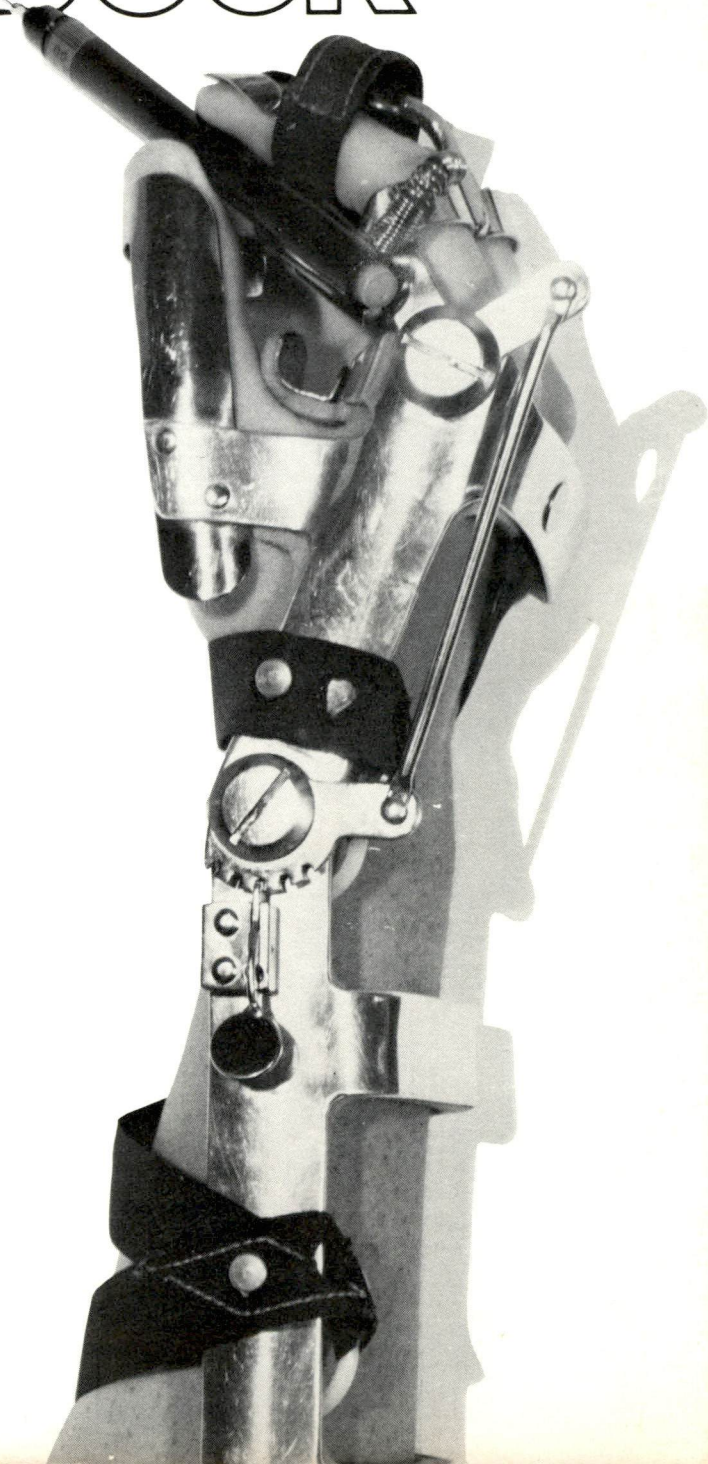
Rehabilitation Engineering Sourcebook



REHABILITATION ENGINEERING SOURCEBOOK

Institute for Information Studies
400 N. Washington St.
Falls Church, VA 22046

Library of Congress Cataloging in Publication Data
Institute for Information Studies (Falls Church, Va.)
Rehabilitation engineering sourcebook.
1. Vocational rehabilitation. 2. Rehabilitation.
I Title.
HD 7255. I56 1979 326.8'5 79-24747

ISBN 0-9 35294-02-3

This publication was made possible in part
by Grant #22 P-59236/3-01 from the
National Institute of Handicapped Research
Department of Health, Education and Welfare
Washington, D.C.

PREFACE

The topic for this document was selected by a nominating panel of rehabilitation service providers including:

Robert Lusin
Vocational Rehabilitation
Eastern Area Office
P.O. Box 30010
Lansing, Michigan 48909

Eric Lucero, Supervisor
Division of Vocational Rehabilitation
Southern District
631 Lake Avenue
Pueblo, Colorado 81004

Jacequeline Sanchez
1265 Race Street
Denver, Colorado 80206

Dr. Eugene Murphy and
Tammy Sowell
Assistant to the Director
Office of Technology Transfer
Veterans Administration
252 Seventh Avenue
New York, New York 10001

The Panel suggested several topics of urgent concern, but gave "potential and actual contributions from the field of rehabilitation engineering" their clear top priority rating. The Final Selection Review Board endorsed this choice without reservation, and stressed that the document should be a practical aid to providers rather than an expository work. **Dick LeClair,** Chief, Office of Research Utilization and Training, National Institute of Handicapped Research, deserves the credit for the initial suggestion that the main body of the text consist of case examples — paired statements describing actual problems encountered by people with disabilities and the specific technological solutions which were brought to bear.

This suggestion was followed up by a telephone survey of nearly three dozen rehabilitation practitioners — with state vocational rehabilitation agency counselors and "sheltered" workshop personnel being most heavily represented — seeking opinions on the desirability of such an approach. The idea was met with resounding enthusiasm. Next it quickly became evident that many excellent sources of suitable data existed in the various rehabilitation engineering projects throughout the country.

Participating Projects

A program ideally suited to generating the type of information sought was discovered in Project IMPART (Innovative Matching of Problems to Available Rehabilitation Technology), established by the Texas Rehabilitation Commission in collaboration with the Southwest Research Institute with funding assistance from the Rehabilitation Services Administration. IMPART acts as a clearinghouse in that it receives rehabilitation problems and searches for individualized solutions. It is a public service available to anyone living in Texas and neighboring states who has a work related rehabilitation problem. **Dr. Carol Whitcraft**, Project Director, expressed the opinion that information sharing such as planned for this document was "an idea whose time has come" and became the first rehabilitation engineering project director to participate in its development.

The problem/solution format was quickly dubbed a "Dear Abby" approach, which brought to mind another source of information, one long appreciated by counselors in the California Department of Rehabilitation. For more than five years, A.G. Garris, Assistive Device Consultant with the California agency, has written a column in the departmental newsletter titled "Dear A.G." Questions are submitted by counselors with problems relating to some aspect of their clients' performance capabilities in the hope that A.G. might know of some technological solution. The column has been greatly appreciated over the years because he often did know of a workable solution. When he did not, he was available to evaluate the situation and could frequently devise one. A.G. too, was pleased by the opportunity to see wider dissemination of the fruits of his labors, and those of Charles Eckles, a consultant with whom he often collaborates.

A total of 15 different agencies (centers, projects) or individuals contributed to the production of this document. In addition to the IMPART and "Dear A.G." files, other sources of problem/solution statements are described below.

Since 1976, the Rehabilitation Engineering Center of The Cerebral Palsy Research Foundation in Wichita, Kansas, has published a series of technical briefs titled "Problem Solving with Rehabilitation Engineering — Tech Brief". Each brief describes specific problems experienced by clients and employees of Center Industries. Center Industries operates under the

same administration as the Foundation, and is a job shop which predominantly hires workers with disabilities. Innovative jigs and fixtures created for use there are well represented in the briefs. **John Jonas,** Executive Vice President of the Foundation, provided the needed materials for abstracts of selected briefs to be included here.

Jerry Kuns, Vocational Specialist for the Sensory Aids Foundation of Palo Alto, California, provided materials describing work and training related problems experienced by blind or partially sighted individuals and the technological solutions which were successfully applied by Foundation staff, often in collaboration with other agencies. The California Department of Rehabilitation, and the Rehabilitation Engineering Center of the Smith-Kettlewell Institute of Visual Sciences in San Francisco directed by Lawrence Scadden, are two primary examples of collaborators.

Dr. Samuel Genensky, Director of the Center for the Partially Sighted at the Santa Monica Hospital Medical Center, provided additional problem/solution statements relating to sensory aids useful in work, training, or other aspects of the person's life. The Center offers both direct services to individuals and conducts an extensive research program.

Dr. O.B. Billings of The Institute for Rehabilitation and Research at the Texas Medical Center in Houston, provided a large volume of problem/solution statements from their files. All aspects of life performance, from the most basic activities of daily living to very specialized work related demands are well represented in the materials from TIRR.

Mickey Christiason, Recreation Therapist at Rancho Los Amigos Hospital in Downey, California, contributed many items on recreation related devices. Most of these are commercially available but not well known.

The Rehabilitation Engineering Program at Northwestern University contributed a number of items, and **Margaret Pfrommer** of their staff was particularly helpful in providing follow-up information.

Anthony Staros, Director of the Veterans Administration Prosthetics Center, arranged for the contribution of several richly detailed descriptions of extensive technological intervention on behalf of very severely disabled individuals. Many of these solutions reflect the innovative work of Saleem Sheredos, an engineer who works closely with the VAPC Clinical Engineering Center.

The Rehabilitation Engineering Department of the Woodrow Wilson Rehabilitation Center in Fishersville, Virginia, contributed items reflecting the innovative work taking place in that program. **Reuven Kruger,** of the Research Utilization Laboratory made the materials available.

Florian Caligiuri, Executive Director of the California Association of the Deaf provided materials for the development of items illustrating problems and technological solutions for people who are deaf.

Ray Disinger, Director of the Special Assistance to the Handicapped Office of Pacific Telephone in Los Angeles contributed a number of items based on the efforts of that office.

Finally, **James Reswick,** Director of the Rancho Los Amigos Rehabilitation Engineering Center, not only arranged for the contribution of case examples illustrating the work of their Project Threshold, but also provided general consultation and guidance for the development of this document.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

ABBREVIATIONS AND ACRONYMS

ADL	Activities of Daily Living
ALS	Amyotrophic Lateral Sclerosis
BP	Blood Pressure
CCTV	Closed Circuit Television
E&J	Everest and Jennings
HITE	Houston Independence Through Engineering
L.E.	Lower Extremity(ies)
MD	Muscular Dystrophy
REC	Rehabilitation Engineering Center
SCI	Spinal Cord Injury(ed)
TDD	Telecommunications Device for the Deaf
TTY	Teletypewriter
U.E.	Upper Extremity(ies)
VAPC	Veterans Administration Prosthetic Center
VR	Vocational Rehabilitation

INTRODUCTION

Scope of Document

The document is designed to serve as a sourcebook, or reference work, for day-to-day use by rehabilitation practitioners whose clients find themselves barred from certain activities by functional limitations resulting from disablement. Here, the user may learn whether a similar problem has elsewhere been found to have a technological solution. It is a practical aid which chronicles actual rehabilitation problems which have been successfully resolved through the use of technology, especially applications issuing from the field of rehabilitation engineering. Specifically excluded are discussions of historical, theoretical, and programmatic matters (which are covered in considerable detail in other current reports and articles) on the role of rehabilitation engineering in serving people with physical and sensory disabilites.

It is not meant to be a comprehensive or exhaustive sourcebook. It is, rather, a sharing of information which has been recorded in various projects throughout the country on efforts to solve client problems, through means of rehabilitation engineering, which have worked — at least once. The selection of cases presented here reflects the response to efforts to encourage projects and individuals to share information on their successes. It is not intended to reflect the proportionate efforts being directed into the various problem areas nationwide. Also, there has been no intention to generate new information in the course of preparing this document. It is simply a means for disseminating existing information with great utilization potential which has been heretofore available to only a few.

The looseleaf format was selected in response to high priority recommendations given by participants in a study conducted by SRI International, funded jointly by NASA and the California Department of Rehabilitation, aimed at designing a model rehabilitation engineering information exchange system.* Following those recommendations, the materials presented here are construed as a "starter set" to which the user may add as further resource information of a similar sort becomes available.

The following section, titled "Guidelines for Formulating Problem Statements" summarizes the most effective ways for either disabled individuals or rehabilitation practitioners to "place their orders". That is, it describes how to ask concisely and unambiguously for exactly what is needed — in functional terms — so the respondent can search effectively and efficiently for exactly what is needed — in technological terms — to devise a solution.

Section Three, titled "Case Examples: Problems and Solutions" comprises the main body of the text. These are brief summaries of actual problems experienced in the life performance areas of: Activities of Daily Living, Communication, Homemaking, Mobility, Recreation, Training, Transportation, and Work, paired with solutions which were successfully used by or known to the contributors. It is hoped that this material will serve as a consciousness-raising function, with respect to the remarkable technological potential existent today, as well as its more specific informational function relating to the cases cited. The fact is, there are now technologically feasible solutions to a heretofore undreamed of range of problems stemming from physical and sensory disabilities. Now that this potential is being recognized with increasing funding from a variety of sources, progress is being made at a quickening pace. Today, there is often good reason to hope for a device or a system that will make it possible for a blind, deaf or paralyzed person to do with relative ease what was unequivocally impossible less than a decade ago. The materials in the third section will demonstrate this, and will also give the reader an overview of types of work being pursued by each of the contributing projects.

Section Four presents an annotated listing of the contributing rehabilitation engineering centers and projects. The annotations briefly describe areas of specialization and/or other pertinent information about the resource cited. The citations in this section are also given as sources of further information relating to specific case examples in Section Three. They are repeated in Section Four simply as a convenience to the reader.

Intended Audience

Because the focus of this document is on the types of problems encountered by disabled people after they have reached the vocational stage of their rehabilitation, it is oriented toward a primary audience of rehabilitation counselors and work supervisors. Whether a rehabilitation counselor is employed by a state vocational rehabilitation agency, a local government, a private agency or facility, or is working in private practice, the problem/solution case materials presented here should have relevance to problems encountered in the caseloads. Just as no two human

*Christy, et al, "Suggested Approach for Establishing a Rehabilitation Engineering Information Service for the State of California," Stanford Research Institute International, 1978.

beings are alike, no two problems and their solutions will be identical; but similar problems which have been successfully resolved should provide direction to the counselor in seeking a workable variant that will solve the problem at hand. The same holds true for work supervisors, whether they are employed by "sheltered" workshop facilities or are working in mainstream industry.

It is expected that other rehabilitation practitioners will also find the document useful. Rehabilitation staff in hospitals may find that the kinds of rehabilitation planning they do at the early stages of rehabilitative treatment are influenced by their knowledge of the increased potential of their patients for future life and work activities. Thus, occupational, physical, and recreational therapists, nurses, physicians, and other allied health professionals may make use of this sourcebook. It may also contribute to meeting the needs of rehabilitation engineers — as suggested in the SRI International report cited earlier — for "information on past attempts to design equipment for particular needs."

Usage of Document

This sourcebook can be used in several different ways. One reader may wish to simply read through it to gain an overview of the kinds of technological solutions which have been devised to meet problems which rehabilitation counselors, work supervisors, and others confront in their work with individuals who have disabilities barring them from certain activities. Such a reader would be making use of the consciousness-raising function of the document, becoming familiar with the general range of problems which can be solved through the application of technology.

Another reader may already be aware of the general range of solutions being made possible by the field of rehabilitation engineering, and want to use the sourcebook strictly as a reference manual, to look up specific solutions which have been devised to meet a particular type of client problem. This reader might use the index tabs to locate the life performance area in which a client is experiencing difficulty, or the "problem index" listings at the end of the document to locate a specific problem, or type of problem, which parallels that being confronted.

Still other readers may have heard of devices, or seen them, but be unsure of their applications. They could use the "solution index" listings at the end to locate the device in question in order to learn how that device has been used for practical problem solving.

Every effort has been made to provide ample descriptors in the indexes to help readers who may have only fragmented information about devices, or who may view the problem in terms of global disability categories as opposed to specific functional limitations. Descriptors relating to job or other life performance area demands are also included, providing an additional way to key into the materials presented.

When the solution consists of a commercially available device, the name and address of at least one vendor is mentioned, and telephone number, contact name, and approximate cost range are given if available. When applicable, additional sources of further information are also given.

When an innovative solution is described, the name of the innovator (usually by organization rather than an individual) is provided along with the appropriate address to which to write for further information. Many of the simpler innovative solutions could potentially be replicated, or serve as a starting point for innovative variation, using only the information presented here — particularly when illustrations have been provided.

Some of the more complex innovative solutions cannot be described in adequate detail to permit replication in a sourcebook such as this. The contributors to this sourcebook will welcome inquiries from users who wish to make use of solutions they have devised, and the needed information for such follow-up is given with each case example.

The format of the sourcebook allows the user to enter notes when further information is obtained relative to specific problem/solution pairs and to include additional problem/solution pairs which may become available from a variety of sources, including personal experience.

Future Development of the Sourcebook

As indicated earlier, the present document is construed as a starter set to which users may add new materials of a similar sort as they become available. Should it be warranted by the response to this initial attempt to organize scattered pockets of information into a useful overview of rehabilitation engineering accomplishments, the Institute for Information Studies may continue to produce supplementary materials for inclusion in Sections Three (case examples) and Four (annotated listing of resources). Hopefully, other organizations will be encouraged to do so as well. For this reason, the Institute will appreciate feedback as to the utility of this document and suggestions for how future efforts along similar lines might be improved. The form included with this package of materials is an evaluation form, and it is hoped that you will complete and return it for this purpose.

GUIDELINES FOR FORMULATING PROBLEM STATEMENTS

"The quality of the answer depends on the quality of the question."

In order to make the most effective use of consultants, specialists, and other experts, there is a fine art which must be developed — the art of asking the question. Conversely, one of the greatest deterrents to getting an answer that will help is failing to phrase the question in a precise, unambiguous manner.

This is a familiar issue to rehabilitation counselors who work in state vocational rehabilitation agencies and contract for work evaluation/adjustment services from workshops and other rehabilitation facilities. If they don't spell out exactly what they want to know about a client's work capabilities and limitations, they may receive an interesting report which, nonetheless, offers little helpful guidance for rehabilitation planning. The facility staff are acutely aware of the problem, too. They express frustration over having to "second guess" what the referring party wants to know when the request is a global plea for help rather than an explicit, itemized requisition for discrete items of information.

This is a very old problem within the public-private rehabilitation partnership, and the lessons are being learned continuously by newcomers to the field. The same kind of problem is now arising in the new interdisciplinary partnership between rehabilitation practitioners of various sorts and rehabilitation engineers. For example, many of the questions and problems posed to Project IMPART of the Texas Rehabilitation Commission and the California Department of Rehabilitation's Rehabilitation Engineering Section are questions that might more properly be addressed to another kind of consultant, or they provide insufficient background information to allow the technological specialist to comprehend the actual and specific need.

Now that referring parties are beginning to learn how to "place their orders" correctly with work evaluation/adjustment facilities, they must learn to place a different kind of order with technological specialists. It is even more crucial to do so for this reason: referring parties ordinarily use work evaluation/adjustment facilities in their own local areas. Thus, any needed follow-up to clarify an unclear request — though time consuming — is fairly easy to accomplish logistically. This is not so with many of the rehabilitation engineering resources. Project IMPART, for example, is a public service available to anyone in Texas and neighboring states who has a work-related rehabilitation problem. Frequent long distance calls to Austin, Texas may be frowned upon. And well they might, when the need could be circumvented by learning how to phrase the request precisely and unambiguously in the first place.

Many readers of this document will have clients on their caseloads or disabled workers under their supervision who might be helped to function more independently or efficiently through the application of technology. The reader, therefore, may wish to submit a problem to one of the resources learned about here — or perhaps some other — in hopes of finding a feasible, affordable, technological solution to a rehabilitation problem. The following guidelines are offered to help in formulating the statement of the problem in a way that will facilitate an on-target response with minimal delay.

First, it is important to adopt an analytic mode of thinking, a mental set of breaking down the global, problem-fraught situation into its component problem parts. The technological consultant needs to know what, specifically, the person needs or wants to do that she/he cannot because of what specific functional limitation(s).

The problem statement should describe the specific activity the person needs/wants to perform in what may seem to be microscopic detail. To say that the person wants to work as a secretary is not explicit enough. What particular **aspects** of secretarial work are impeded by the person's functional limitations? Is it reaching top filing drawers from a wheelchair? Is it typing at a competitive rate due to shoulder weakness? Each specific aspect of impeded performance must be spelled out.

It is important in this respect to remember that the rehabilitation engineer or other technological consultant is an expert in **technology,** but not necessarily in jobs, homemaking, recreation, or whatever the life performance area in question may be.

As implied above, the specific nature of the functional limitation(s) must also be spelled out in detail. Diagnostic categories such as spinal cord injury, poliomyelitis, arthritis, and the like do

not tell enough. Even as explicit a descriptor as "quadriplegic" does not convey suffient information because the term is applied to a considerable variety of functional patterns. The specific activities which are impeded must be spelled out; such as manipulating tape recorder controls, lifting a telephone receiver, or reaching materials.

One of the most basic rules of good report writing also applies to the formulation of problem statements in a request for rehabilitation engineering consultation. That is, "Avoid abstractions and write in terms of directly observable behavior." In report writing, this rule avoids the miscommunications that can arise when the writer and a reader **interpret** abstract conceptions such as "the client tends to be 'dependent' or 'well motivated' " in different ways. However, if writers describe the **behavior** which leads them to conclude that a client is 'dependent' or 'well motivated', then readers can draw their own conclusions from the behavioral data and misunderstandings are less likely to occur.

In consultation requests, the rule provides the same sort of protection against ambiguity. For example, to say "The client can type only fifteen words per minute due to upper extremity weakness" does not convey the picture one would observe if one had the opportunity to watch the client type. On the other hand, to say "The client has good use of her hands but only fair biceps and extremely weak shoulders; thus, she has the dexterity to type but cannot hold her arms in position for more than half a minute without resting for an equal time" gives the consultant an immediate picture of the **type** of solution needed. All that is left is to determine how to implement it.

In summary, the essential information needed is a description of the client in terms of the particular functional limitations which are interfering with his or her efforts to perform a specified activity or set of activities. In addition, it is generally helpful to provide the person's disability diagnosis and any background information which might clarify the problem statement. An important example would be previous efforts to achieve a technological solution which were less than satisfactory.

In formulating the statement of the problem, it may help to ask yourself if you have dealt adequately with each of the following questions:

1. What does the individual want or need to do that s/he cannot do:
   a. At all
   b. Efficiently/effectively?
2. What is the general nature of the desired/needed activity in terms of basic life performance areas? (E.g., training, work, homemaking, recreation, ADL, communication, mobility, transportation, two or more of these designations, other.)
3. What specific activity (or activities) does the individual wish/need to engage in?
   (E.g., secretarial work, college coursework, cooking, bowling, grooming, speaking, stair climbing, driving, other.)
4. What specific aspects or components of this activity are impeded?
   (E.g., reaching, lifting, manipulating small objects, reading, telephoning.)
5. What is the general nature of the functionally limiting condition that interferes with performing the activity (or activities)?
   (E.g., Post-SCI quadriplegia, post-polio weakness, arthritic joint inflammation, visual impairment, hearing impairment.)
6. What is (are) the specific functional limitation(s) associated with the conditions that preclude or impede performance?
   (E.g., lack of finger function, unable to do independent wheelchair transfer, unable to grasp objects, 20/400 vision in better eye, total deafness.)
7. How do the specific performance demands of the activity interact with the individual's specific functional limitations to create the performance problem?
   (E.g., unable to dial telephone, unable to transfer to toilet during work hours, unable to squeeze stapler, unable to read small typeface on insurance documents, unable to hear warning signals.)
8. What kind of help is wanted/expected from the technological consultant queried?
   (E.g., evaluation only, referral to existing/local resources, device development, other.)

As can be seen, this is a funneling technique in which the questions evolve from the general to the progressively more specific in terms of both the performance demands of the activity in question and the functional limitations that interfere with its execution. By answering these questions, you can better ensure that your problem statement will communicate the needed data precisely and unambiguously to the technological consultant whose help you are seeking.

CASE EXAMPLES: PROBLEMS AND SOLUTIONS

This section is comprised of case examples in the form of problem/solution pairs. It has been divided into eight subsections each of which contains problem/solution pairs applicable to a particular life performance activity. The eight subsections include Activities of Daily Living, Communications, Homemaking, Mobility, Recreation, Training, Transportation, and Work.

The format of problem/solution pairs has been standardized to facilitate easy reading and quick-look referral. Problem/solution pairs contain the following components:

Case Number	**Problem Description: (title)**
Impairment Etiology(ies)	_____
Functional Limitation(s)	_____
Performance Activity	_____
Device Name	**Solution Description: (title)**
	_____
	_____

Each component of the problem/solution format is described below.

Case Number

Each case number uniquely identifies a particular problem/solution pair. The case number consists of an alphabetic designator followed by a dash and a unique, two-digit number which is assigned sequentially. There are eight alphabetic designators; they represent the life performance activities into which problem/solution pairs may be categorized. The eight designators include:

A — Activities of Daily Living
C — Communications
H — Homemaking
M — Mobility
R — Recreation
T — Training
P — Transportation
W — Work

Thus the first two problem/solution pairs under the category Activities of Daily Living are assigned case numbers A-01 and A-02; the first two entries under the category Communications are C-01 and C-02, and so on.

Impairment Etiology

This element provides information about the disabling condition(s) which may result in functional limitation(s) that interfere with the performance of a particular activity. Examples of entries under this component include Spinal Cord Injury (SCI), Cerebral Palsy, and Stroke. Some solutions have been found applicable to specific functional limitations regardless of impairment etiology; the designation "any etiology" has been used to indicate this situation.

Functional Limitation(s)

Functional limitation(s) describes the particular physical or sensory deficit(s) associated with the impairment etiology which precludes or impedes performance of some activity. Examples of specific functional limitations include respiratory paralysis, limited grasp, or upper extremity weakness.

Performance Activity

The performance limitation is described in terms of the specific activity to be performed as opposed to the more general categories such as homemaking or work. Specific performance activities include breathing while sitting, stair climbing, reading, or wheelchair propulsion.

Device Name

The term shown indicates the general type of device utilized to solve a particular performance problem. Types of devices may include dexterity aids, mobility aids, remote controls or muscle stimulators.

Problem Descriptions

Problem descriptions provide information about the circumstances surrounding a specific requirement for a technological solution. Information provided includes client characteristics and needs, environmental factors, activities to be performed and any other attendant circumstances. A brief descriptive title is provided to facilitate scanning.

