperial Highway
Downey, CA 90242
(213) 922-7167

Functional Electrical
Stimulation of Paralyzed
Nerves and Muscles.

Robert Waters
Donald McNeal

CHILDREN'S HOSPITAL AT STANFORD
Rehabilitation Engineering Center
520 Willow Road
Palo Alto, CA 94304
(415) 327-4800

Controls and Interfaces

Maurice A. LeBlanc

SMITH-KETTLEWELL INSTITUTE
OF VISUAL SCIENCES
2232 Webster Street
San Francisco, CA 94115
(415) 563-2323

Sensory Aids--Blind and Deaf

Arthur Jampolsky
John Brabyn

GALLAUDET COLLEGE
Washington, DC 20002

Deafness and Hearing Impaired

James M. Pickett

NORTHWESTERN UNIVERSITY
345 E. Superior Street, Rm 1441
Chicago, IL 60611
(312) 649-8560

Internal Total Joint
Replacement

Dudley Childress

THE UNIVERSITY OF IOWA
Carver Pavillion
Iowa City, IA 52242
(319) 356-3470

Low Back Pain

R. R. Cooper, Richard A. Brand
Y. King Liu

CEREBRAL PALSY RESEARCH
FOUNDATION OF KANSAS, INC.
P.O. Box 8217, 2021 N. Old Manor
Wichita, KS 67208
(316) 688-18881

John F. Jonas

Vocational Aspects of
Rehabilitation

CHILDREN'S HOSPITAL MEDICAL
CENTER
300 Longwood Avenue
Boston, MA 02115
(617) 735-6594

William Berenberg

Neuromuscular Control
Using Sensory Feedback
Systems

TUFTS UNIVERSITY
Box 1014, 171 Harrison Avenue
Boston, MA 02111
(617) 956-5036

Richard Foulds

Communication Systems for
Individuals with Nonvocal
Disabilities

THE UNIVERSITY OF MICHIGAN
208 W. E. Lay Automotive Lab
2320 Herbert Street
Ann Arbor, MI 48109
(313) 763-6632

J. Raymond Pearson

Automotive Transportation
for the Handicapped

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

CASE WESTERN RESERVE UNIVERSITY
SCHOOL OF MEDICINE, Department
of Orthopedics
2219 Adelbert Road
Cleveland, OH 44106
(216) 444-3040

Upper Extremity Functional
Electrical Stimulation

Hunter Peckham
Alvin Freehafer

KRUZEN RESEARCH CENTER
Moss Rehabilitation Hospital
12th Street & Tabor Road
Philadelphia, PA 19141
(215) 329-9580

Locomotion and Mobility

Gordon Moskowitz

UNIVERSITY OF TENNESSEE
532 S. Stadium Hall
Knoxville, TN 37916

Deafness and Hearing
Impairment

TEXAS INSTITUTE FOR
REHABILITATION AND RESEARCH
1333 Moursund Avenue
Houston, TX 77030
(713) 797-1440

Effects of Pressure
on Tissue

Thomas A. Krouskop

UNIVERSITY OF VIRGINIA SCHOOL
OF MEDICINE
P.O. Box 3368, University Station
Charlottesville, VA 22903
(804) 977-6730

Spinal Cord Injury

Warren G. Stamp, Colin A. McLaurin

TRACE Center
314 Waisman Center
1500 Highland Avenue
Madison, WI 53706
(608) 262-6966

Communication Systems for
Individuals with Nonvocal
Disabilities

Gregg C. Vanderheiden

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

Upper Extremity Disabilities

A. Senger

WATA WA AMAL
Mugamaa Building
Tahrir Square
Cairo, Egypt

Architectural Barriers

Sahah Hommossani

UNIVERSITY OF LJUBLJANA
Faculty of Elec. Engineering
6100 Ljubljana Trzaska 25
Yugoslavia

Functional Electrical
Stimulation

Lojze Kralj

SELECTED PUBLICATIONS: ACCESS TO TECHNOLOGY

Accent on Living Buyer's Guide. Cheever Publishing, Inc.
P.O. Box 700, Bloomington, IL 61701

Access: The Guide to a Better Life for Disabled Americans.
Bruck, Lilly. Random House, New York. 1978. Overcoming barriers
for the consumer. Excellent resource information.

