
Vocational Workshops Programme for the Civilian War Disabled and Physically Handicapped

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Preface

The Angolan Secretary of State for Social Affairs (S.E.A.S.) wishes to expand their programme for the disabled in order to meet the needs of the large and growing number of civilian war disabled. Plans for future development are still being formulated but they realize that the development of vocational workshops is essential to these plans. In response to the need for defining the materials needs of these workshops, S.E.A.S. requested Development Workshop to assist them. Special focus was put on workshop planning and the adaptation of technologies to the particular needs of the handicapped and to available local resources.

The first phase of the project was a two week technical study trip to discuss the programme with key people at the national and local level; to interview programme participants; and to analyse the problems of a sample of existing workshop centres in both Luanda and the provinces.

Following the trip, the objective was to carry out research into a range of specific technology options appropriate to Angolan conditions. This involved analysing information collected from various sources, including organizations, institutions and manufacturers of available equipment. It was planned to produce a graphic manual of technologies appropriate to the Angolan programme. This manual would also demonstrate how some equipment and tools can be adapted for use by the handicapped. Workshop organization and design was also to be considered.

This was done and it was discovered that there is very little equipment available on the market that would be suitable. Most equipment and aids are very expensive and completely inappropriate for Angolan conditions. The overwhelming evidence points to the need to set up workshops in Angola that can locally design and produce the prostheses, orthopaedic aids, equipment, mobility aids, or tools needed by the disabled. These workshops would have the advantage of being able to design and manufacture the products to meet the local needs of the disabled, save much needed foreign exchange, create employment for the disabled and create the conditions for the Angolans to resolve the problem themselves and not have to depend on outside sources.

This report has therefore been organized to give an overview to the Secretary of State for Social Affairs and to any interested foreign donor agency of what equipment is available, what has been done elsewhere and to suggest what might be possible in the area of vocational rehabilitation and production of aids for the disabled. It then remains for the Angolans to decide on what specific strategy they prefer to take at this point.

The first chapter gives a general background to the organization and work of S.E.A.S. and the scope of the problem of the disabled in Angola.

Vocational Rehabilitation, includes a general review of the definition and objectives of vocational rehabilitation, how to adapt the workplace and the disabled for satisfactory employment, specific design solutions for specific disabilities and a discussion of different employment schemes such as open employment, sheltered workshops and homework.

The third chapter describes four successful projects in Ethiopia, Poland, Sudan and Zimbabwe; each with different objectives and very different conditions.

The chapter on prostheses gives an overview of the type of basic prostheses that can be produced locally with limited resources.

Because the lack of mobility has been repeatedly identified as a major problem for the disabled in Angola, this area has been looked into in greater detail. Purchased aids and locally manufactured mobility aids, including design considerations are discussed. Examples of both types are given for wheelchairs, tricycles, ramps, and walking aids such as walking frames, crutches and walking sticks.

The sixth chapter describes various other technical aids which are either available or can be made locally. The range is not exhaustive and is intended as an indication of what could be produced.

Workshops and their requirements are then discussed. Since workshops vary greatly, the three major categories are basic workshops, vocational training centres and mechanical workshops. Examples of the three types are given. Some of the materials, tools and equipment needed for these workshops are also described.

In the chapter called Other Economic Activities, a wide range of the products which could be made in production workshops are given. Not all would be appropriate in Angola but are listed to show the vast scope of products that could be made by the disabled and to show that the disabled need not be restricted to the standard work of sewing and handicrafts.

The final chapter is a short summary of possible future projects which could be undertaken with some suggestions on how they could be implemented.

The appendices include a list of all the organizations and their addresses which we contacted during the research, a list of available courses which might be of interest, and a complete list of all publications used in producing this report.

Much of the information in this report has been taken from a variety of publications and some have been used more extensively than others. The source of the information is given at the end of each paragraph if several sources were used, or at the end of the section or chapter if only one source was used.

Background

Secretary of State for Social Affairs (S.E.A.S.)

The Secretary of State for Social Affairs (S.E.A.S.) has taken on an increasingly important task of responding to the problem of displaced people. As the war goes on and Angola's 'Emergency' worsens, more and more people are forced to accept the status of 'Deslocados' or internal refugees. At the recent donor's conference in Luanda, the official figure of 600,000 'deslocados' was questioned by the various agencies with experience of working with populations affected by the war. The actual figure is assumed to be greater than the one officially stated.