Solution Descriptions

Solutions are described in terms of the specific device and/or methods utilized to solve a particular performance problem. Explicit, how-to-do-it descriptions are provided when necessary for clarity and may also include illustrations. Vendor information is also provided. Brief titles are provided to assist the reader while scanning.

For Further Information (FFI) Codes

These codes, which appear at the end of each solution description, refer the reader to the listings in Section IV, Resources for Further Information and Solutions. (Section IV provides more detailed information about vendors, exhibitions, publications and rehabilitation engineering centers.)

The problem/solution pairs which comprise this section may be used in two ways. Readers may scan the key words to the left of each case example to identify the types of problems and available solutions associated with each of the eight major performance categories. The brief titles provide further information about specific problem/solution pairs. Alternately, readers who require a solution(s) to specific performance problems or detailed information about the availability and application of specific devices may use the key word indexes located at the end of this document.

ACTIVITIES OF DAILY LIVING

A-01
Paraplegia
Bathing

PROBLEM: Unable to enter bathtub.
A client with paralysis of the lower extremities sought information regarding a device to help him get in and out of the bathtub.

Mobility Aid

SOLUTION: Commercially available bathtub lifts.
IMPART identified the following vendors of suitable devices: 1) Hydraulic chair lift, Invacare Corp., 1200 Taylor St., Elyria, OH 44035, 2) Waterpowered bath lift, Aqualift, Triaxon, Inc., P.O. Box 415, Glenview, IL 60025, (312) 724-0038, 3) Portable water-powered bath lift, National Products Co., P.O. Box 483, Waukesha, WI 53186, 4) Nolan waterpowered bath lift, J.E. Nolan & Co., Inc., P.O. Box 43201, Louisville, KY 40243, and 5) Bath lifts PC 7185F and PC 7188, J.A. Preston Corp., 71 Fifth Ave., New York, NY 10003, (212) 255-8484. Inquire direct for costs. FFI #13

A-02
Polio
Respiratory Paralysis
Breathing While Sitting

PROBLEM: Desire to shed respirator for extended periods.
A post-polio patient felt that with some assist in rhythmic pushing against his diaphragm he would be able to get along without a respirator for extended periods of time.

Respiratory Aid

SOLUTION: Lapboard respiratory assistive device.
A battery operated pusher device was constructed, which while pushing against his belly displaced viscera upward against the diaphragm and caused exhalation. It was quite successful allowing him to shed his respirator for extended periods of wheelchair sitting. FFI #6

A-03
Hand Paralysis
Brushing Teeth

PROBLEM: Inability to squeeze.
A patient, handicapped by lack of hand function and with very little hand strength found it impossible to squeeze the toothpaste from a tube.

Dexterity Aid

SOLUTION: Toothpaste dispenser.
A slotted holder for a tube of toothpaste, fitted with a roller which fits into the slots, and a handle permitting considerable leverage for squeezing the tube was constructed. This patient was then able to handle very easily any tube squeezing task. FFI #6

A-04
SCI
Quadriplegia
Depressing
Muscle Stimulator

PROBLEM: Unable to depress independently to relieve skin pressure.
A high level quadriplegic client needed assistance at regular intervals to shift weight during sitting periods to prevent ulcer formation.

SOLUTION: Muscle stimulator.
A bilateral, master/slave, multi-site triceps muscle stimulator was developed and fabricated. It was necessary to brace the patient's forearms. A development program was required to strengthen unused muscles. FFI #6

A-05
Cerebral Palsy
Door Opening/Closing

PROBLEM: Unable to open/close door.
A cerebral palsy handicapped patient with limited arm extension could not open and close his door from his wheelchair or operate the lock.

Remote Control

SOLUTION: Remote control.
A remote control electrical door latch and lock were designed and installed. Available from HITE, P.O. Box 57843, Webster, TX 77598 for approximately $600. FFI #6

A-06
Stroke
Limited Grasp
Eating

PROBLEM: Reaching and grip weakness.
A man who has had a stroke cannot lift tableware up all the way to his mouth in order to feed himself and has difficulty in gripping small objects.

Dexterity Aid

SOLUTION: Personal eating equipment.
Fred Simmons, Inc., Box 32, Brookfield, IL makes a variety of tableware equipped with enlarged and elongated handles. These extensions can also be made by bolting on a strip of plastic to a fork or spoon. Check out muscle control under supervision at first to insure safe usage. FFI #4

A-07
Quadriplegia

PROBLEM: Unable to operate appliances.
A high level quadriplegic was unable to operate any of the appliances in his home and bedroom.

Environmental Controls

SOLUTION: Environmental control unit.
During his hospital stay he was trained to use a sip and puff mouth switch. On his return home he was provided with an ECU-2 environmental control unit from Prentke Romich Company with sip/puff switch and two remote control receptacles. With this equipment, using only the sip/puff switch, he was able to operate all of the lights, radio, TV, and other appliances in his immediate environment. Available from Prentke Romich Co., RD2, Box 191, Shreve, OH 44676, (216) 567-2906, for approximately $600. FFI #6

A-08
Quadriplegia
Paralysis

PROBLEM: Severely limited reach
High level quadriplegics using environmental control systems frequently need to bring the controls into manipulative range and also to get them out of the way of some activity.

Environmental Controls
Operation
Mobility Aid

SOLUTION: Autopositioner
An "Autopostioner" was designed and built. The autopositioner is a compact, portable system which allows a patient, who can whistle or hum, to control certain electronic systems situated within his environment. The device is mounted to the frame of a bed, or it may be positioned on a table edge for wheelchair usage. The patient whistles or hums to summon or retract the environmental control index device. Additionally, this device can be activated by a head switch or any other switch usable by the patient. FFI #6

A-09
Quadriplegia
Lifting Light Objects

PROBLEM: Inability to manipulate light objects
Many quadriplegics are unable to lift/manipulate even very light objects, such as paper money, coins, typing paper, book pages, and playing cards when daily living, work, or recreational pursuits require it.

Dexterity Aid

SOLUTION: WWRC mouthstick
The Woodrow Wilson Rehabilitation Center's Rehabilitation Engineering Department developed a mouthstick comprised of a 17 inch hollow aluminum arrowshaft mounted in a mouthpiece of dental acrylic and with a small rubber suction cup attached to the distal end.

Sucking action will adhere any light, smooth object. Tongue placement over the mouthpiece opening eliminates need for further sucking action. Weight, 8 ounces. Fabrication costs, approximately $8.00. Not yet available commercially. FFI #11

A-10
Quadriplegia
Operating Tape Recorder

Dexterity Aid

PROBLEM: Unable to operate tape recorder.
A high quadriplegic could not operate the controls of a Craig tape recorder microphone/hand control.

SOLUTION: Lever extensions
The control switches were modified by lever extensions so that they can now be operated with a mouthstick. FFI #6

A-11
Complete Quadriplegia
Page Turning
Mobility Aid

PROBLEM: A quadriplegic with no arm movement wants to turn pages of books and magazines in order to read independently.

SOLUTION: Page turning devices.
There are a number of page turners on the market. In order to operate them, microswitches must be placed within reach of well-controlled body movements, such as head or chin movements. These machines are extremely expensive, most costing over $1000, and can malfunction causing the reader much frustration. Ask for a trial use prior to purchase. Forward and backward page mobility is useful for some persons who like to read magazine articles of their choice and priority. Touch-Turner Co., 1808 10th Avenue, East Seattle, WA 98102, sells a page turner. FFI #4

A-12
Cerebral Palsy
U.E. Impairment
Playing Radio-Tape Recorder

Dexterity Aid

PROBLEM: Inability to operate radio-tape recorder
A cerebral palsied child had a combination tape recorder, calendar, AM-FM combo but she was unable to master the controlled hand and finger movements needed to operate the control keys. She was adept with a head pointer but could not depress the control keys with it.

SOLUTION: Modified radio-tape recorder for use with head pointer
A cross bar was fastened to the appliance and a number of long keys, each with a large concave button, were hinged in place so that each could depress an operating key. The child was able to depress the key buttons with a head pointer. FFI #6

A-13
Blindness - Legal
Reading

Sensory Aid

PROBLEM: Reading menus and checks in dimly-lit restaurant
Worker with partial vision (no vision in left eye, 20/800 in right eye, and almost normal visual field in right eye). This worker has a need to go to restaurants with guests as part of his business day. Often these restaurants are very dark and he has great difficulty reading a menu or the check in the available light.

SOLUTION: Penlight
To solve this problem he uses a penlight that involves a flashlight bulb and two AA batteries. Penlights of this sort are frequently available at hardware stores and drug stores. They sell for about $2 or $3. Be sure to obtain a penlight that uses AA batteries rather than AAA batteries, because AAA batteries wear out much more rapidly than AA batteries and, in the long run, will add significantly to the "operating cost" of the flashlight. FFI #5

A-14
Low Vision
Reading

PROBLEM: Difficulty reading small print, scanning lines
A VR client who has had a stroke and has low vision experienced difficulty in reading newsprint. Aids or techniques were also needed that would enable him to follow a line of print across the page and scan to the subsequent line easily.

Sensory Aid

SOLUTION: Low vision table reading aid
An IMPART team member designed and built a device of lightweight durable aluminum to hold reading material in front of a person with very low vision. The material is placed on a 12" by 16" moveable platform tilted to 75°. The 75° tilt places the reading matter at a more comfortable angle and reduces the strain on back and neck muscles caused by reading with material on flat table surface. With lens magnification up to 20X power, the user can move the material in front of the lens for each sentence and then the material can be elevated to the next sentence, returned to the left margin and reading begun again. Thus, the reading material is moved with a minimum of head and eye movement, reducing the error of losing one's place. The framework supporting the moveable platform is also made of aluminum. A large knob is used to elevate the platform. A line indicator can be attached to the platform. FFI #13

A-15
SCI
Quadriplegia
Securing Drugs

PROBLEM: Unable to secure drugs in dormitory setting
In a dormitory setting a quadriplegic was not able to secure against pilfering his supply of drugs and medications.

Dexterity Aid

SOLUTION: Pushbutton combination lock box
A pushbutton combination lock was installed on a drug box. The box was bolted to the furniture. It was so arranged that it could be operated by a quad from a wheelchair by use of a mouthstick. FFI #6

A-16
Finger Weakness
Shaving

PROBLEM: Inability to operate pressurized cans
With severely limited finger strength, a man was not able to operate a pressurized can of instant shaving cream.

Dexterity Aid

SOLUTION: Shaving cream dispenser
The Biomedical Engineering Department designed and built a holder for the can, with a lever arm over the top, permitting the button on the pressurized can to be depressed with almost no strength required. It worked very well. FFI #6

A-17
Hand/Wrist Immobility
Shaving

PROBLEM: Inability to use standard shaver
A man, handicapped by severely limited hand function and wrist motion, was not able to hold an electric razor and manipulate it so as to shave himself satisfactorily.

Dexterity Aid

SOLUTION: Electric razor manipulator
A clamp-on handle was designed and built for an electric razor permitting this patient to neatly shave himself. The superb design of this manipulator allows the user to maintain the shaving head in contact with the face by simple movement of one hand forward or backward with respect to the other. A unique spring loaded tilt mechanism allows manipulation of the razor so that under-the-chin shaving can be accomplished with correct pressure and minimum effort. FFI #6

A-18
SCI Quadriplegia
UE Paralysis
Shaving

PROBLEM: Inability to use standard razor
A C-6 quadriplegic with an orthosis found it impossible to reposition a safety razor in his orthosis in order to obtain the correct angle for shaving.

Mobility Aid

SOLUTION: Safety razor with adjustable handle angle
A Gillette TRAC-II razor was modified by cutting the handle through about one inch from the original angle in the razor handle. A double ball joint was inserted at this point giving capability of full rotation and unlimited handle angles.

The individual was then able to reposition the razor head to give whatever angle was needed by pushing it against the solid support. The locking mechanism was used to give enough rigidity to shave, but still to permit changing the angle by pushing it against something. A half dozen razors have been made and are being used by C-5, C-6, and C-7 quadriplegics. FFI #6

A-19
Post-Polio
Paralysis
Sitting

PROBLEM: Pressure sores
One of the factors controlling and often limiting the length of time quadriplegics can remain seated in an upright position is the tendency to develop decubitus ulcers. When the ability to voluntarily shift positions periodically is lost, care must be taken to shift the patient at regular intervals by an attendant.

Positioning Aid

SOLUTION: Automated posture control
In order to increase the independence of one post-polio quadriplegic, a powered assist device was developed and fitted to shift his position by pushing on his knees. A compressed CO_2 powered cylinder between the knees periodically pulls on knee pads, raising the patient, and allowing increased circulation in the gluteal area.

The fit of the knee pads is important for comfort. The frequency, length of cycle, and direction are adjustable. It is perfectly feasible to automate the cycle or to connect it to a manually operated switch so that the patient can determine the frequency with which he shifts position.

The patient for whom it was designed experienced much more comfort and was able to sit for much longer periods without adverse affects. FFI #6

A-20
Paraplegia
Toileting

PROBLEM: Electric wheelchair to toilet transfer
A female paraplegic found it impossible to transfer herself from her electric wheelchair to the bathroom commode.

Wheelchair
Modification

SOLUTION: Move battery assembly forward
The battery assembly of the wheelchair was relocated under the wheelchair seat so that the wheelchair could be backed up to bring the patient to the commode seat. The back of the wheelchair was modified to snap out. Now the patient can slide herself directly back through the wheelchair onto the commode. FFI #6

A-21
Cerebral Palsy
Back Pain
Traveling

PROBLEM: Need for portable bedboard when traveling
A cerebral palsied client with back pain problems needed a portable bedboard which could be used for sleep support when traveling.

Bedboard

SOLUTION: Commercial portable bedboard
IMPART found a suitable bedboard available from Nelson Medical Products, 5690A Sarah Ave., Sarasota, FL 33581. Suitable devices are also available from catalog sales at both Sears and Montgomery Wards. All retail for approximately $15. FFI #13

A-22
Any Etiology
UE Paralysis
Typing

PROBLEM: Off the shelf head styli inadequate, too expensive
For a person with little or no use of the upper extremities, a head stylus offers a means for typing. Off the shelf styli tend to be expensive, however, and often need modifications which are hard to obtain and entail further expense.

Dexterity Aid

SOLUTION: Stylus for typing
A stylus holder headpiece was made from a commercially available interlining from a safety helmet. The lining can be adjusted to fit most any head size and also includes an adjustable chin strap that helps to stabilize the stylus. The stylus holder consists of a small length of copper tubing which is brazed to a piece of sheet metal approximately 2 inches by 1 inch. The tubing is then bent down at an angle of approximately 45 degrees to position the wand within the field of vision. The piece of sheet metal is riveted to the helmet liner so that the outer shell of the liner is sandwiched between the stylus holder and the back plate. The inner lobe of the liner keeps the back plate away from the person's head. The wand may be made from plastic and cut to the most suitable length. It is very simple to make and can be produced by anyone able to use simple hand tools. FFI #1

A-23
Brain Damage/Stroke
Paralysis/Drop Foot
Walking

PROBLEM: Drop foot
Many head injury and stroke patients require drop foot correction during the swing phase and foot/ankle stabilization through the stance phase in order to approximate a normal gait.

Transcutaneous electrical stimulation of the peroneal nerve is effective in achieving these corrections. A drawback has been neuromuscular fatigue of such magnitude that the system lost its attractiveness to the patient and was discarded.

The fatigue, due to continuous peripheral nerve stimulation, can be reduced by programming the stimuli to give a pattern of intermittent pulses. One can vary the dropping of pulses during the evaluation phase to see the best pattern.

Mobility Aid

SOLUTION: A programmable extended train peroneal stimulator
Such a system was built and found to be equally effective in controlling gait correction while reducing markedly the fatigue factor.

Another feature is that the pulse amplitude of the stimulus for the different phases of the cycle is independently controllable and can be more easily matched to the requirement of the patient. It was found that more stimulus was needed in stance than swing because limb is loaded in stance.

The result is far greater acceptance of the system by patients in correcting their gait problems following head injury and stroke.
FFI #6

A-24
Polio
Quadriplegia
Weighing

PROBLEM: Obese wheelchair user must weigh daily at home
The freedom of being able to weigh has been denied to those individuals who cannot stand on a scale. Rehabilitation Centers usually have floor level scales but other places do not.

Mobility Aid

SOLUTION: Bathroom scale attachment
Two channels wide enough to fit wheelchair tracking pattern were positioned over a bathroom scale. The channels were only ½" from the floor. The user rolls the wheelchair on the channels, checks the dial, subtracts the weight of the wheelchair. A similar unit is available from Nelson Medical Products Company, 5690 A Sarah Ave., Sarasota, FL 33581 for approximately $50.00. FFI #4

A-25
Quadriplegia
Wheelchair Propulsion

PROBLEM: Unable to propel manual wheelchair
A quadriplegic patient needed a mechanism to utilize his shoulder muscles to propel a wheelchair.

Mobility Aid

SOLUTION: Adaptive propulsion device
An adaptive propulsion device which fits onto a standard wheelchair has been developed. It is a mechanical system that does not require the patient to use active elbow flexion or grip. The only function required is in the triceps and/or shoulder. FFI#6

A-26
Muscular Dystrophy
Paresis, Severe
Writing

PROBLEM: Unable to write
A muscular dystrophy handicapped individual had some hand muscle control in each hand but essentially zero arm and shoulder muscle control on either side. Arm motion was very much needed to allow him to write.

Mobility Aid

SOLUTION: Arm rest/positioner
An electrically driven arm rest and arm positioner for his right arm was constructed and motivated by a switch mechanism operated by his left hand. The device performed so well that the client was able to perfect a legible handwriting. The switch mechanism controls three motions: 1) horizontal at the shoulder, 2) horizontal pivot at the elbow, and 3) vertical pivot of the forearm. FFI #6

C-01
ALS
Quadriplegia
Eating

PROBLEM: Unable to signal caregiver to regulate feeding speed
A woman who is totally paralyzed from amyotrophic lateral sclerosis needed a communication device to signal the person feeding her to regulate the flow of intake.

Signaling Device

SOLUTION: Message selector with eyeglass switch
IMPART provided a Prentke Romich message selector (electronically operated backlighted messageboard) on a loan basis. A special eyeglass-mounted switch was also made available. This assembly provided an adequate means of communication for her while eating or drinking. The Alphabet Message Scanner with Memory is available from Prentke Romich, Box 191, Shreve, OH 44676, for approximately $600. FFI #13

C-02
Deafness
Hearing Alarm Clock

PROBLEM: Inability to hear alarm clock
Deaf individuals need non-auditory means of being awakened.

Sensory Aid

SOLUTION: Digital clock with bed vibrator
A digital clock with a receptacle on the back for a bed vibrator is available from Hellertronics, 1038 Janero Dr., Santa Rosa, CA 95401. Cost; clock is approximately $23.00, vibrator, approximately $19.00. FFI #12

C-03
Deafness
Hearing Baby Cry

PROBLEM: Inability to hear baby cry
Deaf parents need visual systems to alert them when the baby is crying and in need of attention.

Sensory Aid

SOLUTION: Vibra-Lite/Strobe
IMPART acquired and demonstrated the Vibra-Lite, a commercially available alerting device consisting of a sound detector and a stroboscopic lamp. Available from Vibra-Lite Products, Inc., 83 S. Highland Ave., Ossining, NY 10562. Cost: approximately $70 for the Vibra-Lite and $40 for the Vibra-Lite Strobe. FFI #13

C-04
Deafness
Hearing Intruders

PROBLEM: Inability to hear intruders
A deaf individual wanted a visual means for detecting when intruders had entered his property, either home or car.

Sensory Aid

SOLUTION: Burglar alarm light system
Project IMPART acquired and demonstated a device which could serve as an intrusion detector if noise were made during a forced entry. Available from Vibra-Lite Products, Inc., 83 S. Highland Ave., Ossining, NY 10562. Cost: approximately 170 for sound detector and $40 for strobe light. The strobe light can also be attached to commercially available systems. FFI #13

C-05
Deafness
Hearing Smoke Alarm

PROBLEM: Inability to hear smoke alarm
Commercially available smoke alarms use bells or other auditory signals as alerting devices. Deaf people need a visual signal for this purpose.

Sensory Aid

SOLUTION: Strobe lights
Commercially available smoke detector systems can be outfitted with strobe lights instead of a bell. Bids can be obtained from contractors and installers. The Smoketron-Detector, costing approximately $75., and the Remote-Receiver, costing approximately $35., are available from Essco Communications, Inc., Division of Diversified Electronic Corp., 4060 Wakefield St., Philadelphia, PA 19144. FFI #13

C-06
Deafness
Hearing Telephone, Doorbell

PROBLEM: Inability to hear telephone, doorbell
Deaf individuals need visual means for knowing when their doorbells or telephones are ringing.

Sensory Aid

SOLUTION: MAGSAT Phone Ringing Indicator Set
This commercially available system is comprised of a transmitter that detects when a telephone or doorbell is ringing and a receiver that makes a light flash in conjunction with the auditory signal. Receivers may be placed in many rooms or even at a neighbor's house when the person visits there. Available from MAGSAT, 56 Arbor St., Hartford, CT 06106, TTY or Voice (203) 525-4238. FFI #12

C-07
Vocal Cord Damage
Speaking

PROBLEM: Inability to speak above a whisper
A client had suffered severe damage to his vocal chords. The damage was irreversible and forced him to speak by whispering. This limited his range and since he was an instructor it diminished his effectiveness in lecturing. It also, of course, handicapped him in his personal life.

Amplifier

SOLUTION: Personal voice amplification system
The device was designed and built by the Biomedical Engineering Department at the Institute for Rehabilitation and Research. It consists of a miniaturized amplifier and speaker and a small plug-in microphone. The amplifier-speaker piece can be dropped into a shirt pocket, or clipped to belt or dress. The microphone can be attached to the frame of eyeglasses, worn with an ear piece suspension, or an over-the-head clamp.

The voice impaired man reported enthusiastically on the results. For the first time ever, he is able to converse with his wife while he is driving a car and she is a passenger. Classroom results are good. Some difficulty was encountered with feedback but this was countered by proper location of the speaker and controlling the volume. FFI #6

C-08
Cerebral Palsy
Dysarthria
Speaking

PROBLEM: Unable to articulate understandably
A VR client with cerebral palsy whose speech is not understandable has the goal of operating a bookstore and he needs to be able to communicate effectively with his customers.

Communication Aid

SOLUTION: Voice synthesizer, scanning messageboard
It was recommended that the client consider either the HC Handivoice voice synthesizer or an electronic scanning messageboard. The Handivoice, and the Prentke Romich message selector were suggested. The Handivoice is available from HC Electronics, Inc., 250 Camino Alto, Mill Valley, CA 94941 for approximately $2200. The Alphabet Message Scanner with memory is available from Prentke Romich, Box 191, Shreve, OH 44676 for approximately $600. FFI #13

C-09
Deafness
Speaking

PROBLEM: Inability to talk to hearing people who don't sign
Deaf individuals are constantly confronted with the need to converse with hearing people who don't sign in situations where no interpreter is available, on the job and in their personal lives.

Sensory Aid

SOLUTION: The Talking Pocket
This commercially available device is worn on the shirt pocket, blouse, or lapel. When words are typed on the VIP (small portable TDD), they appear on the Talking Pocket as well for the "listener" to read. Available from Automated Data Systems, Inc., P.O. Box 4062, Madison, WI 53711, for approximately $50.00. (VIP available from same vendor for approximately $180.00.) FFI #12

C-10
SCI
Quadriplegia
Telephone Dialing

PROBLEM: Unable to dial telephone
A large number of quadriplegic workers have difficulty using dial telephones which are ordinarily in use at their work sites.

Dexterity Aid

SOLUTION: Telephone dialing systems
There are many solutions to this problem, depending on the functioning of specific muscle groups. Many persons with quadriplegia have good arm movements but lack finger dexterity. Push button phones are generally easier to use than dial, but hand gripping devices with rubber tips can be used with both push buttons and dials. For those with lesser movement, other commercial dialing devices are available. Rehab-a-phone is operated by microswitches that can be placed in a variety of positions and is available from Seegar-Williams, Inc., 4 Norman Street, Bridgeport, CT 06605. Automatic dialers can dial 400 to 1,000 numbers preset by names. Magicall, 1811 W. Katella, Room 118, Anaheim, CA 92804, sells this system. Call or write for cost data. FFI #4

C-11
Cardiac, Epilepsy, etc.
Acute Illness Episodes
Telephone Dialing

PROBLEM: Unable to dial phone in medical emergency
People suffering from heart problems, epilepsy, or other conditions which may occasionally necessitate emergency medical attention may be unable to dial a telephone number during a crisis episode.

Emergency Device

SOLUTION: "Microalert"
This is a commercially available dialing device that will call a specific number or sequence of numbers automatically when activated by a squeeze. It is a small transmitter that activates a preset telephone dialing system. It is available from Microalert Systems International, 3029 San Fernando Road, Burbank, CA 91504 on either a sales or rental basis. Rental cost is approximately $40.00 per month. FFI #4

C-12
Deafness
Telephoning

PROBLEM: Inability to communicate by telephone
Deaf individuals need non-auditory means for discerning what is being said to them by telephone. In addition, those who lack clear speech need means by which their messages can be faithfully communicated to hearing telephone listeners as well as to other deaf persons.

Sensory Aid

SOLUTION: TDD
Telecommunications Devices for the Deaf (TDDs) are keyboard machines allowing visual communications over telephone lines. The TDD category includes both stationary and portable teletypewriters (TTYs) which print messages on paper, and devices with electronic visual readouts that provide no hard copy. Most available stationary TTYs were developed for Western Union Telegraph Co., AT&T, and the

U.S. Government. They are surplused/donated to Teletypewriters for the Deaf, 814 Thayer Ave., Silver Spring, MD 20910, voice/TTY (301) 588-4605. All require the addition of an acoustic coupler to use them over telephone lines. Numerous lightweight portables are commercially available, such as the Porta Printer, Teletyrm, and the MEM/P. In addition, numerous TDDs that use light emitting diodes to form alphanumeric displays are available under such brand names as MAGSAT, MEM/D, Pocket-Phone, Porta-Tel, VIP, and VIDCOM II. Their disadvantage is that they don't allow for reading an entire sentence at a time for deaf persons who have limited grasp of English. Video tube display TDDs are reasonably portable (8 — 25 pounds) devices allowing several lines of communication to be displayed at the same time (C-Phone and TV Phone). FFI #12

C-13
Deafness
Telephoning

PROBLEM: Need for relatively inexpensive TDD with large readout
A deaf individual sought a recommendation from Project IMPART for a less expensive TDD than those he knew about, and which has a larger visual display.