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

Aids for Handicapped Readers. Reference and Information Section,
Division for the Blind and Physically Handicapped, Library of
Congress, Washington, D.C. 20542. Devices and techniques for
handling books, writing, and typing. Free.

Aids for the 80s: What They Are and What They Do, C. Michael
Mellor, American Foundation for the Blind, New York, NY, 1981.
Free. Available from: American Foundation for the Blind,
15 W. 16th Street, New York, NY 10011.

Aids to Independent Living: Self-Help for the Handicapped.
Lowman, Edward and Klinger, Judith L. McGraw-Hill,
330 W. 42nd Street, New York, NY 10036. 796 p., many illus.,
bibl. (820), \$41.00.

Directory of National Information Sources on Handicapping
Conditions and Related Services. U.S. Department of Health,
Education, and Welfare. Available through U.S. Government
Printing Office, Washington, D.C. 20402. May, 1980. A major
reference tool for national level organizations and services
pertinent to the disabled population.

Directory of Organizations Interested in the Handicapped - 1980-
1981. People to People Committee for the Handicapped, 1522 K
Street, N.W. Washington, D.C. 20005.

Equipment for the Disabled. 2 Foredown Drive, Portslade,
Sussex BN4, England. 1973. A set of 10 booklets categorized by
functional activity. Includes problem/solution sections with
illustrated device suggestions.

Equipment for the Disabled: An Index of Equipment, Aids, and
Ideas for the Disabled. International Society for the
Rehabilitation of the Disabled. New York.

The Green Pages Rehab Sourcebook. P.O. Box 1586, Winter Park,
FL 32790. A directory of products and services for the
physically disabled. \$35.00 for 1983 Edition (pre-publication
price).

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.

Information Services to Disabled Individuals, Drexel Library Quarterly, Drexel University, Philadelphia, PA; April 1980, vol. 16, no. 2. \$6.00. Available from: NARIC, 4407 8th Street, N.E., Washington, D.C. 20017.

Non-Vocal Communication Resource Book. Edited by Gregg C. Vanderheiden. \$12.50. University Park Press, Baltimore. Included in the book are these sections:

- a) Illustrated Digest of Non-Vocal Communication and Writing Aids for Severely Physically Handicapped Individuals, compiled and edited by Jana Fothergill, Mary Jo Luster-Carpenter, Gregg C. Vanderheiden, Craig S. Holt.
- b) 1977 Master Chart of Communication Aids by Gregg C. Vanderheiden, Warren P. Brown and Jana Fothergill.
- c) Interface Switch Profile and Annotated List of Commercial Switches by Craig S. Holt, Dave Buelow, and Gregg C. Vanderheiden, 1976.
- d) 1977 Bibliography on Non-Vocal Communication Techniques and Aids by Warren P. Brown, Gregg C. Vanderheiden and Deborah Harris.

Update Set Number 1 (1978-79) - Compiled by Chris Thompson and La Vonne Krause. Prepunched Update pages for insertion in the Resource Book. This set contains all 1978 and 1979 Updates. Set includes Manufacturer's Index, aids Index, Updates, Master Chart Additions, 1979 Bibliography on Non-Vocal Communication Techniques and Aids, addition of Section V on Computer Based Systems and Authors Packet. \$5.00.

Proceedings of the 1981 Conference on Access to Technology, Rehabilitation Engineering Center of the Children's Hospital at Stanford, Palo Alto, CA. 1981. \$10.00. Available from: Children's Hospital at Stanford, REC Publications Department, 520 Willow Road, Palo Alto, CA 94304.