Within S.E.A.S.'s National Directorate of Social Assistance, the deslocado problem is dealt with under two separate departments. The Department of Community Affairs is responsible for responding to the general resettlement and food and materials distribution problems. It is with this department that most donor agencies have worked to date. The second, Department for Social Reintegration, deals with specific groups within the deslocado and general communities whose problems are more critical and need special attention, ie the disabled and the old.

Because of the lack of Donor Assistance, projects dealing with specific groups, particularly the 'disabled', have been left to run largely on local resources. When external support has been received through generalized programmes of assistance to S.E.A.S., due attention has not been paid to specific needs of these target groups. While local level S.E.A.S. field staff have done commendable work in several projects visited using materials at hand, there has been a lack of articulation of the needs of the handicapped deslocado at the national level, hence a lack of awareness by donor agencies.

While the Secretary of State for Social Affairs (S.E.A.S.) has a small departmental sector at the national level with the responsibility for dealing with the handicapped, there is presently no separate programme organized for the war disabled deslocado. S.E.A.S. has created a network of 19 centres in almost every province of the country. These centres provide training and employment for handicapped people and hope to equip participants with useful skills which will assist their reintegration into the community.

It should be stressed that S.E.A.S.'s centres concern themselves with 'reintegration into production'. In Angola as in other African societies, 'social integration' of disabled people does not become a question. There is no social stigma attached to the handicapped as in Europe or America. There has never existed, because of lack of economic resources, a history of institutionalization of the handicapped. Because of the country's past low level of health development, there were always present significant numbers of handicapped people, crippled by polio or other endemic diseases. The family was the social unit which took

responsibility for its disabled members and community integration was maintained. Even today ICRC estimates in Angola that of the civilian war amputees whom they fit with artificial limbs, only 10% gain formal sector employment, another 15% return to agriculture, but 75% fall back to dependance on their families or village communities.

Today, in areas destabilized by war, many villages have been destroyed and families broken. Social disintegration means that the traditional community no longer exists to care for its disabled members. Villagers are forced to quickly abandon their villages when insurgents attack, often leaving behind the old, and the disabled and sometime young children. In many cases families are unable to return. It is S.E.A.S. on the national level who must respond to the urgent and long term needs of these specific groups. The long term solutions are often: orphanages, homes for the aged, and vocational centres for the disabled. Institutionalization is hence introduced by the war.

Each centre for the disabled focuses on one or several productive activities which ideally are keyed to the local resource base of the region and have the potential of generating employment and income. Vocational activities promoted are ones that are accessible to a disabled person or can be adapted to the particular handicap of the participant. Products made in the centres are sold and the income, after covering some basic running costs and the purchase of raw materials, goes to the producer. Participants' earned income is as well augmented with a minimal subsistence allowance from S.E.A.S.

While it is planned that these centres should serve a training function and that the participants be eventually 'reintegrated' into the community with useful jobs, this has rarely happened. While many of the centres are newly established and have not yet had time to fully train groups of participants, some of the longer established centres such as those in Luanda still have on their enrollment most of their initial members. There has not been a recycling of trainees into the productive or service sectors. Programme participants have tended to stay. The capacity of existing centres has become quickly saturated and they have proven unable to respond fast enough to the more recent influx of war disabled deslocados.

The centres established to date encompass a fairly limited number of productive vocational activities. By and large, these reflect a limited conception of the capacity of handicapped people. Sewing or garment making are the most prevalent followed by 'artezanato' - including wood carving and basket weaving. A few of the more innovative centres have introduced carpentry, pottery and one even watch repair. In spite of the heavy emphasis on garment making, cloth, thread and other essential materials are in short supply except in the urban centres of Benguela and Luanda where textile factories exist. On the other hand, the local resource base and its utilization through simple adapted technologies has scarcely been explored.

While the network of existing S.E.A.S. centres embody a number of technical and programming problems, they certainly provide, if supported and developed, a significant potential to respond to the problem of the war handicapped deslocado.