Sensory Aid

SOLUTION: Porta-Tel
IMPART located a commercially available device meeting these requirements called the Porta-Tel, available from Specialized Systems, Inc., 215 S. Highway 101, Suite 203, Solana Beach, CA 92075. Cost is approximately $400. FFI #13

C-14
Deaf/Blind
Telling Time

PROBLEM: Unable to hear Braille wristwatch alarm
A deaf/blind VR client sought an alarm wristwatch which he could use.

Sensory Aid

SOLUTION: Braille watch with tactile alarm
IMPART found that a braille watch with a tactile alarm (Model CM40) is available through the American Foundation for the Blind, Aids and Appliances for the Blind and Visually Impaired, 15 W. 16th St., New York, NY 10011 for approximately $76. FFI #13

C-15
Deafness
Traveling

PROBLEM: Need for miniature TTY
Deaf individuals who travel a great deal for business or pleasure need very small portable TTYs for calling home, making business contacts, etc.

Sensory Aid

SOLUTION: The VIP
This commercially available TDD is small enough to carry in a pocket, purse, or briefcase, weighs 9 ounces, and will work with TTYs, MCMs, MAGSATs, Teletyrms, or any TTY Network unit. It is available from Automated Data Systems, P.O. Box 4062, Madison, WI 53711, for approximately $180.00. FFI #12

C-16
Cerebral Palsy
No Speech, Poor Coord.
Typing

PROBLEM: Unable to use head stylus for typing
Cerebral palsied individuals lacking speech capabilities and also unable to operate a typewriter accurately, even with a head stylus, need an affordable device which will allow them to communicate by typewriter.

Communication Aid

SOLUTION: Row column scanning typewriter
A row column scanning device was designed and interfaced with a commonly available teletypewriter. The scanner consists of the letters and symbols displayed on a six by six matrix. The scanner

begins scanning the rows, beginning with the uppermost. The row display lights step through the rows until the client activates the switch, causing the selected row to remain lit. The scanner begins scanning the columns. When the desired symbol is at the row-column intersection, client again activates switch. This stops scanning and initiates a print command that is sent to the typewriter interface. This initiates a print complete command which clears all counters so operation can begin anew. Symbols are arranged so that access time is proportional to English usage frequency. The single switch may be any configuration convenient to the operator. Scanning frequency may be controlled by operator by a potentiometer located on the external surface of the scanner. FFI #1

H-01
Post-Polio Paraplegia w/Quadriparesis
Cooking

Kitchen Aid

PROBLEM: Unable to operate standard mixer
A housewife who uses a wheelchair and has only limited use of one arm found that most mixers are far too heavy for her to operate. Also, bowl turning was impossible.

SOLUTION: Lightweight mixer
An extremely lightweight commercially available mixer was discovered in the Krups 3 Mix 3000 System, which has the added feature of automatic bowl rotation. Imported from Germany, it is available in department stores thoughout the U.S. It is significantly more costly than other home use mixers; $80 at time of 1978 purchase, compared with $40 for a Mixmaster brand. FFI #7

H-02
MD
U.E. Weakness
Cooking

PROBLEM: Rented apartment precludes architectural changes in kitchen.
A woman disabled by muscular dystrophy uses a manual wheelchair and lives in a rented apartment. She has difficulty using the sink and stove and reaching into cupboards. The landlord doesn't want any major changes.

Mobility/Position Aid

SOLUTION: Commercial aids and proper placement of equipment
An electric powered wheelchair with a removable leakproof wheelchair tray is a great aid in carrying hot food or plates, glassware, etc. Its use makes it easy to use a vacuum cleaner. Lower accessory tables can be used with electric frying pans, crock pots, portable ovens, etc. Usually the doors in front of the sink can be removed and stored for later use. Removable swing-away foot rests will allow closer approach to the sink. An old-fashioned dishpan can also be used on accessory tables. A variety of reachers can be used to reach items on shelves. Plan location of all items on frequency of use and reachability. The use of a mirror over the stove is helpful but regular height stove surface has its hazards. FFI #4

H-03
MD
General Weakness
Home Management

PROBLEM: Inability to stand
A woman who has muscular dystrophy finds it is difficult for her to achieve and maintain a standing position. She was evaluated at her home to determine what applications of technology could be employed to increase her independent activities and security.

Mobility Aid

SOLUTION: Recommended modifications
At the time of this referral, the client was using the Ortho-Kinetic lift wheeled chair. Once the seat angle was adjusted to mid-range and she was shown how to adjust the seat, she was able to accomplish standing and sitting without assistance. Now that she can stand at will, she will be engaging in activities like cooking and doing the laundry. To enhance her independent mobility within the house, it was recommended that a stair lift or wheelchair lift be installed between the first floor and basement. This would allow her access to the downstairs laundry room, safe movement up/down in the house, and access to the outdoors through the garage. The addition of an electric garage door opener and the installation of a brake extension and headlight dimmer switch on the steering post of the sedan she now drives would give her completely independent movement into and out of the house. To enhance her safety and security within the house, the following items were recommended: (1) grab bars in the shower; (2) a medical emergency call system; and (3) smoke detectors. FFI #10

H-04
Cerebral Palsy
Dysarthria

PROBLEM: No intelligible speech
A former resident of a housing facility for people with disabilities became employed and lost his eligibility for special housing. He moved to a nearby apartment house so he could at least purchase the needed support services from the residence. His only problem was being able to convey emergency messages to the switchboard operator of the residential unit.

Communication Aid

SOLUTION: Non speech emergency communication
A memory telephone was installed in his apartment, which allowed him to choose a canned number that would automatically dial the housing unit switchboard. He was also given a cassette tape recorder and six prerecorded tapes deemed appropriate for his daily needs. They were coded pictorially so he could select the proper tape. The tapes had very little leader on each end and were recorded on both sides. They were inserted into the recorder when needed and played into the telephone transmitter. The messages are repeated twice on each side of the tapes, and the recorder has an automatic stop feature.
FFI #1

H-05
Osteogenesis Imperfecta
Short Stature;
Paraplegia
Household Management

PROBLEM: Unable to reach household appliances and furnishings
A woman born with a fragile bone condition, who has a history of many fractures, is paraplegic and approximately two and a half feet tall. Her short stature plus use of wheelchair make it difficult to impossible for her to reach to cook and perform other household chores. She has good use of her upper extremities, however.

Mobility Aid

SOLUTION: Elevating Tiny Tot wheelchair
The REC at Northwestern University designed an adapted wheelchair for her use, with elevating capabilities. Its components included: an E&J Premier Tiny Tot wheelchair with removable arms, high seat, and one piece footboard, less armrests, seat and back upholstery, and rear wheels; a quick disconnect removable seat (the seat shell was molded of a chopped fiberglass reinforced resin with foam cushioning and fabric upholstery); manually controlled seat rotation; drive motors and wheels from the Abec wheelchair; proportional hand controller (Abec) in which was mounted the power on-off button and seat elevation button; elevating actuator (Motion Systems); a quick disconnect battery (two 12 volt, lead acid, GEL-CELs); locking storage compartment in left armrest; and a safety switch mounted in the seat cushion. This switch eliminated the chance of an accidental start up while she was transferring or reaching, since she had to be properly positioned in the wheelchair before the power would be activated. The heights of her bed, tub seat, and toilet seat were then raised to be level with the lowest wheelchair elevation. The wheelchair charging system was rewired so she could make the necessary connections from her bed. Reacher tongs were also provided. The solution not only increased her independence at home as planned, it opened up vocational possibilities for her. FFI #9

M-01
L.E. Amputee; Bilateral
Ramp Use

PROBLEM: Unstable wheelchair on steep ramps
A worker must propel himself in a regular adult wheelchair up a steep ramp each day to get to work. He is a double amputee who doesn't wear prosthesis. His chair tends to tip. He wants to add weight to the front wheels.

Wheelchair

SOLUTION: Amputee wheelchair
Each ounce of weight added to the chair increases energy expenditure. This counts up at the end of a long day. An amputee model wheelchair in which the rear wheels are set back is suggested. This provides a longer wheel base and gives the wheelchair more stability on ramps. FFI #4

M-02
Paraplegia
Stair Climbing

PROBLEM: Unable to climb stairs
A person who uses a manual wheelchair lives on the second floor of a two story house. The local elevator sales company doesn't have a satisfactory solution to his getting up the staircase which, incidentally, has two landings.

Elevator

SOLUTION: Powered device to transport person up and down stairs
First floor living quarters are much more suitable for disabled persons because mechanical devices and elevators do not behave well during fires. Two exits should be available to disabled persons. The WESCOLATOR, made by Cheney Co., 7611 North 73rd Street, Milwaukee, WI 52335, can be used in conjunction with landings. The person must be able to transfer himself upward about 6" to get on the device. An extra wheelchair is necessary on the second floor for his use as the device does not transport wheelchairs. The "elevator" seat is 26 inches high. Costs vary with the number of steps and landings. FFI #4

M-03
M.D.
Paresis
Stair Climbing

PROBLEM: Unable to climb stairs
A muscular dystrophy handicapped person with a chronic back problem was unable to manage a flight of seven steps from her porch entrance down to her automobile in the morning on the way to work. The return problem was equally difficult.

Elevator

SOLUTION: Mechanical lift
A mechanical lift was installed at her home so that she could ride the platform up or down while either standing or sitting in a wheelchair. The lift was installed by Houston Independence Through Engineering — HITE, P.O. Box 57843, Webster, TX 77598 for approximately $1410. FFI #6

M-04
Any Etiology
Paraplegia
Cushion Replacement

PROBLEM: Wheelchair cushion replacement
A counselor asked for guidance on when wheelchair-user clients should replace their wheelchair cushions.

Positioning Aid

SOLUTION: Replacement with cushion to fit individual needs
The basic function of a wheelchair cushion is pressure distribution over a large area. Pressure sores develop in areas where there is a lack of tissue padding over bony prominences. Other features to consider are weight of cushion, heat and moisture exchange and stability. Cushions of foam rubber and other foam materials slowly lose their resistance and pack down so that they fail to protect potential sites for

pressure sores. No cushion can be relied upon to protect fully from pressure sores. One method of fitting utilizes a medium density cushion as a fulcrum, utilizing part of the weight of the lower extremities as a counter force to lower pressure on the bony prominences. Cut out portions also help if they are not circular. Changing positions for at least partial release of pressure is required for prevention of pressure areas. Dail inspection with mirrors is recommended. Provide new cushions on request. The user knows when the cushion needs replacement. FFI #4

M-05
Quadriplegia
Wheelchair Operation

PROBLEM: Unable to operate electric wheelchair
In a high quadriplegic, residual muscle control was not adequate for conventional chin operated control of an electric wheelchair.

Dexterity Aid

SOLUTION: Photo electric controls
The controls of a conventional wheelchair were replaced with an eye activated photo electric system. The user can select the mode of operation or direction (forward, reverse, stop, right, or left) by simply forcing a hard stare in the right segment of vision. The photo electric devices are mounted on the eye frames of a pair of eyeglasses. FFI #6

M-06
Spinal Muscular Atroph
Wheelchair Propulsion

PROBLEM: Unable to operate motorized wheelchair controls
A 21 year old woman with spinal muscular atrophy is unable to control her wheelchair independently. She has very limited shoulder and arm function. However, she does have use of her index and middle fingers on the right hand.

Controls

SOLUTION: Arm cradle and lapboard switches
Project Threshold engineers designed and fabricated microswitches which were mounted horizontally on the client's lapboard. A plexiglass cradle was fabricated to hold her right arm in a comfortable position while using her index and middle fingers to operate the switches controlling her wheelchair. FFI #14

M-07
Any Etiology
Requiring Electric Wheelchair
Wheelchair Usage

PROBLEM: Inability to afford standard electric wheelchair
The cost of standard electric wheelchairs is out of range for many individuals. A cheaper and lighter weight version was needed.

Mobility Aid

SOLUTION: Standard-to-Electric Wheelchair Conversion Kit
A Standard-to-Electric Wheelchair Conversion Kit has been devised. By replacing the handles with rechargeable battery packs and the brakes with a friction motor-drive arrangement on each side, a manual wheelchair can be simply converted to a secondary purpose electric wheelchair. It is lightweight and low cost. FFI #6

M-08
Leg Fracture
Non-ambulatory
Wheelchair Usage

PROBLEM: Heavy leg cast immobilizes worker
Following a leg fracture, a worker had a heavy cast which she had to wear for six weeks. She could return to work if she could use a wheelchair, but she works at a table and the leg with the cast cannot hang down.

Positioning Aid

SOLUTION: Bolt-on leg support on rented wheelchair
Any local wheelchair vending company can rent a wheelchair with a bolt-on leg support. Outriggers should be added to the wheelchair to aid in going up and down ramps safely. FFI #4

R-01
U.E. Weakness
Poor Grip
Billiards

PROBLEM: Inability to grip and propel standard billiard cue
When a player is unable to properly hold and propel a standard billiard cue in a coordinated manner, he may be unable to properly play billiards, may damage the billiards tabletop or may injure himself.

Dexterity Aid

SOLUTION: Spring-loaded billiards cue
This design utilizes a unique light-weight aluminum cue, 50" or 58" long, designed for use by even severely disabled individuals. When user pushes the cue tip against any firm surface, the unit is ready to use. He then aims and releases via control switch at the end. The cue does the rest. The device is available under the brand name "Quad Pod" from North American Recreation Co., P.O. Box 758, Bridgeport, CT 06601 (203) 336-2151, or A to Z Industries 118112-5 Bryand Street, Northridge, CA 91324, for approximately $46.00. FFI #8

R-02
Any Etiology
U.E. Impairment
Billiards

PROBLEM: Inability to propel billiard cue accurately
When a player is unable to hold or propel a standard billiard cue in a coordinated manner, skill development and enjoyment of the game are impeded.

Mobility Aid

SOLUTION: The Murphy Bridge
The design of this commercially available device uses a light weight, durable stick cue that enables the player to shoot billiards with complete independence whether s/he uses one arm only, plays from a wheelchair, or uses other non-standard playing patterns. It attaches to any standard cue, disassembles to fit into a cue case, and has a non-skid rubber side which enables shots to be made from the edge of the table. Available from Charlton Manufacturing, 3511 Highway D, West Bend, WI 53095, (414) 334-7391 for approximately $18. FFI #8

R-03
Any Etiology
Grip Impairment
Bowling

PROBLEM: Unable to hold bowling ball by finger holes
When a player is attempting to roll the ball it is essential to be able to properly grip it. If this is not done, the bowling balls, which are heavy, drop from the player's grip and could either cause injury or damage the floor, not to mention obstructing the development of skills and the player's enjoyment of the activity.

Dexterity Aid

SOLUTION: Design of a bowling ball with a special gripping device
The design allows the player to grasp the ball without the usual finger hold grip. Finger holes have been replaced by a spring-loaded hand grip. Simply grasp the handle, roll the ball and the handle retracts flush into the ball. The bowling ball is made of the highest quality rubber and comes in either 10 pound, 12 pound, 14 pound or 16 pound weights. For approximately $73.00, this device is available from the North American Recreation Company, P.O. Box 758, Bridgeport, CT 06601, (203) 336-2151. FFI#8

R-04
U.E. Function Impaired & Wheelchair Use
Bowling

PROBLEM: Unable to propel bowling ball from wheelchair
Wheelchair users with limited upper extremity strength and coordination may find that they frequently drop the ball, interfering with their enjoyment of the game and, perhaps, causing damage to the floor.

Mobility Aid

SOLUTION: Wheelchair bowling ramp
The design is such that even very severely disabled can participate in bowling. Attendant (fellow player) places ramp in position; ball is then placed on ramp and pushed for ball release. The momentum carries the ball down the alley into the pins. It may also be used from a standing position. Strong, light-weight chrome plated steel that is strong and durable and can be dissembled into two pieces for easy storage and transporting. This is available from the North American Recreation Company, P.O. Box 758, Bridgeport, CT 06601, (203) 336-2151, for approximately $73.00. FFI #8

R-05
Any Etiology
Wheelchair Use
Bowling

PROBLEM: Unable to hold bowling ball and propel chair
When a player approaches the bowling line, s/he must use both hands to propel the chair. Since bowling balls are heavy, they tend to roll from the player's lap and damage the floor.

Positioning Aid

SOLUTION: Wheelchair bowling ball holder
The design incorporates an on-off quick attachment to the wheelchair. A circle of metal slightly smaller than the ball holds it securely over the lap area until it is needed. With this arrangement, it does not interfere with arm swing in launching the ball. Available from North American Recreation Co., Box 153 Fairhaven Station, New Haven, CT 16513. Write for cost. A similar device is sold by George Snyder, 5809 N.E. 21st Ave., Ft. Lauderdale, FL 33308, for approximately $10.00. FFI #4

R-06
Paraplegia
Cycling

PROBLEM: Unable to ride a bicycle
When paraplegics wish to ride bicycles, they cannot as a bicycle is designed to be motivated by foot pedals. A less disabled individual also has difficulty properly balancing on a bicycle.

Mobility Aid

SOLUTION: Hand operated tricycle
The design is a hand operated tricycle engineered for individuals who depend on their hands and arms for mobility. All controls are easily accessible and light weight construction allows for easy pedaling. Standard equipment includes 5 speeds, a dual braking system, independent rear supports, and adjustable seat and leg supports. The device is available under the brand name "Centauri" from Tri-World Industries, 16015 West 5th Avenue, Golden, CO 80401 for approximately $600.00. FFI #8

R-07
Any Etiology
Paraplegia
Cycling

PROBLEM: Unable to use legs for cycling
Standard motorcycles/mopeds require active use of the lower extremities for mounting and balancing. However, many paraplegics wish to enjoy the experience of cycling.

Mobility Aid

SOLUTION: "Tri-ped"
The design of the Tri-ped incorporates a three wheel design 75 inches long, 36 inches wide, and weighing 140 pounds. It has a 1.5 horse-power 49cc motor and gets approximately 100 miles per gallon. This moped will accomodate two passengers, has an electrical start and a reverse gear, and can be fully hand operated. It is available from American Tri-ped Corporation, 113 Marine Street, Farmingdale, NY 11735 (515) 752-9229, for approximately $900.00. FFI #8

R-08
Any Etiology
Paraplegia
Tricycling

PROBLEM: Inability to vacate wheelchair for cycling
Numerous wheelchair users would like to enjoy cycling, but either cannot or prefer not to vacate their wheelchairs in order to do so. Some wish to use a cycle for transportation as well as recreation, and need their wheelchairs to use when they arrive at their destinations.

Mobility Aid

SOLUTION: Try-Cycling
The design of this commercially available device incorporates a special sidecar for the driving of a motorcycle from a wheelchair. It uses a Honda Model CB-400 Hawk Automatic motorcycle. The sidecar, a platform designed to accomodate a wheelchair, has mounted on it the steering, clutch, accelerator, and braking controls necessary to operate the motorcycle. The system can be individually modified and has optional equipment available. An able-bodied companion can ride on the motorcycle seat. Available from Tomco Enterprises, Inc., 7701 Hoover Road, Valley Center, KA 67147, (316) 264-8086, for approximately $1800 (sidecar only) or $3400 (sidecar and motorcycle.)
FFI #8

R-09
Any Etiology
L.E. and Trunk Function Impairment
Horseback Riding

PROBLEM: Inability to maintain balance while riding horseback
People with paralysis patterns impairing lower extremity function and trunk support are unable to enjoy horseback riding using a standard saddle since these muscles are needed to stay mounted.

Positioning Aid

SOLUTION: Support saddle with safety straps
A commercially available support saddle was designed for disabled riders 12 years of age and older who have severe spinal or muscular disorders. It has been successfully used by people with muscular dystrophy, spina bifida, cerebral palsy and spinal cord injury. It is constructed of fiberglass — reinforced plastic and leather, and a padded headband are also provided. It is basically a bucket seat with a wrap around support with safety straps. Available from Maddak, Inc., Penquannock, NJ 07440, for approximately $550.00. FFI #8

R-10
Low Vision
Horseback Riding

PROBLEM: Keeping eyeglasses in place while horseback riding
A client with low vision needed a device to hold his eyeglasses in place while horseback riding.

Positioning Aid

SOLUTION: Headband
A headband for this purpose is used by athletes who must wear their glasses during athletic activity, and is available in local optical stores.
FFI #13

R-11
Any Etiology
L.E. Function Impaired
Ice Skating

PROBLEM: Inability to balance, maneuver safely/skillfully on ice skates
Individuals with weak lower extremity muscles or a significant degree of spasticity may be able to ice skate, but with some risk to their safety and/or impedance of the pleasure derived from skating.

Positioning Aid

SOLUTION: Specially designed support aid for disabled ice skaters
This support aid utilizes a tubular, light-weight metal design that provides support, safety, and enhanced enjoyment for users who have sufficient leg support with braces, special boots, etc. The device collapses for ease of storage and transportation, and comes in sizes for children and juniors as well as adults. Information on cost and appropriate usage is available from Hein-A-Ken Corporation, P.O. Box 56, Thief River Falls, MN 56701, (218) 681-2147. FFI #8

R-12
Any Etiology
U.E. No Use
Painting

PROBLEM: Unable to use arms for painting
Many individuals who have totally paralyzed or absent upper extremities wish to paint or sketch as a creative outlet.

Positioning Aid

SOLUTION: Modified mouthstick brush holder
The design is dependent on good trunk motion and strength and uses a light-weight mouthstick, usually made of balsa wood. The user is instructed to, "Warm the mouthpiece and imprint your teeth; hold the device in the mouth and use your tongue to open the gripper grasp." Available from Cleo Living Aids, 3957 Mayfield Road, Cleveland, OH 44121, (216) 382-9700, for approximately $34.00. FFI #8

R-13
Stroke
Hemiplegia
Pasting

PROBLEM: Unable to hold materials for cutting and pasting
A newspaper reporter who retired after having a stroke which left him hemiplegic wanted to continue his hobby of making scrapbooks of news articles relating to subjects of interest to him. He found that cutting and pasting, and even writing a few words of explanation beside each clipping were extremely difficult for him as he has no ability to use his paralyzed arm and hand as a "holding device".

Holding Aid

SOLUTION: Metal cookie sheet with magnets
He solved his own problem by coming up with the creative idea that a flat metal cookie sheet could serve as his work surface so that he could use magnets to hold the paper as he cut, pasted, and wrote. Following a television program on disability-related issues, he called in to the station to share his idea. It has proved helpful to others not only in arts and crafts activities, but in correspondence, hand lettering, etc. FFI #7

R-14
Any Etiology
Grip Impaired
Playing Ball Games

PROBLEM: Inability to grip racquets and other sporting devices
Individuals otherwise able to participate in wheelchair bowling, billiards, softball, tennis, or other ball games may be impeded from doing so by inability to grip a racquet, cue, assistive bowling device, softball bat, etc. adequately.

Dexterity Aid

SOLUTION: Rancho Activity Mitt
The Rancho Activity Mitt is attached via velcro straps to the hand; wrapping its finger thongs around the specific piece of sporting equipment. Not yet commercially available, it was developed at Rancho Los Amigos Hospital for distribution to out-patients. FFI #8

R-15
Polio, Amputation, LE
Balance Poor
Skiing

PROBLEM: Inadequately designed stand and ski poles for disabled skiers
When a skier with a lower extremity amputation or other balance problem is attempting to properly balance and steer in a safe and independent manner, s/he will be unable to use standard ski poles.

Positioning Aid

SOLUTION: Outrigger ski poles
The design uses outriggers at the end of the pole rather than sharp pointed tips of the standard ski pole. The tip flips up into the vertical position when the skier needs to use it as a crutch for support while walking. Outrigger skis resemble ski poles with little skis on the end and are used to guide/steer, as well as provide balance assistance for the skier. This device is available under the brand name Fupski from: Pauls Sports, Inc., Route 1, Box 615 P, Excelsior, MN 55331, for approximately $118.00. FFI #8

R-16
Quadriplegia
Swimming

Mobility Aid

PROBLEM: Inability to enter swimming pool
A quadriplegic VR client sought information on cost specifications and availability of swimming pool lifts which he could use.

SOLUTION: Hoyer Lift
IMPART found that the Hoyer Swimming Pool Lifter is a suitable device. It is available from Everest and Jennings, 1803 Pontius Ave., Los Angeles, CA 90025, for approximately $400.00. FFI #13

R-17
Paraplegia
Water Skiing

Mobility Aid

PROBLEM: Unable to balance and support body to water ski
Due to lack of strength in the lower extremities, individuals may be unable to support their bodies and utilize standard design water skis safely and independently. This denies some an opportunity to participate in water sports, and for others the safety of the individual is the critical factor.

SOLUTION: Seated water-skiing
The design utilizes two regular water skis spaced about two feet apart and connected by heavy tubing to which a seat is attached. The device is maneuvered by simply tilting the seat which mechanically turns the skis. Frame is 16 gauge 1" diameter steel tubing with a baked enamel finish. Hinged joints have neoprene bearings. Seat is vinyl-covered deep foam cushion. Overall size is 31" x 69" x 15" high, and weighs 29 pounds. Special 72" tow rope with 12" bar, float, hitch ring and bridle are included. The device is available under the brand name "Aqua-Bat" from: Gander Mountain, Inc., c/o Outdoor Sportsman's Supplies, P.O. Box 298, Wilmot, WI 53192, for approximately $105.00. FFI #8

T-01
Amyotonia Congenita
Quadriparesis
Art Therapy

PROBLEM: Extemity function limited to slight movement right arm

As a result of amyotonia congenita, a young woman has quadriparesis with only slight movement of her right arm. She was referred to the VAPC's Clinical Engineering Center for evaluation as she was attending college with the goal of becoming an art therapist. Although full follow up is not available on their recommendations, they are presented here as an excellent illustration of the range of technological issues which must be considered in such a case.