Rehabilitation Engineering: A Counselor's Guide. Sixth Institute on Rehabilitation Issues. Research and Training Center, Stout Vocational Rehabilitation Institute, University of Wisconsin - Stout, Menomonie, WI. 1979.

Rehabilitation Engineering Sourcebook, Supplement I. Institute for Information Studies, 200 Little Falls Street, Suite 104, Falls Church, VA 22046. 1980.

Resource Guide: Rehabilitation Engineering and Product Information. U.S. Department of Education, Office of Special Education and Rehabilitative Services, Office for Handicapped Individuals. Washington, D.C. 20202. Publication number E-80-22015. Sept. 1980. Lists of information resources for rehabilitation engineering or related services. Funding guide and publications available through Federal sources.

Resource Guide to Literature on Barrier-Free Environments with Selected Annotations 1980. Prepared by Architectural and Transportation Barriers Compliance Board, Washington, D.C. 20202, (A&TBCB) 79-00004, (For sale by the Superintendent of Documents. U.S. Government Printing Office, Washington, D.C. 20402) 279 pages. Lists access information for schools, parks and recreation, transportation and housing. Also contains a section on Aids and Devices.

Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons. 1975; 150 pages. (Available from: RT-9 Administrative Office, Room 714, 2300 Eye Street, N.W., Washington, D.C. 20037). \$6.00.

The Source Book for the Disabled. Paddington Press, Ltd., dist. by Grosset & Dunlop, New York. 1979.

Sources of Information on Self-Help Devices for the Handicapped. National Easter Seal Society Library. 4 p.

Technology for Independent Living. Proceedings of the 1980 Workshops on Science and Technology for th Handicapped. edited by Virginia Stern and Martha Redden. 1982. 262 pp. American Association for the Advancement of Science, 1776 Massachusetts Avenue, N.W. Washington, D.C.

PERIODICALS

Accent on Living, Cheever Publishing, Inc. Gillum and High Drive, P.O. Box 700. Bloomington, IL 61701. Subscription: \$5.00/yr. Quarterly.

Bulletin of Prosthetics Research, Rehabilitative Engineering Research and Development Service, Department of Medicine and Surgery, Veterans Administration, Washington, D.C. 20420. Biannually

Bulletins on Science and Technology for the Handicapped, American Association for the Advancement of Science, Office of Opportunities in Science, 1515 Massachussetts Avenue, N.W., Washington, D.C. 20005. No Subscription Charge. Quarterly

Communication Outlook, Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, MI 48824. Subscription: \$12.00/yr.

Handicapped Americans Reports, Capitol Publications, Inc.,
1300 N. 17th Street, Arlington, VA 22209. Subscription:
\$140.00/yr. Bi-weekly

Homecare/Rehab. Product News, Miramar Publishing Co.,
2048 Cotner Avenue, Los Angeles, CA 90025. Subscription:
\$15.00/yr or No Charge to Controlled Circulation.
Bimonthly

ICTA Inform, Box 303, S-161 26 Bromma, Sweden

Journal of Rehabilitation, National Rehabilitation Assoc.,
633 S. Washington Street, Alexandria, VA 22314.
Subscription: Membership Fee Includes Publications or \$30.00/yr
Quarterly

Mainstream, Able-Disabled Advocacy, Inc., 861 6th Avenue,
Suite 610, San Diego, CA 92101. Subscription: No Subscription
Charge. Monthly

NRA Newsletter, The National Rehabilitation Association,
633 S. Washington Street, Alexandria, VA 22314.
Subscription: Membership Fee Includes Publication, \$42.00/yr
Bimonthly

Paraplegia News, 5201 N. 19th Avenue, Suite 111, Phoenix, AZ
85015. Subscription: \$5.00/yr. Monthly