(12)

The Disabled in Angola

There are wide ranging estimates of the numbers of war disabled in Angola. While in the earlier periods of instability during the independence war, the injured were commonly themselves combatants. More recently the insurgents have turned to civilian targets in the attempt at economic disruption. UNITA have tried to force the population off the land to become dependant on government relief. Villages have been attacked and agricultural plots rigged with antipersonnel mines. Women and children who normally tend the field have been the first to suffer. 80% of those mutilated have foot or leg injuries which almost always result in amputations. The International Red Cross has recently estimated that civilians are now suffering as many casualties as the military on both sides. Angola may now have as many as 30,000 war disabled and amputees, 15,000 of them civilians and most of these women and children.

S.E.A.S.'s statistics, by their own admission are lacking but still show the 'registered' disabled in 1985 to be almost 10,000. Even using S.E.A.S.'s own statistics, the 'Centres' are only able to accomodate about 15% of the registered disabled. Many of this 15% represent people with birth or disease related handicaps. The province of Cuanza Sul which has the largest number of registered deslocados, almost 25% of the national total, does not yet have a disabled person's centre.

S.E.A.S. is taking measures to remedy some of these problems. An accurate statistical survey is presently being undertaken to establish the real needs. A number of new centres are being planned to increase S.E.A.S.'s capacity to repond to the increasing number of disabled. Even more significant is the law recently passed requiring the recruitment of the disabled by reserving a minimum of 2% of all employment positions for this sector of the population. With the new law in place, the S.E.A.S. centres can function as they were originally intended, for vocational training and for special support to the disabled within the community context.

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VOCATIONAL REHABILITATION

GENERAL

Definitions

There are many terms used to describe malfunctions and abnormalities in human behaviour, and their effect on individuals and society. In order to come to terms with the outcome of diseases or accidents, a terminology was proposed by the World Health Organisation in 1980. The conceptual framework for the consequences of diseases or accidents is provided by the terms "impairment", "disability" and "handicap". Their inter-relationship is shown as follows:

Impairment is any loss or abnormality of psychological, physiological, or anatomical structure or function.

Disability is any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being.

Handicap is a disadvantage for a given individual, resulting from an impairment or a disability that limits or prevents the fulfillment of a role that is normal (depending on age, sex and social and cultural factors) for that individual.

The inter-relationship amongst the three terms is best explained by the following example: a blind individual has an impairment which will lead to activity restriction and restrictions in perceiving information (disability). Due to this disability, he is disadvantaged because he cannot drive a car or will have difficulties in performing his job. So his disability leads to a handicap.

The first aim of rehabilitation interventions - e.g. through job design or redesign, development of aids, workers' training, and medical intervention - is to ensure that an impairment does not lead to disability (disability prevention). If this is not possible, measures have to be taken to ensure that a disability does not lead to a handicap (handicap prevention).

Objectives of Vocational Rehabilitation

The main objectives or aims of vocational rehabilitation are:

1. the integration or reintegration of the disabled into work according to their remaining functions, abilities, skills, and aspirations; and
2. the reduction instead of aggravation of disabilities through good job design and work organisation.

In order to guarantee the fulfilment of these aims and create job opportunities, it is necessary to design methods, procedures and techniques which adapt both the worker and workplace. This adaptation of workplaces, tools, and machinery calls for detailed knowledge and information on working capacities of the disabled, as well as the physical and mental requirements of the job itself.

Because vocational rehabilitation deals with promoting and maximizing the employment opportunities for the disabled and calls for close cooperation with employers' and worker's organizations, vocational rehabilitation needs to stress the abilities and working capacities of the disabled person, and not their disabilities.

(1)

Adaptation of the Disabled and their Workplace

Job Analysis

In order to adapt jobs for the disabled, a job analysis must be made to match the requirements of the job and the working capacities of the disabled person, and if they do not match, adaptive measures through training, work design or work reorganization must be taken.