Environmental Controls

SOLUTIONS: Recommended instrumentation

The following technical aids were recommended to help her achieve a level of independence and security in her apartment and to utilize her abilities in performing her vocation: (1) A powered, fully-reclining wheelchair operated by a sensitized, proportional joystick control that requires approximately one-quarter inch excursion for control from neutral to top speed and is adaptable to changes in control site (e.g., held in the hand, placed in a receptacle on a lapboard, or situated on a bracket for chin operation). (2) An easily removable lapboard constructed so that when it is secured to the wheelchair armrests, it is at a height of six inches from the seat; it has foam pads on both sides for resting the arms; it holds a fully automatic cassette recorder and an automated holder for a mouthstick; and it has quick disconnects for any electrical connections. (3) An environmental control system installed in the living room (work area), operated through a pneumatic control and a supplementary RF transmitter mounted on her wheelchair, to give her control over existing appliances as well as an automatic dialing telephone and an automated work table (described below). A second environmental control system installed in the bedroom, operated through a pneumatic control, to allow her to operate adapted appliances already in that room as well as an additional automatic dialing telephone. (4) An automated work table, height adjustable from 26 inches to 34 inches, comprised of a single motorized turn table in the middle with a mouthstick controlled file tray; a flat desk on one side where the environmental control system, telephone, etc., can be located; and a motorized tilt desk on the other side with a working surface of at least 36 inches by 36 inches for her art work. (5) A portable, automatic reader, such as the Saltus Reading System, which is an automated scroll that allows any type of reading material to be viewed and can be operated with a company supplied mouth control or through the environmental control system. (6) Bilateral forearm orthosis of the swivel or parallelogram type with the right arm orthosis motorized to extend her reach for the performance of work and daily activities. (7) A security package comprised of smoke/heat detectors; a dual channel automatic telephone dialer that would be activated in fire or medical emergencies; a three-station intercom allowing communication between the bedroom or work area with someone outside the apartment door, and a surface mounted, dead bolt, solenoid lock on the apartment door. In addition to this system, the existing apartment intercom should be interfaced to the environmental control system to allow her to speak to and admit callers who are downstairs at the main entrance. (8) An automatic door release (opener) to enable her to enter and/or exit the apartment independently.

FFI #10

T-02
SCI
Quadriplegia
Attending Classes

PROBLEM: Need for large capacity urine reservoir
A quadriplegic student who uses a wheelchair found the capacity of the conventional urine reservoir inadequate for an extended series of classes.

Urine Collection Device

SOLUTION: 24-hour urine reservoir
A 24-hour urine reservoir was designed and constructed. It stands on the wheelchair base, is spill proof, has baffles, and is odor free. It replaces the conventional reservoir. FFI #6

T-03
Any Etiology
Hand Function Impaired
Calculation

PROBLEM: Inability to operate standard calculator control buttons
Many commercially available calculators have the control buttons so close together that it is difficult or impossible for people with impaired hand use to operate them.

Dexterity Aid

SOLUTION: Big switch calculator
A prototype was tested in two public school classrooms attended by moderately severely disabled junior and senior high school students. It was built aroung the MM5737 calculator chip. A keyboard was designed in which adequate separation and the display was designed using the IEE1720 seven segment display which is one inch high and much easier to see than the conventional display. (Another approach would be to use an off the shelf calculator and parallel the switches with the big switch panel board. One could also parallel the display.) The big switch calculator enabled students to improve their speed as much as 100 percent, and teachers reported a high motivational factor related to its use. FFI#1

T-04
Cerebral Palsy
Quadriplegia
Carrying Books

PROBLEM: Unable to reach books in wheelchair bag
A 20 year old student with cerebral palsy had a problem retrieving carried books in a bag attached to the back of his wheelchair. He had to ask for assistance to retrieve his books and papers.

Mobility Aid

SOLUTION: Lapboard desk
A lapboard desk with a sliding top was designed and fabricated to allow independent access to books and papers. It also provides a convenient writing surface. FFI #14

T-05
Speech Impairment
Classroom Participation

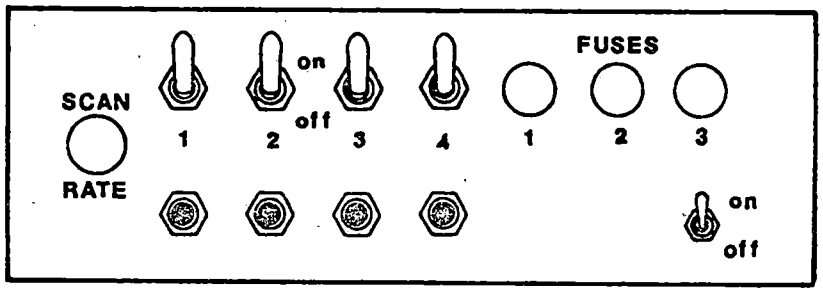
PROBLEM: Unable to speak intelligibly
Severely disabled students with little or no ability to communicate are unable to participate in general classroom discussions in either special school/class or mainstream educational settings.

Communication Aid

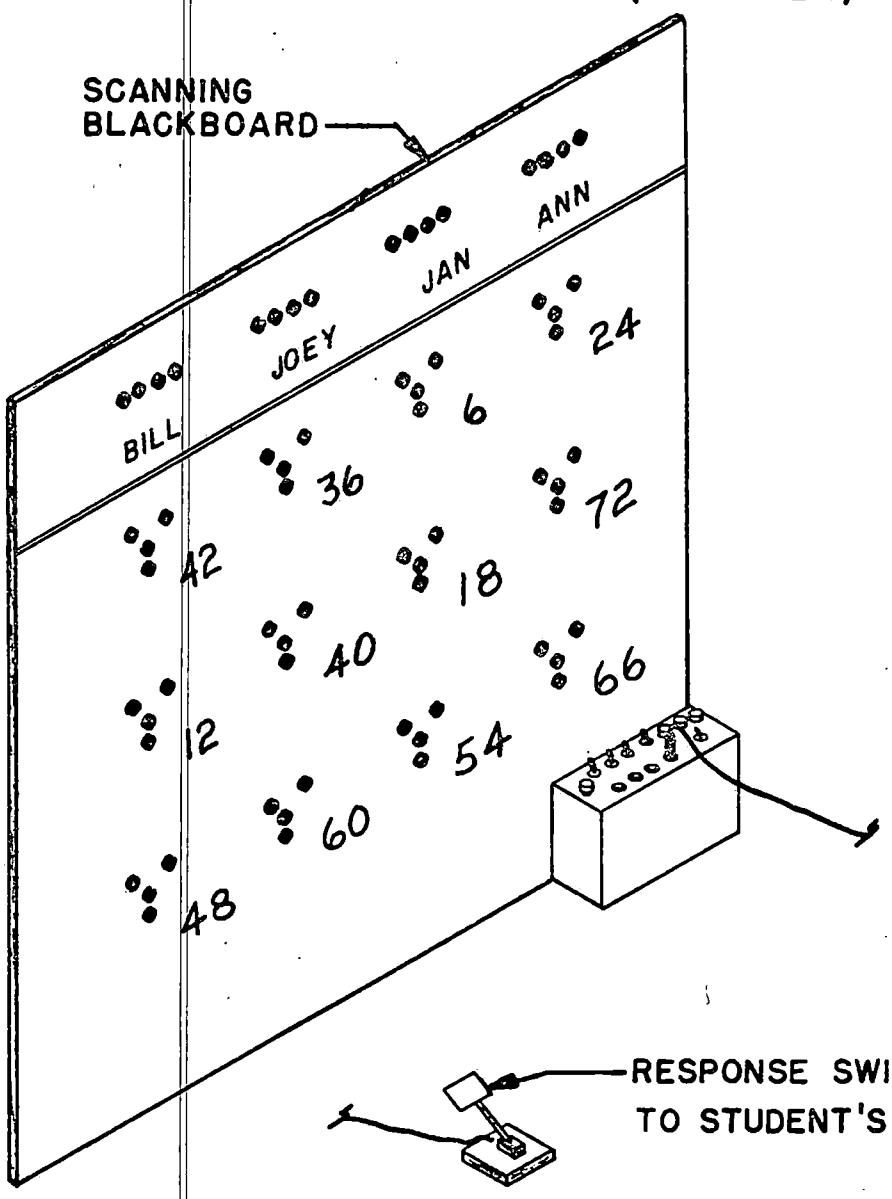
SOLUTION: Scanning blackboard
The board developed is approximately 4 feet square and contains 12 response positions. The upper portion contains 4 sets of 4 lights. The student's name is displayed in this area. The remainder is divided into 12 equal areas, used to write in/otherwise display the desired responses. The scanning is done from left to right in sequence. The scan rate may be varied by a potentiometer from .5 seconds to about 3 seconds per step. The response activator is tailored to the student's needs/movement capabilities. Each activation device is connected through a stereo plug for ease of selection by the teacher. Operation is as follows: the teacher sets up the board for a particular situation and asks a question on the material being studied; s/he selects a student to respond to the question; the lights above that student's name light up and the switching logic sequences the scan operation under the control of the student; student allows scanner to step

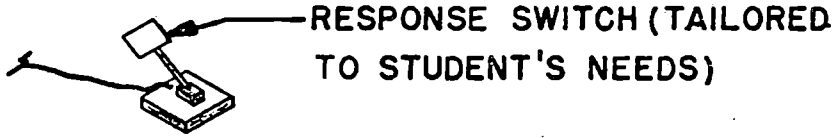
through the responses shown until it reaches the one the student thinks is correct; s/he stops the scan by activating the response switch.

FFI #1



CONTROL UNIT
(TOP VIEW)





SCANNING BLACKBOARD

T-06
Cerebral Palsy
Quadriplegia
College Coursework

PROBLEM: Unable to take lecture notes
Cerebral palsy has rendered this individual functionally quadriplegic. She is a college student who required assistance taking notes in her classes.

Dexterity Aid

SOLUTION: Model A7 Speech Controller
After reviewing her note-taking requirements and available information about portable cassette recorders, it was determined that the Model A7 Speech Controller would best meet her needs. This unit was recommended because it records at conventional speed 1 7/8 IPS, and it can playback from .6 to 2.5 times faster than recording speed while maintaining intelligibility through electronic intervention. This playback feature would allow the client to review a two-hour lecture in less than one hour or slow down the playback to better understand particular details. The unit operates similar to other portable cassette recorders, and it is equipped with these additional features: CUE and REVIEW functions; PAUSE and THRU-PUT (Variable-Speech-Control); levers on RECORD, REVIEW, PLAY, CUE, and STOP (Eject) functions; slide controls for VOLUME and VARIABLE-SPEECH-CONTROL; and built-in condensor microphone plus an extended microphone with an ON/OFF switch. The Model A7 Speech Controller is manufactured by The Variable Speech Controller Company, 185 Berry Street, San Francisco, CA 94107; the cost of the unit including an optional DC 12-volt adaptor for use in a car, an optional carrying case, one-half dozen 60-minute cassettes, and one-half dozen 90-minute cassettes is approximately $350.00. FFI #10

T-07
Infectious Polyneuritis
Quadriplegia
Computer Programming

PROBLEM: Inability to operate video monitor controls
A woman totally paralyzed by infectious polyneuritis enrolled in a home training program for a home-based computer programmer career. She found, however, that she could not independently control the video monitor used to present the course material. This meant that the only time she could work on her lessons was when another person could assist.

Dexterity Aid

SOLUTION: Control modification
The REC at Northwestern University fabricated a plexiglass disc with slots to fit over the existing control knob. Using her mouthstick, she could then independently control the selection switch. FFI #9

T-08
MD
Paresis, Severe
Deskwork

PROBLEM: Unable to reach materials at desk
A student with muscular dystrophy was unable to reach the assortment of books and papers he needed on his home work desk.

Positioning Aid

SOLUTION: Double Lazy Susan desk
A double turntable was designed and constructed to increase several-fold the available working materials for his very limited reach. The table is 30" x 60" with two 24" diameter turntables set flush in the top so that materials can be slid across them. The turntables were balanced to operate with a slight touch. Fabrication cost approximately $360.00. FFI #6

T-09
Hearing Impairment
Hearing Lectures

PROBLEM: Difficulty in hearing classroom lectures
A hearing impaired student needed an amplification system including a remote transmitter to be used by the instructor and a receiver to be used by the student in conjunction with a hearing aid.

Sensory Aid

SOLUTION: The FM Phonic Ear
IMPART identified the FM Phonic Ear as a suitable device. The system consists of a receiver costing approximately $350, a transmitter costing approximately $300, and a pocket stereo charger costing approximately $350. It is available from Herb Dickson, Distributor, H.C. Electronics, P.O. Box 24264, Dallas, TX 75234, (214) 241-0886.
FFI #13

T-10
SCI
Quadriplegia
Typing

PROBLEM: Unable to manipulate typewriter platen
A quadriplegic student was not able to turn the platen on an electric typewriter and could not reverse the typed sheet to make corrections.

Dexterity Aid

SOLUTION: Reverse index mechanism
A low cost highly reliable electrically operated mechanism was built which allows severely disabled persons to reverse index an electric typewriter to previously typed lines. This device fits on a standard electric typewriter and is commercially available. It operates through a friction drive on the knob of the platen and can be activated with a mouthstick. Inquire from HITE, P.O. Box 57843, Webster, TX 77598.
FFI #6

T-11
Cerebral Palsy
Stature Small
Typing

PROBLEM: Unable to reach typewriter keys
A VR client who uses a wheelchair because of cerebral palsy and who is also very small was in training to become a typist. From the low position of her wheelchair, she could not reach the keys well enough to type competently.

Mobility Aid

SOLUTION: Elevating wheelchair
For the term of her training, she was lent a SCAT Electric Elevating Executive Chair manufactured by General Teleoperators, Inc., P.O. Box 3584, Los Amigos Station, Downey, CA 90242 (cost, approximately $2200). The chair satisfied her training needs, but whether one will be prescribed for purchase depends on the requirements of the job she eventually acquires. FFI #13

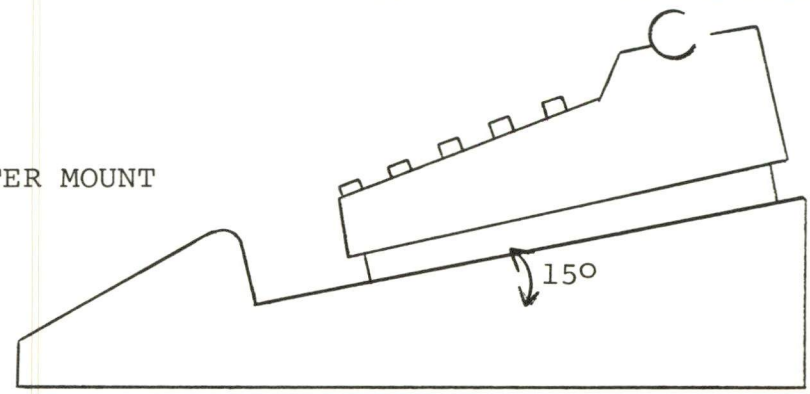
T-12
Cerebral Palsy, Athetoid
Quadriplegia
Typing

PROBLEM: Unable to reach typewriter keyboard
A young man with cerebral palsy, athetoid type, was enrolled in a city college freshman program. Functionally quadriplegic, he was unable to reach a typewriter keyboard effectively when placed on an ordinary work surface.

Positioning Aid

SOLUTION: Typewriter mount
A typewriter mount was designed by the REC at Northwestern University which supports his typewriter at an angle of approximately 15° and has an arm support surface in front of it. (See illustration.) FFI#9

TYPEWRITER MOUNT



T-13
Blindness
Typing

PROBLEM: Proofreading Selectric Typewriter copy
A blind clerical trainee was to obtain training at Goodwill Industries in San Jose on a Selectric style typewriter. Previously available CCTV typewriter attachments have not worked with other than standard typewriters, however.

Sensory Aid

SOLUTION: Visualtek CCTV selectric attachment
A successful prototype (RS-7 Typing Aid System) was delivered to Goodwill, used by the trainee during training, and made available to her when she found employment. It is now commercially available from Visualtek, 1610 26th St., Santa Monica, CA 90404, (213) 828-3453. Cost, approximately $1170.00. FFI #2

T-14
Deafness
Typing

PROBLEM: Unable to hear typewriter margin indicator bell
Deaf students in a vocational typing class needed non-auditory signals to warn them when they were approaching the right margin of the paper. They were using IBM Selectric II typewriters.

Sensory Aid

SOLUTION: Right margin indicator light
An IMPART team member designed and installed suitable right margin indicators utilizing lights as warning signals. A microswitch mounted on a bracket is attached to the Selectric typewriter frame by means of a 1/4" bolt (an existing hole, not in use in the frame is utilized). A three volt battery and a red glowing diode complete the circuit with the microswitch. The diode is attached to a paper clamp and the clamp is attached to the right side of the frame holding the typewriting material. The student is able to insert and bolt the bracket and to remove the bracket from the typewriter. The present bell indicator is not disturbed. FFI #13

P-01
Polio
Bilateral Arm Paralysis
Driving

Foot Controls

PROBLEM: Unable to use arms for driving
A worker with bilateral upper extremity paralysis wishes to drive an automobile so he can become a real estate salesman.

SOLUTION: Automobile foot controls
Over 300 persons with similar upper extremity problems are able to drive by using their feet and legs, with a modification designed and sold by Cameron Enns, 13637 South Madsen Avenue, Kingsburg, CA 93631. The system is considered safe and comparatively non-fatiguing. FFI #4

P-02
SCI
Paraplegia
Driving

Hand Controls

PROBLEM: Paraplegic wants to drive stick shift automobile
A person recently sustained a spinal cord injury which left him a paraplegic. He has a sports car with stick shift, and wants to continue to drive this car.

SOLUTION: Use of automatic transmission
Hand controls for stick-shift cars are not commercially available now. The hand controls installed prior to the invention of the automatic shift were very difficult to keep in perfect adjustment. Release of the clutch to coordinate with motor revolutions often failed with the result of jerky starts and stalled engines. Many stick-shift cars have options for installation of automatic shifting, however. FFI #4

P-03
SCI
Quadriplegia
Driving

Mobility Aid

PROBLEM: Inability to drive independently
A quadriplegic wants modifications to be made on his 1978 Dodge van which would allow him to drive independently.He has incomplete quadriplegia secondary to a spinal cord injury.

SOLUTION: Recommended modifications
The following equipment modifications and additions were recommended to enable him to achieve his goal. To make the van accessible to him, the existing side door will have to be motorized and a fully automatic lift will have to be installed. The controls for the access system should be located in a weather-proof/key locked panel on the outside of the van and in a convenient position near the lift on the inside. A switch for him to raise and lower the lift while he is on it should be on the lift platform or supporting frame in a location that is convenient for him. Since his sitting height is approximately 60 inches and the van's headroom is approximately 57 inches, a 12-inch roof extension with frame reinforcement such as roll bars or a roll cage will be necessary. Hand controls with the push/pull operation that he learned on or the push/right-angle pull operation that most quadriplegics prefer will have to be installed for him to activate the brake and accelerator. The headlight dimmer switch and a horn switch should be located on the hand control. Due to his height, he may need a steering-post extension; and a spinner mount and vertical yoke quad cuff (open end) should be attached to the steering wheel. Mechanical extensions should be made on all dashboard switches and controls including the parking brake and all keys. Since this client's wheelchair seat height is four inches greater than average, he will need an adapted captain's chair with a powered base as well as overhead hanging straps in the driver's position to accomplish transferring himself into the driver's position. An electromechanical tie-down

system will be required to secure his wheelchair while he is driving. The van floor will have to be finished for wheelchair maneuverability, and a manual wheelchair tie-down will have to be installed in the event the client is being transported. Additional adaptations that are needed include: (1) powered windows on the driver's and passenger's sides; (2) dual battery and charge splitter; and (3) citizen's band radio. FFI #10

P-04
Post-Polio
Paraplegia, Arms Weak
Driving

PROBLEM: Paraplegic cannot load wheelchair into two door car
A paraplegic worker can transfer from her wheelchair to her car. However, she has difficulties in folding her wheelchair and she cannot load it behind the driver's seat.

Mobility Aid

SOLUTION: Powered wheelchair loader with folding assist
The loader picked up the wheelchair by an extension under the seat of the wheelchair. This force tended to fold the wheelchair when lifting. The wheelchair could be lifted to a point where the foot rests could be folded without stooping over. At maximum lift, the wheelchair was pushed inside the car using four ball bearing rollers on a lifting track. Power was obtained by use of a powered window motor. (When a person can fold their own chair a hoist can be used, making more room available in back of the front seat.) FFI #4

P-05
Ambulatory
L.E., Impaired
Van Boarding

PROBLEM: Ambulatory passengers need handrail on van lift
Ambulatory passengers in wheelchair user's vans frequently need to enter via the wheelchair lift. This can create a balancing problem for persons who are standing, especially if they have L.E. weakness themselves.

Balancing Aid

SOLUTION: Folding handrail
A suitable folding handrail is available from the R.E.B. Manufacturing Compayn, Route 2, Carey, OH 43316. Cost information may be obtained directly from them. FFI #13

P-06
Obese Wheelchair User
Van Boarding

PROBLEM: Need for extra wide van lift
A wheelchair user who weighs 300 pounds and uses a 36 inch wide wheelchair needed an extra-wide lift for his van.

Mobility Aid

SOLUTION: Lift-Aids
Project IMPART identified Lift-Aids of Texas, P.O. Box 18627, Fort Worth, TX 76118 as a supplier of a suitable device. Obtain cost information directly from supplier. FFI #13

P-07
Paraplegia
Wheelchair Loading

PROBLEM: Unable to load wheelchair into car
A paraplegic driver needed an assistive device for loading the wheelchair into the space behind her car seat.

Lifting Aid

SOLUTION: Simple wheelchair loading mechanism
A small winch was installed on the floor board in the right rear of the car. It was operated by a switch on the dashboard of the car on the driver's side. The cable from the winch was run through a pulley suspended from the ceiling. With only slight guidance the wheelchair could be pulled up over the threshold of this two door car and slid into the space behind the seat. FFI #6

P-08
Multiple Sclerosis
Paraplegia, U.E.
Weakness
Wheelchair Loading

Mobility Aid

PROBLEM: Transfer balance problem
Driver has difficulty transferring from wheelchair to car and in moving around the steering wheel after he gets in because of weakness and impaired balance.

SOLUTION: Specialized equipment
The March 5, 1974 issue of the Los Angeles Examiner reported on a front seat available in SAAB 99 models that can be turned 90 degrees. It also has a special undercarriage that allows the seat to be pushed four inches outside the doorstep. Another solution to this problem is an adjustable steering wheel and electrical powered front seat and use of a stool with two legs outside the car and two legs inside the car on which the driver sits, bridging the gap between the wheelchair and the car seat. The use of this stool aids in loading and unloading the wheelchair in back of the front seat. The adjustable steering wheel allows more room for entry. FFI #4

P-09
SCI
Quadriplegia
Wheelchair Securement

Positioning Device

PROBLEM: Wheelchair securement in commercially used van
Worker is transported in a van and driven to and from work. The van is equipped with a lift. The van is also used commercially and no projections should be on the floor. What kind of securement can be used?

SOLUTION: Design of removable clamps as hold down devices
Two over center clamps were designed. They can be attached to wheelchair and van floor and can be easily removed when not in use. The over center feature assures the proper tension preventing any movement of the wheelchair in any direction. Plans for construction of clamps are available. Safety belts should also be used and attached to van floor. FFI #4

W-01
Multiple Sclerosis
Tremors
Accounting

PROBLEM: Tremors preclude use of standard automatic dialer
C.P.A. needed a way to operate an automatic dialing device, pre-set to dial separately each of his seventeen customers. He has continuous severe tremors so he can not use the closely placed normal buttons on an automatic dialer.

Dexterity Aid

SOLUTION: Rewired automatic dialer
An automatic dialer was rewired to extend each of seventeen button connections to separate push buttons, widely spaced on a long board located on the edge of the desk. FFI #15

W-02
Blindness
Administration

PROBLEM: Need to review tape recorded materials quickly
A totally blind project coordinator for an association of art museums needs to review extensive taped materials in lieu of reading written reports. The additional time required to listen to spoken materials, compared with reading time, reduces the efficiency of her time usage, however.

Sensory Aid

SOLUTION: Speech compressor
Several speech compressors, which permit playback of recorded materials at speeds faster than the original recording without altering the pitch of the voice, are available commercially. For example, combined recorder/compressors are available from Variable Speech Control Co., 185 Berry St., San Francisco, CA 94107, (415) 495-6100, and Visualtek, 1610 26th St., Santa Monica, CA 90404, (213) 829-3453, for around $300. A compressor unit which may be used with other variable speed playback units is available from American Printing House for the Blind, 1839 Frankfort Ave., Louisville, KY 40206, (502) 895-2405, for approx. $85. FFI #2 & #3

W-03
Hand Absence
Assembly

PROBLEM: U.E. amputee unable to do two-handed job
In a sheltered workshop a client with one hand was not able to perform a job which required the assembly of valve handles by inserting a threaded bolt into a drilled and tapped sleeve.

Jig/Fixture

SOLUTION: Holding fixture
A fixture was built to hold the post head by means of a slot milled into the base of the fixture. This prevented the bolt from twisting when the sleeve was screwed on. The completed assembly was dropped down a chute to a tote box. FFI #6

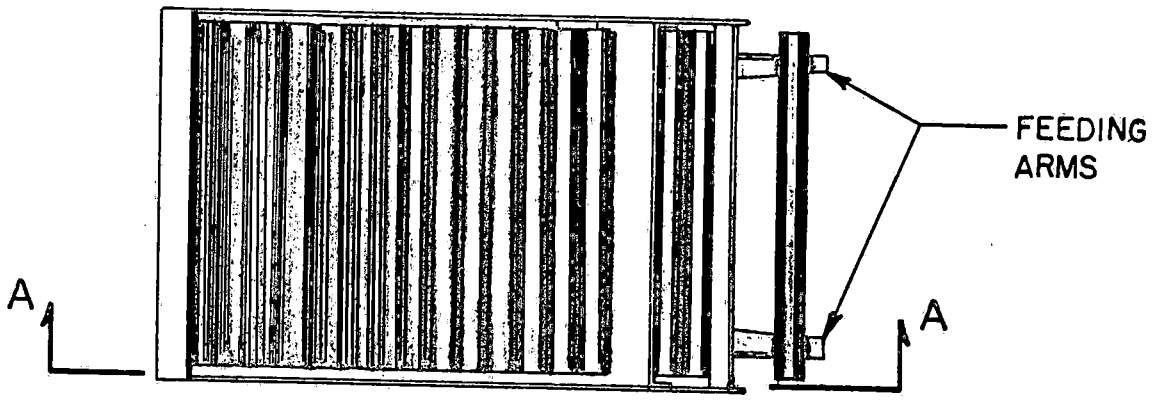
W-04
Any Etiology
Hand/Finger Dexterity, Poor
Assembly

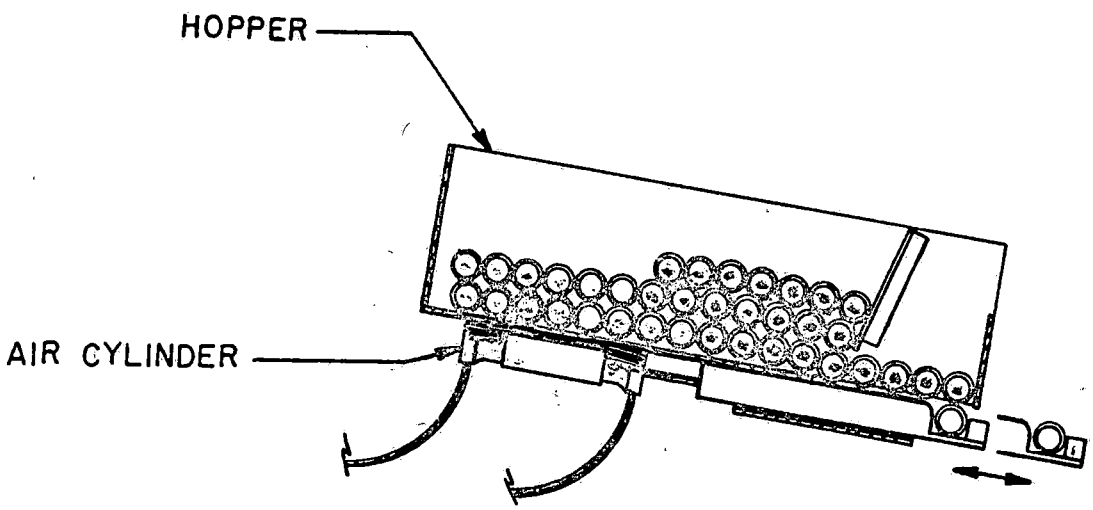
PROBLEM: Lack of dexterity to search, select, grasp objects
Ten inch lengths of steel tubing (.75 or .875 inch diameter) are received by Center Industries Corp. in Wichita, KS in bulk quantities for a manufacturing/assembly job. They are placed in large hoppers containing several hundred tubes. Several disabled workers lacked the dexterity to search, select, and grasp one tube from the hopper.