Rehab. Brief, Institute for Information Studies, 200 Little Falls
Street, Suite 104, Falls Church, VA 22046
Subscription: No Subscription Charge. Monthly

Rehabilitation Digest, Canadian Rehabilitation Council for the
Disabled, Suite 2110, One Yonge Street, Toronto, Ontario M5E
1E5, Canada.
Subscription: \$7.50/yr. Quarterly

Rehabilitation Gazette, 4502 Maryland Avenue, St. Louis,
MO 63108.
Subscription: \$7.00/yr. Annually

Rehabilitation Literature, National Easter Seal Society for
Crippled Children and Adults, 2023 W. Ogden Avenue, Chicago,
IL 60612.
Subscription: \$18.00/yr. Bimonthly

Report and Access Information Bulletin, National Center for a
Barrier Free Environment, 1140 Connecticut Avenue, N.W., Suite
1006, Washington, D.C. 20036.
Subscription: \$25.00/yr. Bimonthly

RESNA Newsletter, Rehabilitation Engineering Society of North
America, Suite 210, 4405 East-West Highway, Bethesda, MD 20814.
Subscription: Membership Fee Includes Publication
\$35.00/yr. Quarterly

Rx Home Care, Barrington Publications, Inc., 825 S. Barrington Avenue, Los Angeles, CA 90049.

Subscription: \$40.00/yr or No Charge to Controlled Circulation Monthly

Sports 'N Spokes, 5201 North 19th Avenue, Suite 111, Phoenix, AZ 85015.

Subscription: \$5.50/yr. Bi-monthly

Technical Aid to the Disabled Journal, c/Royal Ryde Rehabilitation Hospital, 227 Morrison Road, P.O. Box 108, Ryde, N.S.W. 2112.

Subscription: No subscription charge. Quarterly

The Pathfinder, National Rehabilitation Information Center, 4407 8th Street, N.E., The Catholic University of America, Washington, D.C. 20017.

Subscription: \$7.00 Braille Ed: \$12.00/yr. Bimonthly

Upfront, 90 Cherry Street, Box 519, Johnstown, PA 15907.

Subscription: \$15.00/yr. Monthly

FUNDING SOURCES

NOTES

FUNDING SOURCES

Financial Resources for Disabled Individuals

Institute for Information Studies. Falls Church, VA. 1980, 75 pp. Available from: NARIC, Catholic University, Washington, D.C. cost: 11.00. Although not oriented specifically toward funding for devices, this guide covers a broad range of programs which focus on such areas as basic living needs, education and employment. It identifies major programs which exist throughout the nation, or could exist if a particular state or community elected to participate in a program.

THESE PUBLICATIONS FOCUS ON FUNDING FOR DEVICES:

Funding Book: The Many Faces of Funding... Anna Hoffman. Phonic Ear Inc., 250 Camino Alto, Mill Valley, CA 94941. \$25

Funding of Mobility Equipment: Current Issues and Strategies. Virginia Ruggles, Muscular Dystrophy Association, 810 7th Avenue, New York, NY 10019. 9/81

Funding of Non Vocal Communication Aids: Current Issues and Strategies. Virginia Ruggles, Muscular Dystrophy Association, 810 7th Street, New York, NY 10019, 30 pp.

Guidelines for Seeking Funding for Communication Aids. Donna DePape and LaVonne Krause. revised 1980. Trace Center, Waisman Center, University of Wisconsin, Madison, WI 53706. 44 pp.

FUNDING
FUNDING

INFORMATION
INFORMATION

SPORTS
SPORTS

TOYS
TOYS

ON THE JOB
ON THE JOB

CLASSROOM
CLASSROOM

VEHICLES
VEHICLES

WHEELCHAIRS
WHEELCHAIRS

HOME
HOME

SELECTION
SELECTION

To facilitate use of the Resource Guide, the tabs
below have been printed for your use. They will
fit standard 1/5 cut divider pages with plastic
tabs.