Jig/Fixture

SOLUTION: Cylindrical parts selector feeder
A tube feeding device was designed that would select one tube at a time from the hopper and place it within easy reach of the operator. The tubes are stacked orderly in the hopper so they roll to the selecting slot. The tube is fed to the operator by two feeding arms, which are parallel and suspend each tube between them in presized

notches. They are powered in and out (select and place) of the hopper by a small air cylinder. The feeding action may be activated by the operator or some other related operation. FFI #1





SECTION A-A

CYLINDRICAL PARTS SELECTOR FEEDER

W-05
Hand/Finger Dexterity
Poor
Assembly

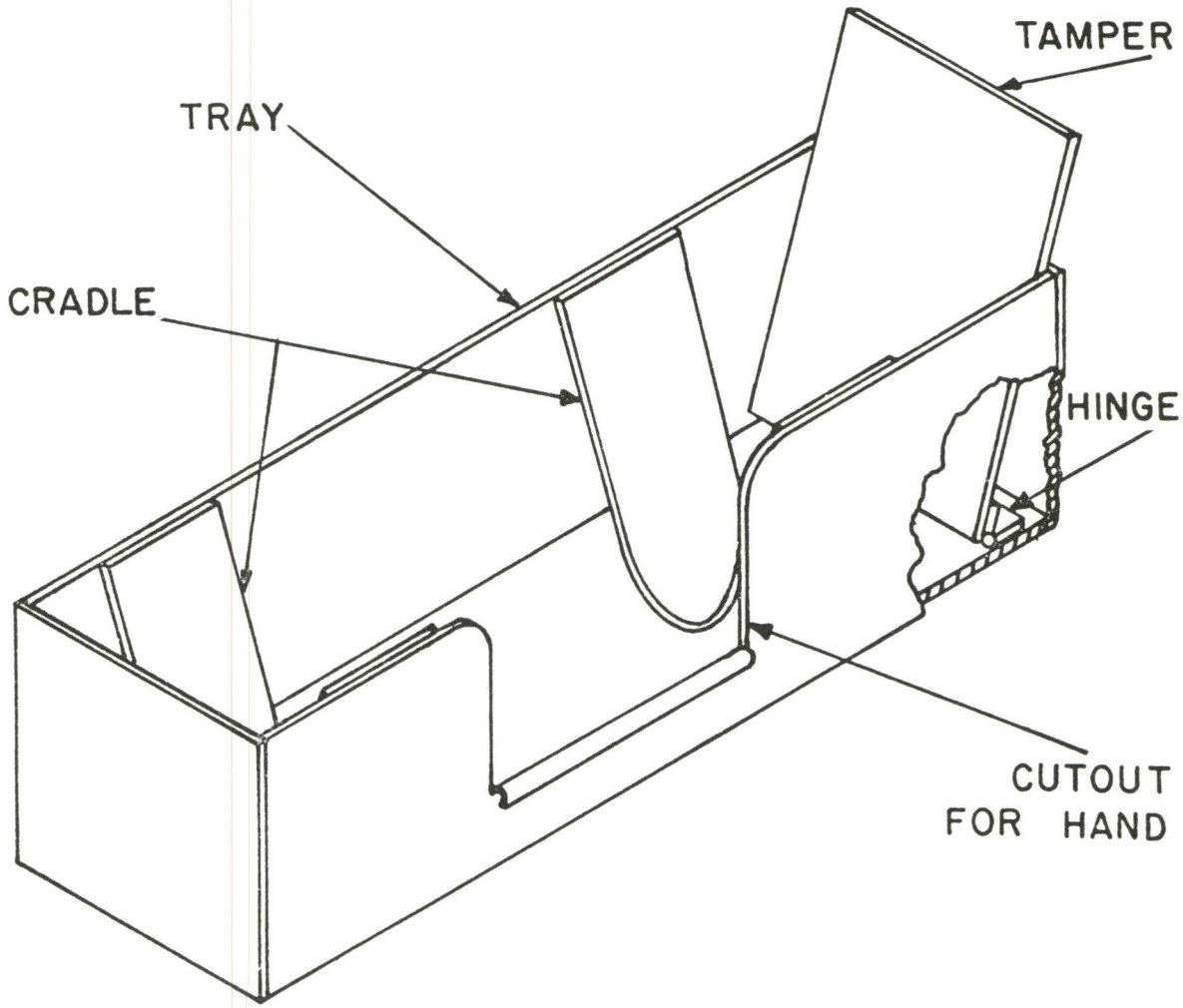
PROBLEM: Impaired grasp and dexterity

A manufacturing operation at Center Industries in Wichita, KS entails removing 13 inch wires from a rectangular tray and bundling them in bundles of 100 units. A worker with poor dexterity in his hands and fingers had difficulty removing them from the tray and was unable to bundle them with a tape wrap.

Jig/Fixture

SOLUTION: Wire bundle tray

A holding tray was designed and fabricated that would accumulate the wires into a bundle that could be easily grasped for taping. It incorporates a radiused holding cradle and is cut-out on one side to accept the operator's hand as he grasps the bundle of wires. The tray is approximately one and one half inches longer than the formed wires to allow placement of a plate which is hinged at the bottom in one end of the tray to act as an alignment tamper. The tamper is mounted in the tray at a slope which provides for a funnel effect to ease placement of the wires in the holding tray. (See illustration.) FFI #1



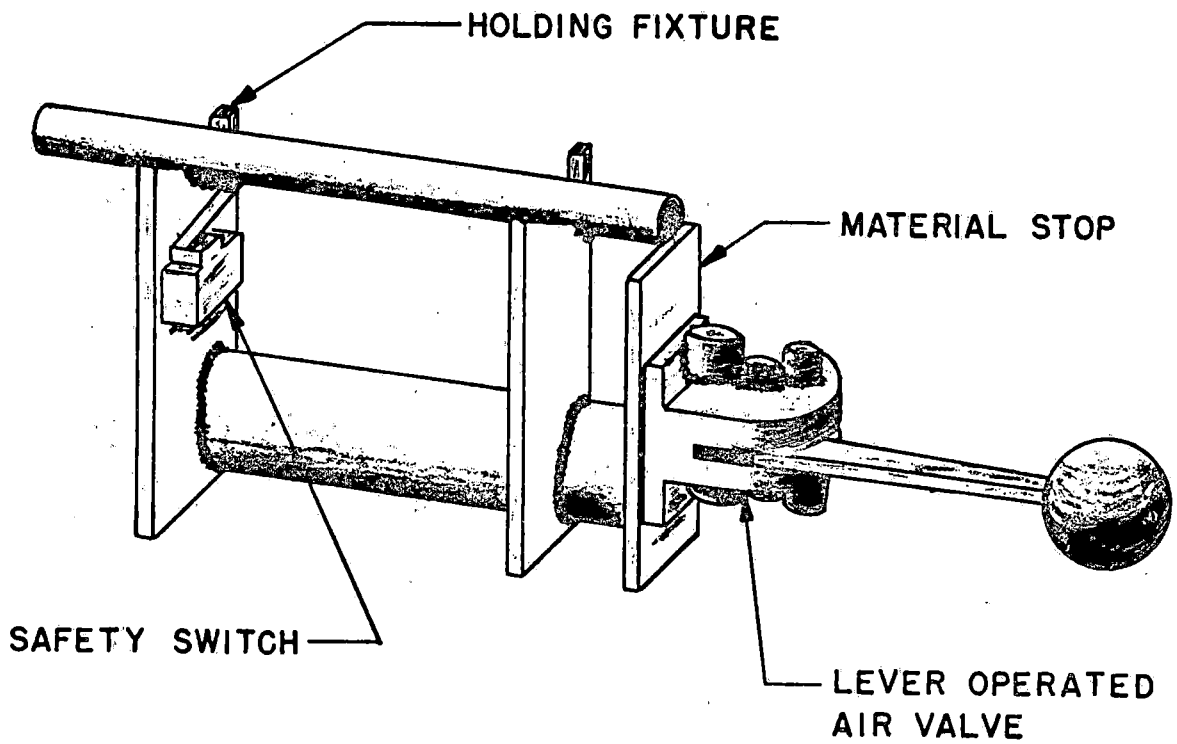
HOLDING TRAY

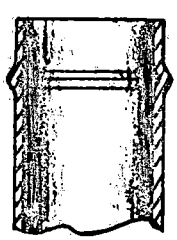
W-06
Paralysis, Judgement Impaired
Beading Machine Operation

PROBLEM: Inability to stand, poor manual dexterity
The beading machine used in a manufacturing process is operated from a standing position and requires the operator to operate two levers, hold a length of steel tubing in place, and gauge the length of cycle time during each beading operation. The employee selected used a wheelchair, did not have the dexterity to operate the levers and hold the tubing, and lacked the judgement necessary to gauge the cycle length consistently.

Jig/Fixture

SOLUTION: Modified tube beading machine
A new machine stand was built to lower the beading machine. The levers were fitted with air cylinders to incorporate pneumatically powered actuation. An electronic timer was built that controlled the length of time the beading head was engaged. A holding fixture was fabricated which eliminated any operator error in aligning the tube with the beading head. This included a material stop for locating the tube, and a safety switch which prevented machine operation until the tube was properly nestled in the cradle. A lever operated air valve was installed to actuate the sequence of operations. FFI #1





CROSS SECTIONAL VIEW OF BEADED TUBE

MODIFIED TUBE BEADING MACHINE

W-07
Grasp, Impaired
Benchwork

PROBLEM: Unable to remove parts from work area
In a sheltered workshop a handicapped client with limited grasp and reach found it difficult to remove finished parts from his work area and transfer them to a tote bin. Small parts were particularly difficult.

Dexterity Aid

SOLUTION: Drop chute
A drop chute was built into the work bench leading to a tote bin. Thus the grasping operation was eliminated and the required range of motion and reach were significantly reduced. FFI #6

W-08
Grasp Impaired
Benchwork

PROBLEM: Difficulty manipulating small objects
In a sheltered workshop it was necessary to remove about 12,000 screws mistakenly placed in electrical terminal blocks. The terminal blocks were small and difficult to handle for handicapped clients possessing grasping coordination problems.

Jig/Fixture

SOLUTION: A jig for removing screws
A jig was designed to hold the terminal blocks. Holes centered over screws to be removed acted as a guide for a power screwdriver. The jig was fastened to a work bench and located over the hopper of a drop chute to catch screws as they were removed.

Some quads were able to carry out this funtion satisfactorily. Reasonable hand-eye coordination, reasonable grasp, and reasonable hand strength were requirements. FFI #6

W-09
Cerebral Palsy
Grasp, Impaired
Dexterity, Impaired
Benchwork

PROBLEM: Poor grasp dexterity
A trainee with cerebral palsy needed a bench job (sitting) but lacked the grasp dexterity needed to perform at an acceptable rate on packaging tool checks for a production run.

Jig/Fixture

SOLUTION: Grasp pad
A foam rubber grasp pad was placed on the normal assembly surface so parts and tools could be distributed on it prior to assembly. This resulted in a performance increase of 435%. (Continuing studies are examining the effects of pad density, item dimensional characteristics, and physical disabilities.) FFI #1

W-10
Quadriplegia
Benchwork

PROBLEM: Unable to manipulate small objects
In a sheltered workshop a task required hand starting two set screws into a drilled and tapped brass block, driving the set screws to a seat, and backing the set screws out to a predetermined position. The task required a good deal of dexterity and it was desired to restructure the job to enable "gross" motions to be used.

Jig/Fixture

SOLUTION: A jig for driving set screws
A jig was designed to position the brass blocks under a locating plate. The operator drops a screw into a location hold, sets it with a power screwdriver and backs it out to a flush position.

The set up was successful using quadriplegics and in one instance a bilateral upper extremity amputee achieved productivity exceeding 50% of standard. Without the devices he could not have performed at all. FFI #6

W-11
SCI
Quadriplegia
Benchwork

PROBLEM: Unable to deburr drilled holes in brass blocks
In a sheltered workshop it was desired for lower level quads to deburr eight previously drilled holes in a small brass block by holding the block against a countersink bit in a drill press. Lower level quads could not safely and efficiently perform this task.

Jig/Fixture

SOLUTION: Holding fixture
A holding fixture was built to hold seven brass blocks at a time in a proper orientation for deburring. A quick release clamp was devised to allow unloading the fixture into a drop chute after completion of the deburring. The fixture was large enough to be easily stabilized on the drill press table and held with one or both hands out of the way of the bit. FFI #6

W-12
SCI
Paraplegia
Benchwork

PROBLEM: Unable to work standing
A guitar factory worker has a spinal cord injury. He has good use of his arms. He uses a manual wheelchair. The employer is willing to lower one work bench where fret work is installed on guitars. Is this the best solution? All other jobs in the plant are standing tasks.

Work Site Modification

SOLUTION: Elevate client by special wheelchair
The lowering of only one job area would limit the worker to that job. An elevating electric wheelchair was provided which made many standing job sites available to the worker. The electrically powered wheelchair also enabled the worker to carry materials without danger of dropping them. The wheelchair used by this worker was discontinued, however. Orthokinetics, Inc., P.O. Box 2000, Waukeshi, WI, made one model of an elevating wheelchair and is now redesigning it. General Teleoperators, Inc., Box 3584, Los Amigos Station, Downey, CA 90242, will also build a power elevating wheelchair on order. FFI #4

W-13
SCI
Paraparesis
Brazing

PROBLEM: Difficulty in shifting between work areas
A brazing operation required a worker who uses long leg braces and Canadian crutches to move a cooler from a slanting holding rack to a table, turning it over to complete the brazing operation. This required ambulation by crutches and movement of his working stool to a new work area.

Mobility Aid

SOLUTION: Revolving work holder
A television chassis holder was modified to hold the various cooling units. The holder was adjustable and could be revolved to complete the brazing operation without the worker having to change work areas. Quick change clamps were used to fit and hold the parts to be brazed without damage to the parts. FFI #4

W-14
Blindness
Broadcasting

PROBLEM: Inability to visually inspect meters
A totally blind radio operator was able to perform most aspects of his job with the simple addition of Braille labels to tape cartridges and disc recordings. However, determining grid voltage, plate voltage, RT output, and frequency deviation generally require visual inspection of the various meters.

Sensory Aid

SOLUTION: Aud-A-Meter/Aud-A-Level
The individual was able to monitor all meters with the use of two commercially available devices. The Aud-A-Meter permits reading of a variety of DC meters that have moving needle display with external meter movement terminal posts allowing connection of unit.

The Aud-A-Level monitors audio level of monaural and stereo tape recorders during recording or broadcasting and emits a buzzing output when signal is too strong. Both are available from Science for the Blind Products, Box 385, Wayne, PA 19087, (215) 664-9429. Cost of Aud-A-Level is approximately $235. Cost of Aud-A-Meter is approximately $90. (or $215 for model which can be connected to four meters at once.) FFI #2 & #3

W-15
Any Etiology
U.E., Impairment
Calculation

PROBLEM: Unable to operate a hand calculator
The use of small, hand held calculators has become almost a necessity in our society in work, school, and even home management. Individuals with little or no use of their arms and hands are unable to use them as they are, however.

Dexterity Aid

SOLUTION: Scanning calculator
A row column scanner was interfaced with a standard, off the shelf calculator. The calculator's key board code was determined and the scanner was interfaced with the calculating mode. Calculations are performed in the usual way. After the unit is turned on, a reset button is activated to assure that the unit is in the proper mode. The circuit scans through the numerals (0 - 9) and the functions (=, ×, +, −, %, decimal, and clear). The calculator used utilizes algebraic inputs, so the problem is entered exactly as written. The scanning unit is controlled by a single switch, which may be breath, motion, tilt, or foot activated. This gives the operator access to calculator operation by a single mode of activation. FFI #1

W-16
Blindness
Calculation

PROBLEM: Inability to see for pencil figuring
A blind insurance and securities dealer encountered problems with the extensive pencil figuring required.

Sensory Aid

SOLUTION: Keypact by Comptone
This commercially available device was originally designed to increase efficiency for sighted dealers. The complicated procedures usually requiring pencil figuring are performed in minutes with a long distance telephone accessible computer, a tape recorder, and a printed form easily understood by customers. The Keypact is an array of thumb wheel rotary switches enclosed in an attache case, by which users request analyses for transmission to a central computer. The immediate response is verbal, and printed copies can follow by mail. It is available from the Keypact Division of Computone Systems, Inc., 361 E. Paces Ferry Road, Atlanta, GA 30305. Cost is approx. $1575 plus computer time. FFI #2

W-17
Injury
Arm Rotation, Impaired
Carburetor Repair

PROBLEM: Unable to make twisting motion
A carburetor repairman injured his hand in such a way that he can no longer perform the twisting motions required to disassemble a carburetor.

Power Tool

SOLUTION: Electric screwdriver
Because the screws used in these auto parts are very long, an electric screwdriver not only solved the problem for him, it raised his level of production above that of his co-workers (who subsequently also began using them). Available from large hardware firms in major cities, for approximately $45.00. FFI #4

W-18
Paraplegia
Paralysis
Clerical

PROBLEM: Inability to use foot switch
A receptionist at Center Industries in Wichita, KS was unable to use the dictaphone for recording messages because she could not operate the foot switch due to paraplegia. The switch consisted of two micro switches mounted inside a rocker mechanism. When one side of the rocker switch was pushed, the unit went into a play mode. When the other side was pushed, it went into the rewind mode.

Equipment Modification

SOLUTION: Dictaphone switch for use by paraplegics
The function of the rocker switch was duplicated using a push to turn on and a push to turn off switch to control the play mode. A single pole double throw momentary push button switch was used to control the rewind mode. These switches are mounted in a small box. The receptionist can now operate the dictaphone with her hands. The new switch is plugged in parallel with the old switch; thus, when one desires to use the foot operated switch rather than the hand-operated push button switches, one merely unplugs the hand-operated switch and proceeds to control the unit with the foot switch. FFI #1

W-19
MD
U.E. Impairment, Bilateral, Wheelchair Usage
Collections

PROBLEM: Unable to approach desk and use standard telephone
A 21 year old male with muscular dystrophy obtained employment as a collection correspondent with a national chain department store. Because of confinement to an electric wheelchair and bilateral weakness in upper extremities, he had difficulty utilizing a standard telephone to call customers, and was unable to have full access to his desk as his wheelchair was too high to allow the arms to slide under the desk.

Worksite Modifications

SOLUTION: Headset telephone, elevating blocks
Standard telephone headset was provided and desk was raised on blocks to permit access by wheelchair. FFI #6

W-20
Deafness
Computer Operation

PROBLEM: Unable to establish smooth typing rate on computer terminal
A visual feedback method was required to assist deaf data terminal operators in establishing smooth and continuous typing rates.

Sensory Aid

SOLUTION: Metronome with light signal
An electric metronome with convenient setting for tempo and a flashing light to indicate tempo was found to be suitable for the purpose. It is available from J.A. Preston, 71 Fifth Ave., New York, NY 10003. Inquire direct for cost information. FFI #13

W-21
Post Polio
Paralysis
Computer Programming

PROBLEM: Inability to lift objects
A computer programmer, paralyzed by polio has weak arms but strong fingers, and uses an electric powered Lazy Susan desk very effectively. However, because she must sit in a reclining position, it is very difficult for her to hold and read bulky printouts, especially when two must be read and compared simultaneously.

Mobility Aid

SOLUTION: Ramp attachment for electric-powered Lazy Susan desk
On site observation revealed that she had learned to use her mobile desk to do things her weak arms couldn't do, such as assist in lifting printouts. A ramp was designed to assist her when she used the moving desk top, while hanging on to the printouts, to drag them up the ramp to a tilted platform from which it was easier for her to read. FFI #4

W-22
Infectious Polyneuritis
Quadriplegia
Computer Programming

PROBLEM: Totally paralyzed woman wishes to work as computer programmer

A woman who is completely paralyzed from infectious polyneuritis wanted to develop a career as a home-based computer programmer. Her environment needed to be massively instrumented to make this possible.

Mobility/Dexterity Aid

SOLUTION: Home environment instrumentation

NUREP first recommended that the use of an enviromental control system would increase her independence by permitting her to make her own phone calls, and use control lights, radio, and other equipment. The state VR agency funded a Northwestern University Comfort and Communications System. She was also fitted for a mouthstick to assist in typing, using a tape recorder, writing, and turning pages of a book. This has three interchangeable types of tips. Later, she was provided with an E&J model 34, 24 volt electric wheelchair with powered recliner activated by a headswitch mounted directly on the headrest which did not obstruct peripheral vision, sip and puff controller, and a ROHO seat cushion. This gave her more power to negotiate ramps, could be controlled more safely, and allowed independent position changes to relieve pressure and fatigue. Her Hoyer lift sling was coated with latex to reduce slippage while reclining. A mouthstick holder was provided so she could travel safely using the sip and puff controller. Mounted on the armrest post, it allowed her access to the three interchangeable tips without obstructing her functioning. Her work counter is two feet deep forming an "L" of ten feet and four feet. At the corner is a typewriter support frame with adjustable angling table. Also mounted on the counter is a computer terminal support frame with terminal. FFI #9

W-23
Cerebral Palsy
Paralysis, Spastic
Custodial

PROBLEM: Inability to bend/stoop

A client performing custodial work at Center Industries in Wichita, KS was unable to bend over to hold a dust pan and sweep dirt into it.

Mobility Aid

SOLUTION: Floor sweeping collector

A pan was designed which consists of a large rolling dustpan on wheels with a long handle. Both hands can be freed to manipulate the broom and the pan holds large amounts of sweepings before needing to be emptied. The device can be fabricated at little cost with scrap material usually found around production shops. FFI #1

W-24
U.E. Amputee
Unilateral
Deburring

PROBLEM: Unable to hold part for deburring

In a sheltered workshop it was required that a 5/16" hole through the head of a stainless steel bolt be deburred. A holding fixture was needed in order to permit a triplegic client to perform this task.

Jig/Fixture

SOLUTION: Holding fixture

Such a holding fixture was fashioned using a wood fixture and quick acting toggle clamps so that the bolt was positioned in the proper orientation for the drill press deburring operation. The fixture was large enough that the bolt was stabilized on the drill press table and could be gripped or held down by one or both hands without danger to the hands. FFI #6

W-25
Blindness
Broadcasting

PROBLEM: Unable to identify record albums and cuts

A blind disc jockey was referred to IMPART for help in finding a way for him to identify record albums and the individual record selection cuts on LP albums.

Sensory Aids

SOLUTION: Optacon plus paper money identifier

It was found that the Optacon (tactile readout reading system available from Telesensory Systems, Inc., 3408 Hillview Ave., Palo Alto, CA 94304, (415) 493-2626, for approximately $3000) could aid in choosing the correct albums, and that a paper money identifier developed by the Southwest Research Institute (an IMPART collaborator) could be attached to the turntable pickup head to identify individual record selection cuts. The Paper Money Identifier and Audible Light Detector are now available commercially from EMR Ltd., Drawer 845, Pico Rivera, CA 90660, for approximately $130.

FFI #13

W-26
Cerebral Palsy
Quadriplegia, Spastic
Drill Press Operation

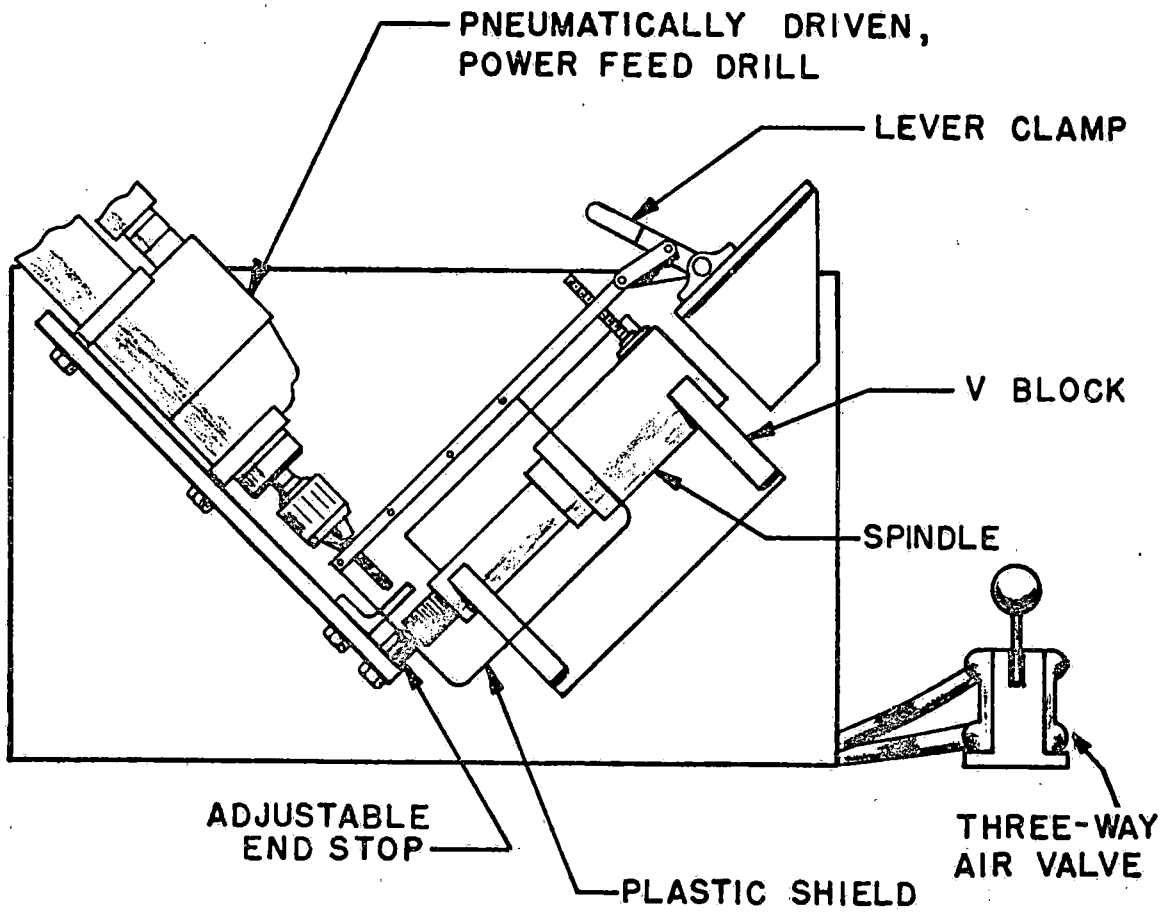
PROBLEM: Inability to operate standard drill press

An employee with spastic quadriplegia was selected to perform a drilling operation in the production of trailer axle spindles. He scored well below the 50 percentile level of the able-bodied standard on the Available Motions Inventory. The right hand had an effective work area only at shoulder height and within 12 inches of the chest. The spindle weight of up to four pounds required the operator to have good lifting strength and stamina.

Jig/Fixture

SOLUTION: Spindle drilling fixture

A drill fixture was designed so the spindle is positioned at a 45 degree angle to the table work surface. The spindle is supported by V blocks and an adjustable end stop. The angled positioning allows the spindle to slide against the adjustable end stop for accurate drill position.



SPINDLE DRILLING FIXTURE

During the drilling operation, a simple lever clamp holds the spindle securely in the V blocks. The drilling is performed by a pneumatically driven power feed drill. (See illustration) Spindle drilling proceeds as follows: A spindle is placed in the drill fixture; the spindle is automatically located due to gravity, which positions the spindle against the end stop; the lever holding clamp is secured and the drill operation is activated by a three-way air valve; the pneumatically powered drill sequences through the drill and retract operations; the lever clamp is released and the spindle is removed and set aside for inspection. The entire work station was located at shoulder height and as close to the chest as safety would permit. FFI #1

W-27
Syringomyelia
U.E. Paralysis
Driving

PROBLEM: Unable to operate transportation service
A 36 year old male with Syringomyelia of the spinal cord developed a transportation service for wheelchair-bound persons. Because he lacked functional use of upper extremities, he was unable to drive a passenger van, answer telephone calls for services, or assist passengers in transferring into and out of the van.

Foot Controls

SOLUTION: Foot controls, head set telephone, assistant
Van was installed with commercially available foot controls, head set and tape recorder were provided to handle phone calls, and assistant driver was hired to assist passengers in transfers and to drive "extra trips". FFI #6

W-28
Visual Impairment
Electronics

PROBLEM: Inability to read schematics
A worker was able to perform his duties of testing circuit boards, trouble shooting, and repairing poor connections through the use of special lenses attached to his glasses which allow free use of his hands. Reading schematic drawings presented a problem, however.

Sensory Aid

SOLUTION: Closed circuit television (CCTV)
He was able to read the schematic drawings when they were placed under the camera of a closed circuit television system which both enlarges and presents the image in high contrast on a cathode ray tube (CRT) monitor. Available from such vendors as: Pelco Industries, Inc., 351 E. Alondra Blvd., Gardena, CA 90248, (213) 323-1628 (CA residents), (800) 421-1146 (out of state), cost approximately $1600 — $1700; Visualtek, 1610 26th Street, Santa Monica, CA 90404, (213) 829-3453, cost range approximately $1200 — $1950. FFI #2 & #3

W-29
Aphasia Brain Injury
Embossing Metal

PROBLEM: Inability to count/poor spatial judgement
In the manufacture of motor vehicle license plates, the operator must be adept at using hands, have enough stamina for a normal work day, be able to count, and use some judgement in placing the numerals. An employee selected to fill the position met all requirements except for counting and placement of numerals due to aphasia post traumatic brain injury.

Jig/Fixture

SOLUTION: Digital readout numerical counter
Testing showed the employee could match numbers/symbols and follow written instructions so that all that was needed was a digital counter which could sequence the numbers and was also capable of correct columnar placement of the numerals. In the counter and display unit constructed, the counter consists of five digits and is capable of counting any sequence desired between 0 and 99,999. As

the count increases to 2, 3, 4, or 5 digits, the number displayed is positioned left or right to maintain a specified format.

Total of 5 digits	x	x	x	x	x
1 digit			9		
2 digits			9	9	
3		9	9	9	
4		9	9	9	9
5	9	9	9	9	9

The counter may initially be set up by the supervisor to agree with the starting number. It indicates the correct numbers of the snapper dies that should be inserted into the press. To facilitate selection of dies, the number of each is painted on the handle. The operator checks the counter readout and matches the die's number to it. The die is inserted into the press and the press is cycled which embosses the plate. After the press is cycled, at least one digit on the counter will change and the operator changes the die(s) to match the counter number. FFI #1

W-30
Cerebral Palsy
Spastic, Athetoid
Inspection

PROBLEM: Lack of manual skills
When motor vehicle license plates are ejected from the embossing press, they are upside down and reversed. The visual inspector is responsible for removing rejects, and deciding whether to stop the press if inspection indicates serious error in the embossing process. The individual selected for the job was diagnosed as "cerebral palsied, spastic, athetoid" and could neither turn the plates over, reverse them end-to-end, nor remove them from the conveyor inspection line.

Jig/Fixture

SOLUTION: Visual process inspection station
A large mirror was installed above the inspection line opposite from the inspector to effectively reverse the tags for reading. It was canted for easy viewing from a wheelchair. An air jet, under the control of the inspector, is directed across the line perpendicular to the motion of the line. (Because plates are aluminum, a magnetic process was not feasible.) A scrap metal container is located on the opposite side of the line from the air jet to receive rejects. The air jet is controlled by an electrically operated solenoid valve. A 12 volt dry cell holding system connects the appropriate relays to the inspector's control buttons, which are located per his specific requirements. The embossing press lockout scheme uses a relay to interrupt the process. Once the inspector stops the press, it must be re-started by the supervisor. The 12 volt dry cell system is used in conjunction with relays to isolate high voltage from the inspection station. FFI#1

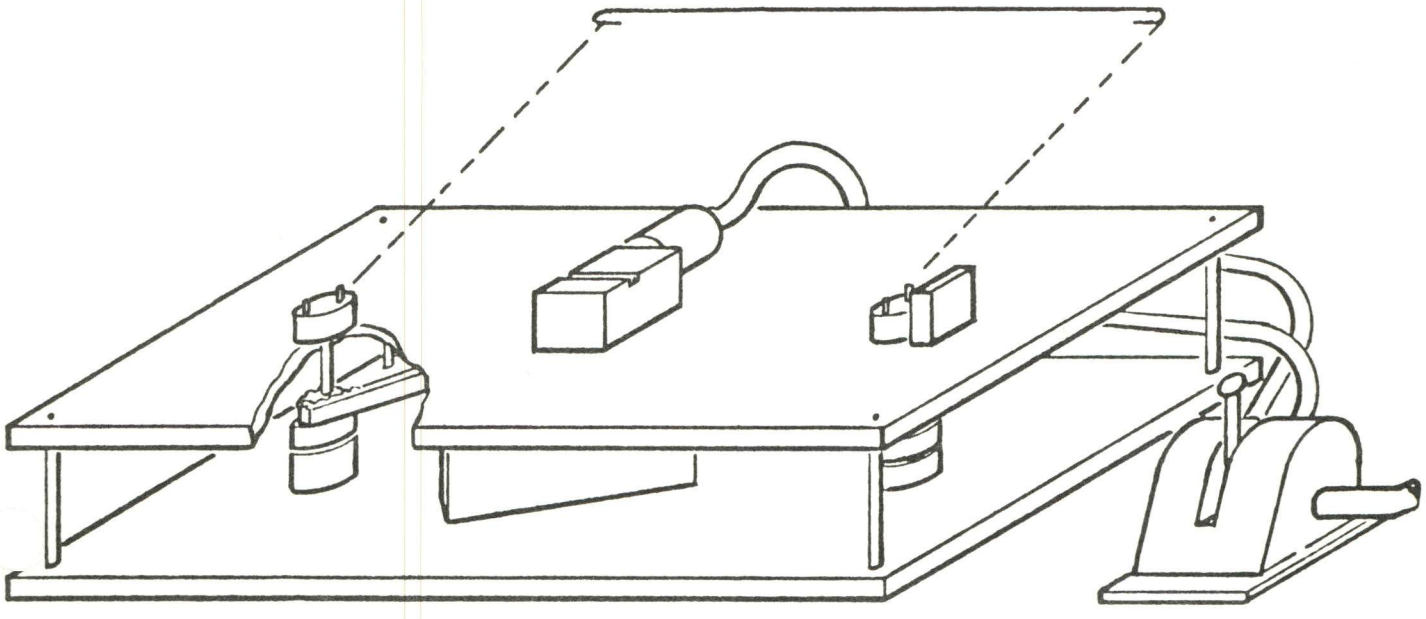
W-31
Any Etiology
U.E. Function, Limited
Installation

PROBLEM: Workers lacking strength and use of both arms
Manufacturers ship **spring struts** (mechanical door openers) to recreational vehicle manufacturers in a compressed condition ready for installation. The retaining wire is typically bent by a two-handed wirebender which requires good eye-hand coordination, good grasp, two-hand coordination, good range of motion, and upper body strength to rotate both levers simultaneously. A small tool used to pry the wire from the bending pins requires fine motor control and good hand strength.

Jig/Fixture

SOLUTION: Pneumatically-powered wirebender
A pneumatically-powered wirebender with pre-set stops and solid pin construction was designed and fabricated which can be used effectively by individuals with very limited use of one arm. Pneumatic cylinders and mechanical drives were mounted

between two ½ inch steel plates to maintain dimensional stability of the wires and to eliminate the possibility of operator contact with pinch points. The cylinders drive lengths of geared rack across pinion gears which turn the bending heads 180 degrees and return to their original positions on the return stroke. The bending head consists of a rotating cylinder with two hardened dowel pins spaced to allow the wire to be easily slipped between them and with bending allowance for the finished wires to be easily removed by hand. A stop is installed to insure proper positioning of the wire and a pneumatic clamp holds the wire in place while it is being formed. The tool is operated by a small four-way hand valve or an electric solenoid valve could be used which would allow for many different means of activation. FFI #1



Pneumatically-Powered Wirebender

W-32
SCI
Quadriplegia
Insurance Examining

PROBLEM: Reliance on co-workers for manipulating work materials
A state employee was referred for evaluation and recommendations regarding more independent functioning on the job. He has a spinal cord injury at the C5, 6 level (incomplete), and he is functionally quadriplegic with fair use of his arms and gross grasping ability with his hands (contracted). An evaluation was conducted at his place of employment to determine what technical aids could help him in his performance as a state insurance department insurance examiner. He uses a powered wheelchair for mobility, relies on others for positioning and manipulating books, papers, forms, etc., and cannot use a telephone efficiently.

Work Site Modification

SOLUTION: Recommended modifications
The following devices were recommended to allow this client to perform certain tasks independently and efficiently: (1) A twin-turntable desk, low height range, executive model with bilateral straight extension desks that should be located facing the wall in his workspace to allow him ready access to files, business equipment, books, etc.; and two deluxe easy file trays for access to client folders. (2) A Saltus reader, which is a motorized scroll, for ready access to regulation sheets, telephone index, and other pages of information as well as an additional scroll cartridge to pre-store additional

information, booklets, etc. The unit should be supplied with soft-touch switches for control. (3) An adapted telephone to allow him to dial and receive calls with greater ease and independence. The unit should have a coupler to accept up to five extensions, and the coupler should allow selection of wanted extensions and have a HOLD feature for each extension. The unit could be controlled by a rocker switch and have a flexible gooseneck for the handset. (Coordination with the telephone company is necessary for the installation of this type of device.) (4) An electric stapler. (5) Book shelves mounted on partitions for books that are not used routinely but should be available. (6) Rotating vertical tiers for the storage of papers, small books, etc., and (7) A replacement powered wheelchair with a joystick control, and an arrangement for him to charge the batteries at work.

FFI #10

W-33
Post-Polio
Paraplegia With
U.E. Weakness
Interviewing

PROBLEM: Need for larger accessible work area

An office worker has limited reaching and lifting ability in both upper extremities due to poliomyelitis. Her arms are supported by devices attached to her powered wheelchair. She needs access to various bulky materials, forms, and reference materials during the day. She tries to effectively use a wheelchair tray but does not have enough room.

Worksite Modification

SOLUTION: Electrically powered revolving desk top

This worker could reach a 12" x 12" area directly in front of her. A "Lazy Susan" desk was built allowing a circular movement of a disk which was supported by a normal appearing desk. A microswitch controlled a reversible drive motor. Two other support wheels provided a level surface. The desk top increased her available space over 1200%, permitting her total independence in her job of interviewer. The circular portion is faced with micarta on both sides to prevent warp. The desk was painted to conform with colors of other nearby office furniture. FFI #4

W-34
Blindness
Lathe Operation

PROBLEM: Inability to see readout dial on engine lathe

A machinist who became totally blind was unable to repair equipment for oil drilling and pumping machinery for a tool company because the job required the use of an engine lathe which is centered by a dial indicator.

Sensory Aid

SOLUTION: Dial indicator with audio readout

The Smith-Kettlewell Institute developed a replacement part with an audio readout which provides information on angular measurement and mechanical or linear displacement to 1/1000 of an inch. It can be removed so sighted operators can also use the lathe. For availability and cost information contact Smith-Kettlewell Institute of Visual Sciences, Rehabilitation Engineering Center, 2232 Webster St., San Francisco, CA 94115, (415) 563-2323, x 2475. FFI #2 & #3

W-35
Dwarfism
Short Stature
Laundry

PROBLEM: Inability to reach

A laundry worker is too short to reach, fill and empty two large washers. The supervisor will not allow any permanent changes in the work area because workers of ordinary height also feed the machines on other shifts. Stretching overhead proved to be too difficult for him to sustain.

Positioning Aid

SOLUTION: Spring-loaded platform
A spring-loaded platform was designed for his exclusive use. When no downward pressure is on the platform it is easily moved from its storage area near the washing machine. When pressure downward is applied, the platform will not move. The added height makes it easier for the worker to perform. FFI #4

W-36
Stature Short
Laundry Loading

PROBLEM: Unable to reach large washers in laundry
A 32 year old mentally retarded man with mild cerebral palsy is employed as a laundry worker in a large hospital. When he was referred, he was able to perform all duties of his position except loading and unloading the large washing machines because of his short stature.

Worksite Modification

SOLUTION: Spring loaded step
Because hospital safety regulations prohibited the use of a conventional step stool or ladder, a spring loaded step, running the length of the bank of washers, and which lifts up and out of the way when not in use was designed, fabricated, and installed. FFI #14

W-37
Blindness
Lawnmower Repair

PROBLEM: Unable to discern when spark plug has made successful contact
A blind lawnmower repairman needed an audible signaling device to alert him to the spark plug making successful contact.

Sensory Aid

SOLUTION: Radio/amplifier
A simple method which eliminates the dangers inherent in other methods is to place a transistor radio or audio amplifier nearby. The whine of the spark will create static on the radio or amplifier. FFI #13

W-38
Post-Polio
Quadriplegia
Lens Grinding

PROBLEM: Slowness in operating hand-operated lens grinding machine
A 24 year old male polio quadriplegic obtained employment as a contact lens curve grinder with a contact lens manufacturing company. Because of bilateral paralysis and weakness in upper extremities, he was very slow in operating a hand operated grinding machine.

Automation

SOLUTION: Pneumatic lens grinding machine
A commercially available pneumatic grinding machine was purchased which resulted in improved efficiency in client's performance. FFI #6

W-39
Quadriplegia
Machine Operation

PROBLEM: Unable to operate control knob
In a sheltered workshop, a quadriplegic and others with grasping and twisting inadequacies found it was impossible to operate a Recordak Microthin Jacket Reader-Filler. The clients could not manipulate the machine's operating knob which drives the film into the proper jacket channel and positions the film precisely at the cutting knife.

Jig/Fixture

SOLUTION: Grasp rods
Four 1/8" holes were bored in the face of the operating knob at 90 degree intervals. Lucite rods were glued in the holes with one inch of rod protruding parallel to the axis of the knob. The grasping and twisting motion formerly required were eliminated. FFI #6

W-40
Blindness
Machining

PROBLEM: Inability to see readout dial
A machinist who lost his sight returned to work for an airline, using a variety of specially adapted Braille micrometers, taped instruction manuals, and Braille-labelled parts bins. A means was also needed for him to check for gas leaks after a repair which did not require visual inspection of a needle pointer on a pressure gauge.

Sensory Aid

SOLUTION: Electronic pressure gauge with auditory signal
This 5x7x3 inch gauge produces an auditory signal as long as the pointer is NOT on the correct value of pressure; when the pointer is adjusted to the correct pressure setting, the tone disappears. A hose connects it to the refrigeration system. On top is a crank knob with Braille markings surrounding the pointer. Documentation sufficient to reproduce the unit is available from Smith-Kettlewell Institute of Visual Sciences, Rehabilitation Engineering Center, 2232 Webster St., San Francisco, CA 94115, (415) 563-2323. Contact Bill Gerrey, x 2475, for details and costs. FFI #2 & #3

W-41
Quadriplegia
Micrography

PROBLEM: Unable to grasp paper sheets
In a sheltered workshop a quadriplegic with grasping and reach problems found it impossible to feed sheets from a stack into a rotary camera for micrographic work at a reasonable speed.

Dexterity Aid

SOLUTION: Feed tray
A staff orthotist designed a feed tray manually operated which permitted the grasp-limited client to place a stack of sheets to be fed to the camera into the tray and feed them into the camera with a relatively simple short hand stroke which involved no grasping. The bottom of the feed tray was curved so that the stack of sheets was easily riffled and edge guides kept the stock oriented. FFI #6

W-42
Quadriplegia
Micrography

PROBLEM: Unable to grasp control knob
In a sheltered workshop, a quadriplegic with grasping problems could not operate a Micrographics Editor because he could not grasp and turn the control knob to each of the five positions which controlled the operation of the machine.

Dexterity Aid

SOLUTION: Lever control
The control knob was held in place by two set screws. One of these was removed and in its place a two-inch threaded lever was inserted. The grasping problem was eliminated. FFI #6

W-43
Post-Polio
Quadriplegia
Office Work

PROBLEM: Unable to access materials in office work job
A 27 year old woman with a diagnosis of post-polio quadriplegia needed to increase her independence in her office. Due to her limited reach, it was difficult to access various materials and to operate the telephone and tape recorder. The upper extremity movements of elbow flexion and use of her fingers were motions which could be utilized to interface with equipment.

Worksite Modification

SOLUTION: Worksite modifications
A rotary desk was designed and fabricated to provide easy access to materials over a large surface. For pressing the extension and hold buttons on the telephone, a base with a sliding lever was fabricated to give increased leverage for depressing the buttons. For dialing, her telephone was modified with string and finger ring that turns the dial as the client uses her elbow flexion to pull the string toward her. Using varying degrees of elbow flexion, the finger ring and string are pulled

to select numbers. For independence in tape recorder operation, a tape recorder was recommended that required only one button to be depressed at a time for operation. A base was made that has a sliding lever which depresses the control buttons when the end of the lever is elevated by elbow flexion. FFI #14

W-44
Developmentally Disabled
Cannot Count
Packaging

PROBLEM: Worker cannot count
A developmentally disabled person, who works in a workshop, cannot count and has to package twelve parts in a plastic bag.

Counting Aid

SOLUTION: Space filling system attached to packing tray
An empty egg carton is attached to a tray that is shaped at one end to hold plastic bag. Items to be packaged are put in pockets of egg carton until each space is filled. The carton is then tipped over into tray. A bag is placed over end and all parts slip into bag when tray is tilted. No counting is required. FFI #4

W-45
Cerebral Palsy
Athetoid Movement
Packaging

PROBLEM: Unable to control arm movements on packaging job
A workshop employee with cerebral palsy was assigned to a packaging job. It required her to package five items in a bag. However, her random arm movements made this virtually impossible using the setup provided for workers with better U.E. function.

Jig/Fixture

SOLUTION: Packing tray with U.E. guides
A tray was designed with compartments for each of five different items to be packaged. The dividing barriers point to the exit hole and serve as a guide for her hands, enabling her to pack the items in a bag which hangs from the "spout" of the tray by a clamp which she can operate to place bags independently. FFI #4

W-46
Dexterity Impaired
Reach, Impaired
Packaging

PROBLEM: Unable to grasp bulky parts
In a sheltered workshop a large volume of bulky parts were to be packaged with each package containing as many as six each of up to six different parts. High hand dexterity and good reach were lacking in the population of amputees, low-lesion quads, and hemiplegics. A packaging station was needed which made these requirements unnecessary.

Jig/Fixture

SOLUTION: Gravity feed bins
A system of gravity feed bins was assembled to deliver the parts into a reasonable reach area, a smooth area, in front of the worker. A loading chute for the package and a delivery chute for carrying the full, stapled package to the shipper are incorporated. High hand dexterity was no longer needed to attain reasonable speed. FFI #6

W-47
Blindness
Photography

PROBLEM: Inability to see liquid levels in containers
A blind darkroom technician must be able to determine when the supply of developing chemicals is low enough to require making a new batch.

Sensory Aid

SOLUTION: Light sensor, Brailled tape levels
A set of Brailed dymo tape labels indicating liquid levels have been placed on the outside of the transparent plastic containers. A light is suspended behind and above them. The technician moves a light sensor down the sides of the containers until a change in emitted pitch

indicates he has reached the surface of the liquid. Available from American Printing House for the Blind, P.O. Box 6085, Louisville, KY 40206, (502) 895-2405. Cost approximately $21.00. FFI #2 & #3

W-48
Low Vision
Focal Length Short
Posting and Calculating

PROBLEM: Neck positional problem
Due to very short focal length of vision, worker bent over his desk causing neck strain with pain.

Positioning Aid

SOLUTION: Vertical desk
A desk nearly vertical instead of flat was designed. This permitted the close vision the worker required for visual acuity, and permitted a more normal positioning of the neck, thereby removing the neck strain and resultant pain. Production also increased with use of the "Vertical" desk. FFI #4

W-49
MD
Arm, Weakness
Precision Assembly

PROBLEM: Precision assembly on new assignment
Worker has weak arms due to muscular dystrophy. He was doing well on an assembly job, but the contract ran out. His new assignment required him to fit two small metal caps by regular hand pressure on the ends of swimming pool thermometers. He is unable to exert the required pressure. Tapping or hammering will damage the instruments.

Jig/Fixture

SOLUTION: Jig to increase leverage and control
An inexpensive hand press and holding jig was designed for this worker. The thermometer and caps were positioned in the press with the thermocouple tube extending through a slotted cutout in the fixed end of the press. A light uniform pressure on the press handle forced both end caps on the thermometer body at the same time. Mechanical advantage was built in to compensate for weak arms. FFI #4

W-50
Blindness
Proofreading

PROBLEM: Inability to see for proofreading
The International Division of Wells Fargo Bank wanted to hire a blind woman as a word processing operator because of her ability to speak Spanish, French, and German. However, proofreading one's own work is an essential part of this job.

Sensory Aid

SOLUTION: Optacon
This commercially available device is a general purpose reading system which produces direct tactile reproduction of printed material. It is available from Telesensory Systems, Inc., 3408 Hillview Ave., Palo Alto, CA 94304, (415) 493-2626. The base price is approximately $3000. FFI #2 & #3

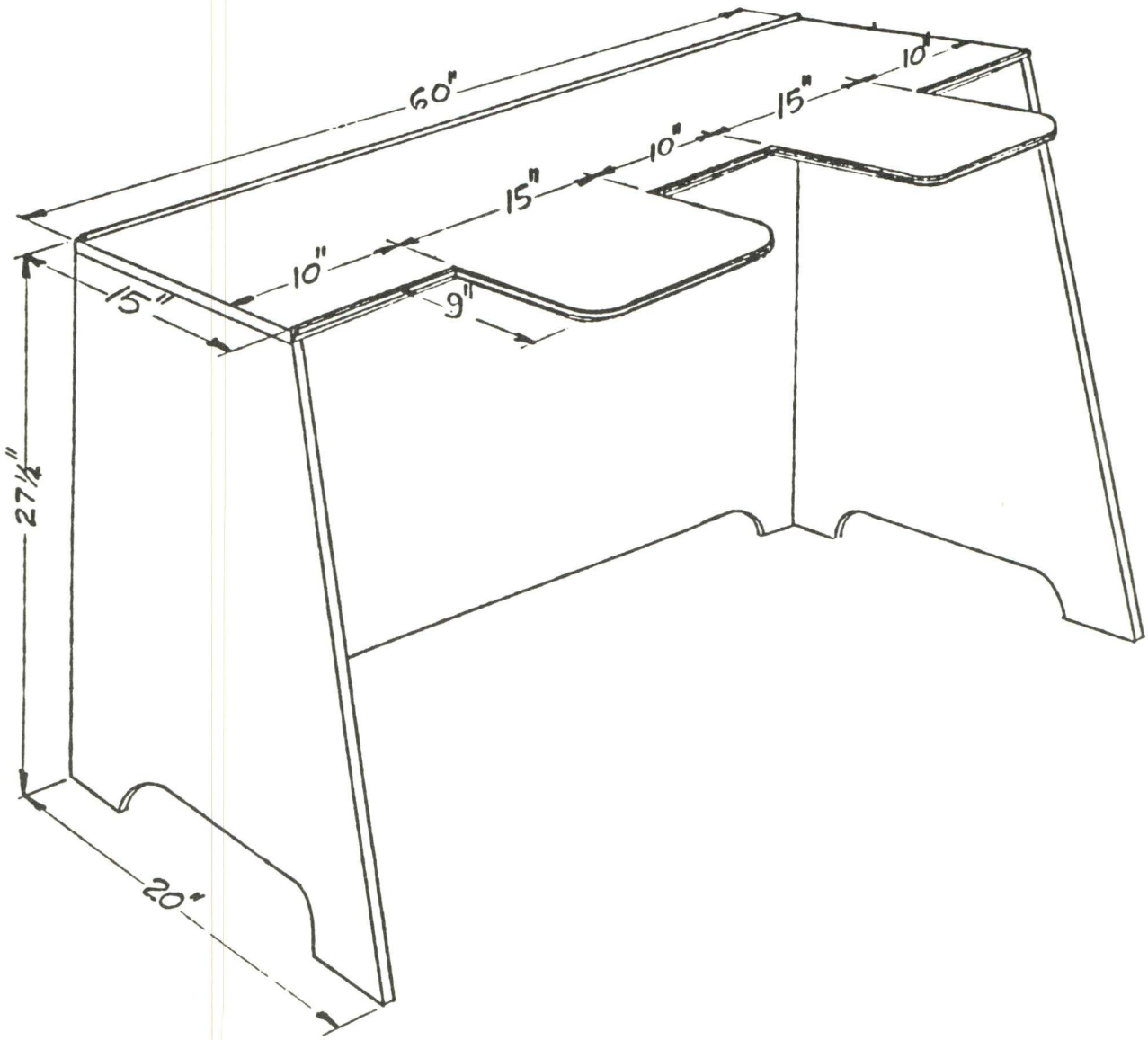
W-51
Cerebral Palsy
Athetoid
Proofreading

PROBLEM: Unable to approach typewriter
A proofreader with cerebral palsy who must type rather than write uses a wheelchair with regular (not desk) arms for safety. Presence of the wheelchair arms demanded a high table which placed the typewriter in an inconvenient position resulting in very poor typing performance.

Worksite Modification

SOLUTION: Special typewriter table
Evaluators at the Southwest Research Institute (IMPART collaborator) found that her best typing speed and accuracy were achieved when the typewriter was essentially in her lap. A special table was designed to place the typewriter in this optimum position. It is low, narrow, and

includes two projections, each of which can wedge between the arms of her electric wheelchair to assure a firm and fixed position. The typewriter placed on such a table is thus in her lap where she has the best control of her arms and hands. It is made of ¾ inch plywood with a rubberized moulding about ½ inch square around the front edge to assure a good fit between projection and chair and to minimize damage due to impact. Three-Quarter inch "quarter round" was installed at the back to keep articles from falling off. FFI #13



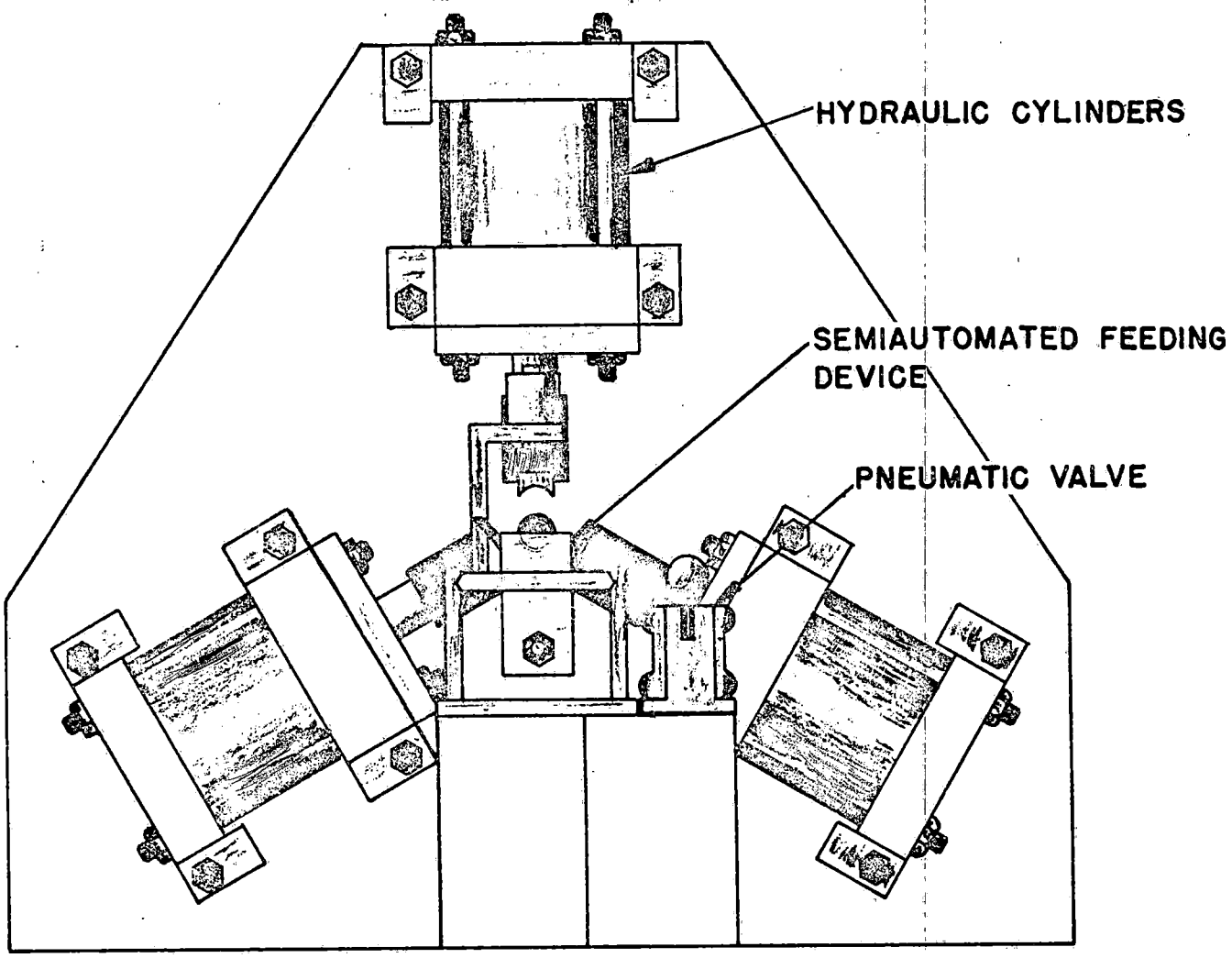
SPECIAL TYPEWRITER TABLE

W-52
Cerebral Palsy
Paralysis, Spastic
Punch Press Operation

PROBLEM: Severely impaired strength and two-handed coordination
A product manufactured requireds a thin-walled steel tube to be crimped at one end. The crimp was formed on a small **punch press** with a single action die, requiring the operator to place the tube on a **forming mandrel**, activate the press, and pull the tube off the mandrel three consecutive times to complete each tube. It was necessary to rotate the tube 120 degrees after each stroke. This required an operator with good two-hand coordination and substantial strength in the hands and arms. The person selected to perform the job had limited use and strength in only one hand. Optimum performance was from a semi-reclined position with operations placed to the side and above shoulder height.

Machine Modification

SOLUTION: Three axis crimper
A new machine tool was designed using three hydraulic cylinders with male form dies. The cylinders were mounted on a plane surface, positioned radially about the forming mandrel, and spaced at 120 degree intervals. (See illustration.) A semi-automated feeding device was included that could position the tube over the forming mandrel and remove it after forming. The operator places the tube in the cradle of the feeding device, activates a pneumatic valve, and removes the tube after forming. Pneumatic valve activation begins the process with the electronic machine logic sequencing the feeding, forming, and retraction operations. FFI #1



THREE AXIS CRIMPER

W-53
Post-Polio
Paraplegia, Short Arms
Reaching

PROBLEM: Wheelchair user cannot reach P.B.X. console
A post-polio paraplegic with very short arms could not reach the P.B.X. console needed in her work. The console was fastened near the center of a long table. The supervisor did not want to move the console which was properly placed for other workers.

Worksite Modification

SOLUTION: Design cutout which can be closed for other workers
The cutout permitted a close approach to the console. A sliding cover was designed and installed so that other workers could also utilize the work area. FFI #4

W-54
Traumatic Injury
Amputation, Triple
Reaching Top Shelves

PROBLEM: Reaching top shelves to obtain parts
A worker is a triple amputee. He has normal left arm and hand. He has to reach cardboard boxes on a high shelf, take them down, extract parts and return the boxes to top shelf. He uses a manual wheelchair. His right arm prosthesis is used only to help propel wheelchair.

Mobility Aid

SOLUTION: Custom designed reacher
A spring-loaded clamping reacher was designed. When pressure was applied, the reacher opened up. Applied to the box, the reacher handle could then be allowed to slide down in one hand without dropping the boxes. It held the box while parts were removed, and the box was then replaced on the shelf. FFI #4

W-55
Diabetic Retinopathy
Low Vision
Reading

PROBLEM: Must avoid certain head movements
A client with diabetic retinopathy must avoid angling his head down and moving his head from side to side. The client needed a reading stand with a platform to hold reading material. The platform had to move smoothly both vertically and horizontally. The tilt angle had to be adjustable.

Positioning Aid

SOLUTION: Reading stand with three dimensional movement
A reading stand with three dimensional movement was identified. It is available from Martin's Cabinet and Specialty Shop, 1001 W. 2nd St., Taylor, TX 76574, (512) 352-6875. The cost is approximately $25 when ordered in quantity. Inquire direct for individual unit pricing. FFI #13

W-56
Dystonia Musculorum
Movement, Involuntary
Reading

PROBLEM: Unable to hold book open
A man who has dystonia musculorum, which entails uncontrollable motions, jerking, and posturing, works on a volunteer basis as editor of a newsletter for the nursing home in which he lives. He used a number of assistive devices successfully, but a remaining problem involved page turning and holding.

Positioning Aid

SOLUTION: Elastic book strap
An elastic strap with a section of clear plastic which passed over the printed matter, allowing unobstructed vision, proved to be the solution. The elastic can be made tight enough to hold the book open, but not so tight as to interfere unduly with turning the pages of the book. It stays in place firmly enough to withstand his involuntary motions. FFI #9

W-57
Birth Defect
Mobility Impaired
Receptionist

PROBLEM: Unable to depress "hold" button on telephone
Multi-line telephone operation is a major part of a receptionist's job. An employee who had a birth defect and very little mobility was able to cope physically with all phone line buttons except "hold."

Dexterity Aid

SOLUTION: Extension lever
An extension lever of metal was fashioned and installed to give easy access by mouth stick and to dramatically reduce the pressure necessary to operate the "hold" button. FFI #15

W-58
SCI
Quadriplegia
Removing Staples

PROBLEM: Unable to remove staples
In a sheltered workshop, quadriplegic workers could not operate a standard staple remover in a micrographics shop requiring large numbers of staples to be removed.

Tool Modification

SOLUTION: Solenoid activated staple remover
A solenoid activated staple remover was designed and built. FFI #6

W-59
Blindness, Legal
Research

PROBLEM: Viewing material at a distance
A worker with partial vision (no vision in left eye, 20/800 in right eye, and almost a normal visual field in right eye) needed to: (1) View a chalkboard and take notes on or copy what was being written on the board; (2) View maps, charts, and other material spread out on a table which those materials were being discussed and viewed by him and his fully sighted colleagues.

Sensory Aid

SOLUTION: Binoculars
The worker used a pair of 10 x 40 binoculars with one of the binoculars' optical trains capped by a lens which permitted him to see at very large distances, and the other permitted him to see clearly at distances ranging from about 25 to 50 cm.

Binoculars can be obtained from various quality optical and camera shops. However, it is advisable that a partially sighted person have a good low vision examination prior to the purchase of this or other visual aids. Sometimes such an examination will reveal that there is a simpler technique for coping with the problem under discussion as well as with other visual problems or tasks.

A very good discussion of binoculars and their value to partially sighted persons can be found in "Binoculars — A Long Ignored Aid for the Partially Sighted" Rand Report 1402 by S.M. Genesky. This report can be obtained from the Publication Department, The Rand Corporation, 1700 Main Street, Santa Monica, CA 90406. FFI #5

W-60
Blindness
Reservations

PROBLEM: Inability to track lines of characters
A totally blind airline reservationist was able to perform most of her duties easily with the help of various sensory aids, including an Optacon with a CRT lens attachment. However, tracking rows and columns of figures and other characters, without losing her place, proved difficult and time-consuming.

Sensory Aid

SOLUTION: CRT tracking guide
A prototype was successfully tested by her with the airline's cooperation. The guide holds the Optacon CRT lens attachment against a vertical display screen and allows the user to follow the lines without constantly repositioning the camera. Availability and cost information can be obtained from Clement Laboratories, 2560 Wyandotte St., Mountain View, CA 94040, (415) 964-0921. FFI #2

W-61
Blindness
Sales

PROBLEM: Inability to use standard calculator for pricing
A blind office products sales trainee was able to perform all needed functions using standard office equipment plus Brailled materials and a light probe for telephone answering. The calculations required for pricing presented a problem, however.

Sensory Aid

SOLUTION: Talking calculator
The Speech Plus calculator provides a voice readout from all functions of a general electronic calculator. It is available from Telesensory Systems, Inc., 3408 Hillview, Palo Alto, CA 94304, (415) 493-2626. Cost is approximately $400. FFI #2 & #3

W-62
Blindness
Saw Sharpening

PROBLEM: Blind worker needs three hands
A blind saw filer must use his hands for functions ordinarily accomplished by visual inspection. Thus, he needs to move the saw blade which is being sharpened by some other means.

Jig/Fixture

SOLUTION: Knee operated saw indexer
This modification permitted the blind operator to use his hands for alignment and to index the saw (move it forward by two notches) with his knee, without moving his hands from the critical alignment area.
FFI #4

W-63
SCI
Paraplegia
Sewing

PROBLEM: Unable to operate sewing machine foot controls
Worker is a spinal cord injury paraplegic. She was a power sewing machine operator prior to her injury. Now she cannot handle the foot controls on her power sewing machine.

Jig/Fixture

SOLUTION: Arm controls for power sewing machine
Extensions were added to the foot controls of the power sewing machine. Alternate controls were set up for use of either arm. The system was designed for easy removal in the event she wanted to change machines or jobs. FFI #4

W-64
Dwarfism
Legs Short
Sewing

PROBLEM: Worker unable to reach power sewing machine controls
A woman who is a dwarf with very short legs wanted training as a power sewing machine operator but she could not reach the foot controls.

Jig/Fixture

SOLUTION: Extensions to foot pedals
Extension controls were attached to the power sewing machine at the training school. They were designed to allow removal and installation on standard power machines used by industry. At the end of the training program, they were installed on the employer's machine.
FFI #4

W-65
Post-Polio
Paralysis
Skip Tracing

PROBLEM: Unable to hold large directories
A skip tracer who is a post-polio quadriplegic was able to perfrom most aspects of his job using **Handi-Hooks** (a product of **Robin Aids,** Vallejo, CA, which uses the principle of arm prosthesis to open hook by shrug of opposite shoulder) in both hands. Accessing 50 large, street to street telephone directories was still a problem for him, however.

Holding Aid

SOLUTION: Lazy Susan directory holder
A Lazy Susan directory holder was designed. The directories were attached to the holder by a wire pin which allowed replacement of new issues. The holders were tilted away from the worker. The unit revolves, making each directory available. The worker was then able to use his Handi-Hooks to look up numbers efficiently FFI #4

W-66
Spinal Injury
U.E. Weakness
Small Engine Repair

PROBLEM: Unable to use rope start on small engine
A VR client with a spinal injury and limited use of his arms needed a device or method by which to turn or whirl a small engine instead of pulling a rope to start the engine.

Machine Modification

SOLUTION: Screw-type starter
IMPART located a suitable device, a screw-type starter for small engines that could be used as a starter for lawnmowers, available from Harold Lehnick Co., Route 2, Box 64E, Manor, TX 78653. The cost is approximately $26. FFI #13

W-67
Quadriplegia
Soldering

PROBLEM: Unable to operate soldering tool
In a sheltered workshop, a quadriplegic worker with less than normal strength and dexterity was not able to satisfactorily hold and solder terminal strips.

Jig/Fixture

SOLUTION: Holding device
A bracket holding eight strips in position was fabricated to relieve him of the strength requirement when he soldered. FFI #6

W-68
Low Back Injury
Back Pain
Sorting and Filing

PROBLEM: Difficulty in stooping and bending
Sorting of 8½" x 11" files was performed at the side of a cart which had five shelves parallel to the floor. This required stooping and maintaining a bent over position which placed a strain on a worker with a low back injury.

Worksite Modification

SOLUTION: Sorting shelf and back support chair
The worker had a small desk area and a three-level shelf was designed in an "L" shape to provide enough room for temporary storage while the sorting operation was performed. The worker was also provided with a chair that gave support to the low back area. FFI #4

W-69
SCI
Quadriplegia
Starting Screws

PROBLEM: Unable to start screws
In a sheltered workshop, quads were not able to start screws into tapped holes in brass plugs.

Jig/Fixture

SOLUTION: Holding/alignment fixture
A fixture was designed and constructed to hold a number of parts and to drop screws into slots properly aligned so that with a screwdriver the screws could be started and tightened. FFI #6

W-70
Blindness, Legal
Systems Analysis

PROBLEM: Need for portable CCTV
A legally blind systems analyst working for a bank found that his advancement opportunities were blocked by the lack of a closed circuit TV (CCTV) system which could be easily carried on and off an airplane.

Sensory Aid

SOLUTION: Visualtek Commuter
This commercially available portable CCTV system is available from Visualtek, 1610 26th St., Santa Monica, CA 90404, (213) 829-3453. Cost approximately $900 — $1000. FFI #2 & #3

W-71
SCI
Paralysis
Tape Recording

PROBLEM: Unable to operate standard tape recorder
A high quadriplegic needed to be able to operate a tape recorder for training and work activities, but lacked the necessary finger function.

Dexterity Aid

SOLUTION: Tape recorder for the spinal cord injured
The controls of a reel-to-reel magnetic tape recorder/player were redesigned to provide remote control of the record, playback, rewind, and stop modes. Remote control can be accomplished by either a low force actuated pushbutton unit or a light beam interruption unit. Either unit can be activated by a mouthstick. FFI #6

W-72
Blindness
Telephone Answering
Multiple Line

PROBLEM: Unable to identify correct incoming call line
Blind persons have difficulty promptly answering correct lines on multiple line telephones. Employee needs to quickly identify conditions of four incoming phone lines in use, ringing, on hold, or available for use. Volume of calls is low but important.

Sensory Aid

SOLUTION: Light probe with audio response
A light probe with audio response was found to be the most practical solution. Several probes are marketed commercially but on the West Coast, one is offered by the Pioneers of America, Chapter #31, 421 S.W. Oak Street, Portland, OR 97204, and is very popular. The cost ranges from $19.00 to $25.00. FFI #15

W-73
Cerebral Palsy
U.E. Weakness
Spasticity
Telephone Operator

PROBLEM: Unable to use standard telephone, reach switchboard
A 26 year old female with cerebral palsy obtained employment as a telephone operator in a sheltered workshop. Because of confinement to an electric wheelchair and bilateral weakness and spasticity of upper extremities, she was unable to utilize a standard telephone and had difficulty reaching the switchboard above her desk.

Worksite Modification

SOLUTION: Headset and repositioned switchboard keys
Standard telephone headset was provided and switchboard keys were positioned at front edge of desk. FFI #6

W-74
Post-Polio
Quadriplegia
Telephoning

PROBLEM: Speaker telephone echo
A post-polio quadriplegic working in a desk job must use a speaker telephone because of severe upper extremity paralysis. He complains of echos that make his voice sound like he is talking from a cavern.

Sound Absorber

SOLUTION: Enclosed sound absorbing booth
A non-echo sound absorbing material was built around the desk on which the speaker telephone was installed. This muted the echos and good communication was established. FFI #4

W-75
Hemophilia
Joint Damage
T.V. Repair

PROBLEM: Lifting heavy T.V. chassis for repairs
A worker was trained as a T.V. repairman. He has hemophilia that has damaged his hip and knee joints making it necessary for him to use crutches in ambulation. The pickup man deposits sets for repair on the floor of the shop. The worker cannot lift them up to bench height.

Worksite Modification

SOLUTION: Variable height work bench
An elevating work bench was designed. The work surface of the bench could be electrically lowered to the floor. Sets could be slid onto bench surface. A set could then be raised to optimum level for the work to be done. In case of power failure, the work surface could not drop. Casters allowed the work bench to be used to transport sets from one location to another. Plugs were installed for soldering and testing devices. (When worker was absent, other people [employees] used desk because of its vertical versatility.) FFI #4

W-76
Quadriplegia
Typing

PROBLEM: Mouthstick typists unable to advance/reverse paper
Even with self-correcting typewriters, mouthstick typists still need the ability to advance and reverse the paper through the typewriter roller.

Dexterity Aid

SOLUTION: Electric reverse indexer
A simple, inespensive adaptation to provide electric reverse indexing for an IBM self-correcting Selectric typewriter was developed. It uses a gear motor operated by two momentary contact switches mounted on the typewriter cover. The rear of the typewriter is elevated to allow easy character viewing by a typist who cannot lean forward. Fabrication cost approximately $80.00 Through further development, the Royal 5000C self-correcting electric typewriter adapted to include these features, is now commercially available for approximately $750. FFI #11

W-77
Amputation, Right Upper Extremity
Typing

PROBLEM: Selection of equipment for typing
A teacher in a training school recommends that client learn to type on one-hand keyboard instead of a regular keyboard. A left-hand keyboard typewriter is available, but no training manual.

Dexterity Aid

SOLUTION: Purchase of keyboard typewriter manual
If the client learns to use the regular keyboard, she will have to do about 40% of the typing work with her little finger. The left hand keyboard distributes the typing load on the best functioning fingers. It also cuts down on the single finger letter sequences which slow down typing. Write to the Typewriting Institute for the Handicapped, 3109 W. Augusta Avenue, Phoenix, AZ 85021, and request a free training manual. Your client can learn to type by using this manual, even without a teacher. FFI #4

W-78
Amputation, U.E., Unilateral
Typing

PROBLEM: Need to type one-handed
An upper extremity amputee needed a typewriter with keyboard arranged for efficient typing with one hand.

Machine Modification

SOLUTION: One-hand typewriter
IMPART found that suitable one-hand typewriters are available from the Typewriting Institute for the Handicapped, 3102 W. Augusta Ave., Phoenix, AZ 85021, (602) 939-5344. The cost for either a right or left hand model is approximately $400. FFI #13

W-79
Cerebral Palsy
U.E., No Function
Typing

PROBLEM: Inserting typing paper for head stylus typist
An employee who lacked U.E. function learned to type accurately on an IBM Selectric (whose built in features greatly enhance typing capabilities) using a head stylus, but had to ask for help each time a paper change was required. Typed rough drafts only.

Mobility Aid

SOLUTION: Typewriter paper feeder
A holder was designed to support a roll of typing paper and a hacksaw blade was installed to go over the paper within the carriage so it could serve as a cutting bar. White bond paper rolls were purchased from IBM. The design is simple and the cost of fabrication and installation is minimal. FFI #1

W-80
SCI
Quadriplegia
Vocational Counseling

PROBLEM: Unable to "depress" to relieve skin pressure
A rehabilitation counselor who is a C5 quadriplegic had to ask colleagues to help lift him to relieve sitting pressure every two hours during the work day. He sought help to find a way that he could be independent in meeting this need.

Positioning Aid

SOLUTION: Reclining wheelchair
A reclining wheelchair was fabricated by the Center with a head rest that automatically moves into position during the reclining movement. A low chair back is maintained when the user is upright to enable him to use the back for support when leaning forward. The recliner obviated the need for periodic lifting and also reduced fatigue. FFI #9

W-81
Cerebral Palsy
Athetosis/ataxia Right Hemiplegia, Left
Vocational Counseling

PROBLEM: Unable to work efficiently/independently as vocational counselor
A state VR agency counselor was referred by her employer for evaluation and recommendations which would render her more independent and efficient in her work. Her physical dysfunctions included left side paralysis, right side athetosis and ataxia, and dysarthria. The employer's goals were to see her become less reliant on others in the office, more organized, and more productive.

Work Area Modifications

SOLUTIONS: Work site modifications
A conventional work table was replaced by two long, narrow (18" x 6') tables to accomodate her limited reach, arranged in an "L" shape; tape recorders, telephones, and other devices were permanently fixed in convenient locations to eliminate their motion when she uses them; mouthstick holders were placed at three locations to provide easy access; a touchswitch which activates without pressure was added to her dictating unit; a gooseneck clamp was installed for positioning of her dictation microphone; the room air conditioner was relocated so she could reach the on-off switch; a slanted reading stand with a lip at the lower edge and a swinging lever at the top to hold pages and a non-slip desk mat were provided. Much of the equipment was commercially available (e.g., tables, "Dycem" desk mat) and the remainder was fabricated in the Center's laboratory. FFI #9

W-82
Cerebral Palsy
Movement Athetoid
Weighing

PROBLEM: Unable to place objects on scale
A worker with cerebral palsy, athetoid type, has severely impaired hand and arm function. His uncle sells packaged nails to hardware stores and specialty shops, and has offered his nephew a contract if the price is competitive. The job requires the packaging of nails to a required weight. The worker's poor grasp and coordination would not permit him to quote a competitive price.

Jig/Fixture

SOLUTION: Adjustable electromagnet
An electromagnet was obtained from an automobile air conditioner clutch and fitted with a handle. Power was supplied at a safe low direct current voltage by an inexpensive battery charger. With the power on, the magnet lifted a fixed quantity of nails from the bulk

supply. The captured nails were placed over a funnel which rested on a scale. By turning off the current, the nails fell into the package. A quick check on the weight indicated whether a nail or two had to be added for the exact weight. A competitive packing speed was the result. FFI #4

W-83
Quadriplegia
Welding

PROBLEM: Unable to operate heat control on Heliarc welding machine
A quadriplegic VR client who uses a stretcher-type wheelchair needed a modification of the heat control on a Heliarc welding machine that would permit him to operate it.

Machine Modification

SOLUTION: TIG Torch with 25 foot cable
The Southwest Research Institute (an IMPART collaborator) identified a commercially available system which the client was able to operate. The TIG Torch with 25 foot cable, ON/Downslope Switch P/N 366592-1 Model #E-20 is available from Robert Welding Sales/Service in Orlando, FL., for approximately $48.00. FFI #13

W-84
Crutch/Cane Users
Work Area Safety

PROBLEM: Safely storing canes/crutches
Work plant safety officers frequently object to workers placing their canes or crutches on the floor near their desks or other work sites.

Appliance Storage

SOLUTION: Holders for ambulation aids
There are several workable solutions. Some prefer to hold canes between their legs and not put them on the floor. Fishing rod holders sold in tackle stores will hold a cane securely. These holders attach to a desk surface with screws or glue. Broom holders work well for aluminum crutches. Velcro fasteners on a strap are also easy to use and are adjustable. Any of these solutions should satisfy the safety officer.
FFI #4

W-85
Blindness, Legal
Writing

PROBLEM: Unable to see to read and write
Worker with partial vision (no vision left eye, 20/800 right eye, and almost normal visual field right eye). This worker could only write by bringing his right eye to within 3 cm. of the writing paper. This meant that he was forced to bend over a horizontal desk surface or an inclined surface. In either case this put undue stress on his back, caused him to bend into unnatural and uncomfortable positions, and made it very difficult for him to answer a telephone and take notes on the conversation while the latter was in progress.

Sensory Aid

SOLUTION: CCTV
The worker obtained a closed circuit TV system that permitted him to solve all the difficulties listed above, and also to take advantage of the fact that a CCTV system makes it possible to vary the magnification of the image on the monitor screen and to control the image contrast, brightness, and polarity. The ability to change image polarity was particularly helpful, because for this worker and for many other partially sighted persons viewing white symbols on a black background involves far less eye fatigue than viewing black symbols on a white background.

Quality CCTV systems can be purchased from Apollo Lasers, Inc., 6357 Arizona Circle, Los Angeles, CA 90045, and Visualtek, 1610 26th Street, Santa Monica, CA 90404. There are several models of CCTV systems offered by each manufacturer as well as various optional accessories. CCTV systems vary in price between about $1,000 and $2,000. FFI #5

W-86
Blindness, Legal Writing

Sensory Aid

PROBLEM: Reading, taking notes, copying from what is being read
Worker with partial vision (no vision in left eye, 20/800 right eye, almost normal visual field right eye) found it very difficult to read and take notes on or copy from what he was reading.

SOLUTION: Double x-y platform
Worker obtained double x-y platforms that he uses in conjunction with the closed circuit TV systems in his two offices. The double x-y platforms replaced the single (or usual) x-y platforms that were part of his CCTV systems (and should be an integral part of any competently manufactured CCTV system). These double x-y platforms have two rectangular platforms that move together in the x — or left/right direction, and that move independently of one another in the y — or toward the user/away from the user direction. The double x-y platform in effect remembers the line upon which the user left off reading (writing) when the user shifts over to writing (reading) and also while he is writing (reading).

At the present time double x-y platforms are not available commercially. A detailed illustrated description of double x-y platforms is given in R-1614 "A Double X-Y Platform for Randsight-Type Instruments" by R.W. Clewett, S.M. Genensky, and H.E. Petersen. This report can be obtained from the Publications Department, The Rand Corporation, 1700 Main Street, Santa Monica, CA 90406. FFI #5

RESOURCES FOR FURTHER INFORMATION AND SOLUTIONS

FOR FURTHER INFORMATION (FFI) ENTRIES

#1 **The Cerebral Palsy Research Foundation of Kansas**
Rehabilitation Engineering Center
P.O. Box 8217
Wichita, KS 67208

Cerebral Palsy Research Foundation of Kansas, Inc. is administered by a Board of Directors and John F. Jonas, Jr. as Executive Vice President. There are three main programs under this organization: Rehabilitation Engineering Center, Center Industries Corporation, and Timbers Housing Project. In addition, on-going contracts with the State Department of Special Education and Department of Health interface Cerebral Palsy Research Foundation with children's programs.

The Rehabilitation Engineering Center was established as a joint research activity of Cerebral Palsy Research Foundation and the College of Engineering of Wichita State University. Cerebral Palsy Research Foundation of Kansas provides the client environment through Center Industries Corporation and the HUD — Timbers Housing Project for this research.

Center Industries Corporation is the setting wherein physically disabled clients can be employed and integrated into the manufacturing scene. This is done through engineering adaptations for various clients, enabling them to perform tasks as proficiently as able-bodied employees.

The Timbers Housing Project provides physically disabled persons with the opportunity to live as independently as possible. The Timbers is composed of apartment units arranged in fourplexes and sixplexes with dining and recreational facilities easily accessible to all residents.

Ask for further information on a solution abstracted from their publication series titled: "Problem Solving with Rehabilitation Engineering — Tech Briefs".

#2 **Sensory Aids Foundation**
399 Sherman Avenue, Suite 4
Palo Alto, CA 94306
(415) 329-0430

The Sensory Aids Foundation is a non-profit foundation associated with Telesensory Systems, Incorporated, 3804 Hillview Avenue, Palo Alto, CA 94304, (415) 493-2626, known for producing such devices as the Optacon and the Talking Calculator. The Foundation operates a vocational program through an Innovation and Expansion grant, emphasizing the creation of employment opportunities for blind and partially sighted persons. All placements are supported by sensory aids which either augment vision or provide alternate forms of information for totally blind persons.

For further information, contact the following staff:

Employment Development Program
Susan Phillips, Program Coordinator
Dan Van Horn, Vocational Specialist
Yvonne Russell, Engineering Consultant

Training Program
Jerry Kuns, Program Coordinator
Sharon Conner, Vocational Specialist, Trainer

Ask for further information on a solution abstracted from their publication series titled: "Sensory Aids Foundation Quarterly Reports.".

#3 **Sensory Aids Foundation**
399 Sherman Avenue, Suite 4
Palo Alto, CA 94306
(415) 329-0430
— OR —
American Foundation for the Blind
15 West 16th Street
New York, NY 10011

Ask for a copy of their joint publication titled: "Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide".

#4 **A.G. Garris**
Assistive Device Consultant
California State Department of Rehabilitation at
Rancho Los Amigos Hospital
7601 E. Imperial Highway
Downey, CA 90242
(213) 922-7733

A.G. Garris writes a column titled "Dear A.G." for the house organ of the California State Department of Rehabilitation. For more than five years, counselors have written to him with questions regarding assistive device needs of their clients and responses are published in the departmental newsletter. In addition, A.G. Garris and contract consultants (engineers) will evaluate and develop solutions to problems when feasible.

#5 **Center for the Partially Sighted**
Santa Monica Hospital Medical Center
1250 Sixteenth Street
Santa Monica, CA 90404
(213) 451-1511, x 2393

The Center for the Partially Sighted provides direct services for in-patients and out-patients of the Santa Monica Hospital Medical Center, and also has an active research program. The research program is oriented toward developing means of utilizing residual vision as much as possible.

#6 **The Institution for Rehabilitation Research**
Texas Medical Center
1333 Moursund Avenue
Houston, TX 77030
(713) 797-1440
Contact: Dr. O.B. Billings

This is a multi-institutional program which is operated cooperatively by the Baylor College of Medicine, The Institution for Rehabilitation and Research, and Texas A & M University. The Center's efforts are focused on developing devices and methodologies which will reduce the risk of pressure-induced tissue breakdown. The major program areas are: tissue pressure management, clinical device development, implant materials, and support of the Vocational Industrial Center. In the last, industrial engineering is applied to the productivity problems that limit the vocational potential of severely disabled clients. Work stations are designed to minimize the effects of a client's limitations and special aids are developed to permit disabled workers to work at normal or near normal levels of output.

#7 **Institute for Information Studies**
400 N. Washington Street, Suite 202
Falls Church, VA 22046
(703) 533-0383

The Institute for Information Studies is a non-profit organization involved in research for and about handicapped individuals and their problems. For the cases cited, please contact Dr. Carolyn Vash at the Institute.

#8 **Mickey Christiason**
Recreation Therapy Department
Rancho Los Amigos Hospital
7601 E. Imperial Highway
Downey, CA 90242

The Recreation Therapy Department at Rancho Los Amigos Hospital is strongly oriented toward preparing Hospital patients to use their leisure time constructively and rewardingly after they leave the Hospital, rather than entertaining them while they are there. In the course of this, numerous techniques and devices have been developed to help given individuals, which have proved to have more general applicability.

#9 **Northwestern University**
Rehabilitation Engineering Program
Room 1441
345 East Superior Street
Chicago, IL 60611
(312) 649-8560

The core area of this NIHR funded rehabilitation engineering center is internal joint replacement. A secondary area of concern is the development of assistive devices for severely disabled people. In both areas, both research and development and clinical service programs are conducted.

#10 **Development, Evaluation and Clinical Engineering Center**
Veterans Administration Prosthetics Center
252 Seventh Avenue
New York, NY 10001
Contact: Saleem Sheredos

The VA Prosthetics Center operates development, evaluation, and service delivery programs which are national in scope in response to the needs of all VA Medical Centers; its interest is broad spectrum in rehabilitation engineering, having special programs in prosthetics, orthotics, orthopedic shoes, and all types of technical aids. Development efforts are primarily focused on the problems of severely disabled persons with spinal cord injuries. Its automotive vehicle program is focused on the development of standards for adaptive equipment for disabled drivers. The Center also emphasizes mobility systems, particularly wheelchairs, both in development and evaluation. The VAPC also conducts educational and training programs for rehabilitation engineering specialists.

#11 **Rehabilitation Engineering Department**
Woodrow Wilson Rehabilitation Center
Fishersville, VA 22939
Attn: Reuven Kruger

The major engineering effort at Woodrow Wilson Rehabilitation Center revolves around rehabilitation engineering service delivery as opposed to pure research activities. Here the concerns are to deliver a product or consultation service to an individual within a defined time frame and at a minimum of cost. Rehabilitation Engineering is also concerned with helping to facilitate the transition of research developments to actual consumer usage.

Rehabilitation Engineering at Woodrow Wilson Rehabilitation Center also serves as a source for referral to rehabilitation engineering centers, Veterans Administration facilities, universities, and other sources of pertinent rehabilitation engineering information.

Rehabilitation Engineering's first concern is with service to the clients at the Center. However, limited statewide service is available depending on the circumstances of each individual case.

#12 **Florian Caligiuri, Executive Director**
California Association of the Deaf
1507 21st Street, Suite 102
Sacramento, CA 95814
TTY (916) 443-2833 Voice (916) 443-3604

The California Association of the Deaf is an information and referral and advocacy agency for people who are deaf or hearing impaired. A special area of interest is that of communication aspects of deafness, and much of the information provided relates to sensory aids for people with impaired hearing.

#13 **Carol Whitcraft, Ph.D., Project Director**
Project IMPART
Texas Rehabilitation Commission
118 E. Riverside Drive
Austin, TX 78704
(512) 447-0367

IMPART is a problem solving project funded as a research utilization laboratory by the National Institute of Handicapped Research. Problems of handicapped persons in work settings and in independent living situations are submitted to the IMPART project rehabilitation engineers. These problems are then matched with commercially available solutions or with prototypes developed through other resources. IMPART serves the Federal Region VI five-state area of Texas, New Mexico, Oklahoma, Arkansas and Louisiana. IMPART is an acronymn for Innovative Matching of Problems to Available Rehabilitation Technology.

#14 **Project Threshold**
Rancho Los Amigos Rehabilitation Engineering Center
7601 E. Imperial Highway
Downey, CA 90242

Supported jointly by the California Department of Rehabilitation and NIHR, the purpose of Project Threshold is to assist severely disabled clients of the California State Department of Rehabilitation (DR) in becoming more employable by increasing their independence. Client services include independent living skills, mobility evaluation, and worksite evaluation and modification. The Project makes use of the Rehabilitation Equipment Demonstration Unit — a model home stocked with technical aids for trial use by disabled consumers.

#15 **Special Assistance to the Handicapped**
Pacific Telephone
500 E. Main St. Room 202
Alhambra, CA 91801
Voice: (800) 242-4565 TTY: (800) 242-4570
Director: Ray Disinger

This is a new special assistance program for telephone users with physical disabilities developed through the joint efforts of Pacific Telephone, the California Department of Rehabilitation, the California Public Utilities Commission, and various other public service groups. It attempts to solve telephone usage problems posed by mobility or hearing disabilities. At the time of this writing, the program is available only in the Los Angeles 213 area code area.

Interagency Conference on Rehabilitation Engineering
Co-sponsored by the Veterans Administration and the Rehabilitation Services Administration in the Department of Health, Education and Welfare

1979 Chairmen: Anthony Staros, Veterans Administration
Joseph E. Traub, Rehabilitation Services Administration

This annual interagency conference was initiated in Washington, D.C. in 1978, and was held in Atlanta, Georgia in August of 1979. The major purpose of the conference is to expedite information dissemination on rehabilitation engineering to professional, consumer, government and other agencies. Descriptions of devices and methods which can facilitate independence and promote a higher quality of life for those who have physical or sensory disabilities are offered through instructional courses, plenary sessions, technical workshops, exhibits, and sessions reporting research and development. The conference is scheduled for Toronto, Canada in 1980, but thereafter will be held in Washington, D.C. in even numbered years, and in different cities around the U.S. in odd numbered years.

International Abilities Unlimited Exposition
2945 Harding, Suite 107
Carlsbad, CA 92008
(714) 729-0853

General Manager: Richard C. Wooten

This is an annual exposition of goods and services for the disabled from around the world. Sponsored by the California Association of the Physically Handicapped, it was held for the first time in Los Angeles in the Spring of 1979, will be held in Los Angeles in 1980, but may then be held in other cities on the West Coast. This Exposition includes major employers of people with disabilities as well as assistive device exhibits.

International Disabled Expo
32 W. Randolph Street
Chicago, IL 60601
(312) 346-0752

General Manager: R.J. Powell

This is an annual show of products and services of interest to people with disabilities. Sponsored by the Paralyzed Veterans of America, it has been held for two years in Chicago (1977 and 1978) and was held in Houston in 1979. In the future, it is to be held in various cities around the U.S. In conjuction with the Expo a series of conferences and lectures are conducted on subjects of interest to Expo attendees.

Assistive Devices Purchasing and Supply Catalog
Published by the Texas Rehabilitation Commission IMPART Demonstration Center
1138 Airport Boulevard
Austin, TX 78702
(512) 926-1661

The Demonstration Center is a centralized collection of many devices which represent the latest products of rehabilitation engineering. Their catalog is published for the purpose of providing rehabilitation personnel with references for submitting purchase requests for devices for their clients. Items which are starred (*) are not available for inspection at the Demonstration Center but are included for information purposes. All other items listed are available at the Center.

For further information contact John O. Robinson, Assistant Commissioner for Purchasing and Supply, at the above address or telephone number.

Sensory Aids for Employment of Blind and Visually Impaired Persons: A Resource Guide; two editions; Large print and Braille, $7.50.

This 210 page catalog of sensory aids useful in the employment of blind and visually impaired persons was developed through the joint efforts of the Sensory Aids Foundation and the American Foundation for the Blind. A vast array of devices is described in terms of Function, Employment Application, Description, Vendor, Availability, and Price. It is well indexed, in terms of Employment Area, Manufacturers and Vendors, Research and Development, and Devices.

It is available from either:

Sensory Aids Foundation
399 Sherman Avenue, Suite 4
Palo Alto, CA 94306
(415) 329-0430
or
American Foundation for the Blind
15 West 16th Street
New York, NY 10011

Sensory Aids Foundation Quarterly Report (Formerly the Optacon Fund Report)

This newsletter is published by the Sensory Aids Foundation as a means for disseminating information regarding the progress of the vocational programs operated by the Sensory Aids Foundation. The change of name reflects a name change on the part of the Foundation itself in 1977. The reports recapitulate some of the placements accomplished by the Foundation and describe the sensory aids used to expedite in making them possible.

Copies my be obtained by writing to:

Sensory Aids Foundation
399 Sherman Avenue, Suite 4
Palo Alto, CA 94306
(415) 329-0430

REHABILITATION ENGINEERING CENTERS

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

Director: Maurice A. LeBlanc

The core area of research under NIHR funding as a REC is controls and interfaces for rehabilitation engineering systems for severely physically limited people. The Center also has five service areas: prosthetics, orthotics, mobility devices, communication devices, and prevention of tissue damage. In addition to the research and direct service programs, an education and training program is conducted in which help for families as well as training of patients and professionals is stressed.

Rehabilitation Engineering Center
Moss Rehabilitation Hospital
12th Street and Tabor Road
Philadelphia, PA 19141
(215) 329-5715

Director: A. Bennett Wilson, Jr.

The core area for research at the REC-MRH is locomotion and mobility for physically disabled individuals. Clinical evaluations are carried out for other groups, and a Rehabilitation Engineering Clinic is conducted to determine the proper role of the engineer in service delivery. Education programs concerning the results of their work are conducted, as well as a publication program designed to make easily available the results of their work to clinicians, researchers, counselors, etc.

For further information contact either Serge Minassian, M.E., or Nathanial Mayer, M.D.

Rehabilitation Engineering Center
Smith-Kettlewell Institute of Visual Sciences
and
Department of Visual Sciences, University of the Pacific
2232 Webster Street
San Francisco, CA 94115
(415) 567-0667 & 563-2323

Director: Lawrence Scadden, Ph.D.

The core area of the San Francisco Rehabilitation Engineering Center is research and evaluation activities relating to sensory aids for blind and visually impaired individuals. The interdisciplinary staff includes experimental psychology, Biophysics, neurophysiology, and electrical, electronic, mechanical, and computer engineering. An informal consortium of local organizations working with blind and visually impaired individuals has been established including Smith-Kettlewell, Pacific Medical Center, University of California School of Optometry, University of California Medical School, University of the Pacific School of Engineering, Stanford University School of Engineering, San Francisco State University Department of Special Education, Veterans Administration Western Blind Rehabilitation Center, California State Department of Rehabilitation, Sensory Aids Foundation, San Francisco Lighthouse for the Blind, and Telesensory Systems, Inc. Recent work has been focused on vocational rehabilitation engineering, graphic displays, paperless Braille, orientation and mobility research, information storage and retrieval, low vision research, evaluation of sensory aids developed elsewhere, deaf-blind communications, and informal dissemination.

Texas Rehabilitation Engineering Center
1333 Moursund
Houston, TX 77030
(713) 797-1440

Program Director: Thomas A. Krouskop, P.E., Ph.D.

This is a multi-institutional program which is operated cooperatively by the Baylor College of Medicine, The Institution for Rehabilitation and Research, and Texas A&M University. The Center's efforts are focused on developing devices and methodologies which will reduce the risk of pressure-induced tissue breakdown. The major program areas are: tissue pressure management, clinical device development, implant materials, and support of the Vocational Industrial Center. In the last, industrial engineering is applied to the productivity problems that limit the vocational potential of severely disabled clients. Work stations are designed to minimize the effects of a client's limitations and special aids are developed to permit disabled workers to work at normal or near normal levels of output.

Veterans Administration Prosthetics Center (VA National Rehabilitation Engineering Center)
252 Seventh Avenue
New York, NY 10001

Director: Anthony Staros

See: FFI #10

INDEXES

The two indexes which follow are included to assist the reader who desires to selectively obtain information about specific case examples. They are intended to help readers find possible solutions to problems which occur in their caseloads on a day-to-day basis; as such, they serve as a quick reference tool for counselors and supervisors who have specifically observable client needs.

The Problem Index is organized by impairment etiology and areas of functional limitation. Major headings represent the impairment etiology, e.g., "Spinal Cord Injury"; subheadings indicate the functional limitation e.g., "Quadriplegia." In some cases, the etiology is not reported by the participating project. Where such information is not available the functional limitation is utilized as the major heading. Where appropriate, cross-references are used to direct the reader to other relevant index terms.

The Solution Index is organized by the general device name which was utilized to solve a specific performance problem, e.g., "Dexterity Aid." Subheadings indicate the specific performance activity for which the device was utilized. An example of how the Solution Index is organized is: A dexterity aid which is used to assist a client in eating is indexed under the major heading "Dexterity Aids" and the subheading "Eating." Cross-references are utilized **within** subheading groups to indicate alternate performance terms. For example, under "Jig/Fixtures" the subheading "Precision Assembly" indicates "see Assembly." The phrase tells one to look under the subheading "Assembly" within the major heading "Jig/Fixtures."

PROBLEM INDEX
(Etiology/Functional Limitation)

SOLUTION INDEX
(Device/Specific Activity)

READER RESPONSE FORM

Would you like to be on our mailing list to receive our publications? If the answer is yes, please take a few minutes to answer the following questions and return the card to us.

1. I am a disabled individual or family of one. ☐ yes ☐ no
2. I am visually impaired. ☐ yes ☐ no
3. I work in: ☐ 01 - state agency (general)
   ☐ 02 - state agency (blind)
   ☐ 03 - private facility/workshop
   ☐ 04 - federal/regional office
   ☐ 05 - legislative
   ☐ 06 - professional organization
   ☐ 07 - consumer organization
   ☐ 08 - insurance company
   ☐ 09 - medical organization
   ☐ 10 - academic
   ☐ 99 - other (describe) _____
4. I work as a: ☐ 01 - counselor
   ☐ 02 - placement specialist
   ☐ 03 - educator/researcher
   ☐ 04 - staff development specialist
   ☐ 05 - administrator
   ☐ 06 - information provider
   ☐ 07 - medical, including nurses and physical therapists
   ☐ 99 - other (describe) _____

Your response to the following questions will help us develop better publications in the future.

5. I found this publication to be (check all that apply):
   ☐ useful and informative
   ☐ informative but not practical
   ☐ irrelevant to my needs
   ☐ too short
   ☐ too long
   ☐ not clear
6. I found out about this publication through:
   ☐ automatic distribution
   ☐ notice in a newsletter or magazine
   ☐ a friend or colleague
   ☐ don't remember/not sure
   ☐ other _____
   _____
7. My interest in seeing publications on the following subjects are as follows:

	High Interest	Medium Interest	Low Interest
Community Advocacy	_____	_____	_____
Job Opportunities in Science and Technology	_____	_____	_____
Small Business Enterprises for Handicapped Individuals	_____	_____	_____
Understanding Your Rights as a VR Client	_____	_____	_____
Sheltered Industrial Employment and the Minimum Wage	_____	_____	_____
Other _____	_____	_____	_____

8. For future publications, I would like to suggest the following improvements in format, distribution or content _____
   _____
   _____
   _____

_____

_____

_____

_____

_____

_____

_____

I would attend a workshop on:

	Highly Likely	Maybe	No
Media Relations	_____	_____	_____
Independent Living Program Management	_____	_____	_____
Community Advocacy	_____	_____	_____
Lobbying and the Legislative Process	_____	_____	_____

THANKS FOR YOUR COOPERATION!

Fold as indicated, fasten and mail. No envelope necessary.

_____

_____

_____

Place stamp here. Post Office will not deliver without postage.

Institute for Information Studies
400 N. Washington St., Ste. 202
Falls Church, VA 22046

INSTITUTE FOR INFORMATION STUDIES
EMERGING ISSUES SERIES PRICE SCHEDULE

PRICE PER COPY
(includes postage and handling)

NUMBER OF COPIES	1 INDEPENDENT LIVING	2 MEDIA	3 REHABILITATION ENGINEERING	4 WORK DISINCENTIVES
ONE	75 cents*	$ 2.50*	$ 5.00*	$ 5.00*
2 - 50	60 cents	$ 2.10	$ 5.00	$ 5.00
51 - 500	55 cents	$ 1.85	$ 5.00	$ 5.00
501 - 1000	50 cents	$ 1.55	$ 5.00	$ 5.00
over - 1000	45 cents	$ 1.45	$ 5.00	$ 5.00

* A quantity of copies has been set aside by the Institute for free distribution (one per organization) however, single copies will be charged for at the value indicated above after this initial free copy supply is depleted.

Return to: Institute for Information Studies
400 N. Washington Street, Ste. 202
Falls Church, Virginia 22046
(703) 533-0383

ORDER FORM

Enclosed is a check for order of documents listed below:

NAME ____________________

ADDRESS ____________________

CITY ____________________ STATE __________ ZIP __________

DOCUMENT	NO. OF COPIES	PRICE PER COPY	TOTAL
1 INDEPENDENT LIVING			
2 MEDIA			
3 REHABILITATION ENGINEERING			
4 WORK DISINCENTIVES			
TOTAL			

The Institute for Information Studies, under a grant from the National Institute of Handicapped Research, developed four documents on topics of priority concern to the rehabilitation community:

NEW LIFE OPTIONS: INDEPENDENT LIVING AND YOU
(Co-produced with the Institute for Rehabilitation and Research — TIRR)

This 16-page booklet explores the new options that are now available to disabled individuals seeking an independent lifestyle of their own making. It traces the history of the movement, describes selected independent living programs and their services and discusses the new opportunities for consumers provided by the 1978 Amendments to the Rehabilitation Act. The booklet includes a section on sources of technical assistance and financial support for independent living programs.

MAKING FRIENDS AND INFLUENCING THE MEDIA

Consumer organizations and advocacy groups will be assisted by this manual on developing public relations programs. Unlike most PR manuals, this one focuses on how to influence the image of disabled people as they are portrayed in the mass media. The manual takes a practical "how-to-do-it" approach and provides examples of press releases, tip sheets and other tools of the trade. Included in the manual is a section on media regulations and how they can be used by consumer groups to access the media.

REHABILITATION ENGINEERING SOURCEBOOK

The first of an on-going series, it presents 150 case examples in which the application of technology has solved specific work-related or other functional problems of people with vision, hearing, or physical-motor disabilities. Designed as a reference work primarily for vocational rehabilitation counselors and work supervisors, it contains useful information for other rehabilitation professionals and rehabilitation engineers as well. Special features include: Guidelines for Formulating Problem Statements and Sources of Further Information for readers wishing to consult with contributors on technological solutions for their own clients' and subordinates' functional problems; and a loose-leaf format to which subsequently published materials can be added.

WORK DISINCENTIVES

Written primarily for the policy maker and others with a vested interest in the issue, this document synthesizes the available research-based knowledge on disincentives to work. Policy options are offered and pros and cons are delineated. This document is prepared by Dr. Monroe Berkowitz, well-known authority on the subject.

The above documents are available while supplies last from the Institute for Information Studies. (Order form enclosed) Copies are also deposited in:

National Rehabilitation Information Center
8th and Varnum Streets, NE
The Catholic University of America
Washington, D.C. 20064 (202) 635-5826

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161 (703) 557-4650

ERIC Document Reproduction Service
P.O. Box 190
Arlington, VA 22210 (703) 841-1212