Determination of Job Requirements

In order to evaluate the job requirements which the disabled worker has to meet, a job analysis should be undertaken which will entail obtaining information about a job which explains what the worker does, how he/she does it, why he/she does it, and what skill is involved in doing it. In other words, it must identify, evaluate and document:

- work tasks (manual as well as tasks of planning, decision-making, analysing and combining information);
 - conditions for carrying out these tasks;
 - demands upon the working person;
 - information on the work objects eg. weight, size, form, danger involved in and sensitivity of handling;
 - the equipment to be used, eg. lathe, spanner, screwdriver, micrometer, etc.;
 - the physical characteristics of the work environment, eg. noise, lighting, climate, mechanical vibrations, dust, toxic substances, etc.;
 - the characteristics of the organizational and social environment, e.g. working hours, paced/unpaced work, rest pauses, group work, etc.;
 - job demands arising in emergency situations eg. applying great force, escaping quickly from a dangerous zone, aiding colleagues in danger, etc. ;
- and
- physical demands to reach the working area, washrooms, canteen, etc.

Assessment of Workers' Capacities

Human work capacities may be evaluated on the level of functions, abilities and skills. Examples of human functions are muscle contractions, breathing, perception of colour, etc. Abilities (e.g. stamina and dexterity) are fairly enduring traits which facilitates the acquisition of skills. Skills are organized and coordinated patterns of mental and/or physical activity (e.g. flying an airplane).

It is important that any assessment procedure of a worker should:

- be objective, reliable and valid;
- not harm the tested individual;

- be accepted by the worker;
- not discriminate against disabled person (i.e. be compared with the non-disabled); and
- assess actual working capacity as well as trainability.

Matching Job Demands and Workers' Capacities

After job requirements and working capacities of the disabled have been evaluated, criteria are needed to determine whether a match between a job and the disabled person is possible. This in fact poses difficult problems which have not yet been solved satisfactorily and enlarging the work opportunities of the disabled makes a pragmatic approach necessary.

For example, to find a job for a person with a visual impairment, jobs with no visual requirements must be sought. A second group of occupations which might be performed by the visually impaired are those requiring visual functions but where the other channels of information perception may be substituted. In this case, it should be checked what aids are available which can shift visual perception requirements to auditory or tactile information perception. A third method of enlarging job opportunities for the visually impaired is based on the fact that an impairment is only a minor human defect compared with the remaining abilities and skills. So the question might be asked: What prevents skilled visually impaired people from working in a certain field of occupations? Job analyses will identify hindering factors but, in order to overcome these obstacles, technical aids must be supplied or developed. Because many impairments are often associated with a slow tempo of work, a fourth category of jobs especially suitable for the disabled which can be considered are those with flexible working conditions such as part-time work, unpaced work, or self-employment, where there is autonomy in organizing one's own work and a variety in the use of skills.

Job Design

In vocational rehabilitation, job design or job adaptation means improving employment opportunities for disabled persons through the design or redesign of equipment, work organization and the working environment.

Design Principles

To bridge the gaps between the working capacities of a disabled person and the requirements of a job, the remaining physical abilities of the disabled person may be:

- amplified;
- supplemented; or
- replaced.

For example, minor impairments of vision may be corrected to a certain degree by eye glasses (amplification). In a case of a severely impaired vision, only some information may be perceived visually and other visual information has to be transformed into sound or tactile information (supplementation). For a totally blind person, visual information has to be replaced by Braille writing or acoustic information (replacement).

Or in the case of a weak arm, difficulties may be reduced by the use of a lever, by making full use of the unimpaired arm, by the use of tools operated by compressed air or by replacing hand operations with foot operation, e.g. the use of a foot pedal.

Design Solutions

The three design principles of amplification, supplementation and replacement provide a basis for design solutions which may be classified according to their attachment to the worker or workplace into prosthetic/orthotic appliances, technical aids and job modification.

Prosthetic and Orthotic Appliances. A prosthetic appliance or prosthesis is an artificial device to replace a missing part of the human body. An orthotic appliance or orthosis is a device to amplify human functions (e.g. eye glasses, loudspeaker, hearing aid).

Technical Aids. The term "technical aids" may be defined as devices which in general are not attached to the human body but which amplify, supplement or replace impaired human functions.

Job Modifications. Job modifications comprise the (re)allocation of functions amongst different workers, as well as changes in the work environment and timing of the work (e.g. working hours, shift work, paced work).

As a rule, the gaps between the capacities of a disabled worker and job requirements should first be bridged by the use of prostheses or orthoses which are functional or enable the disabled person to perform a task (in contrast to cosmetic prostheses). In addition, technical aids should be supplied. If both measures together still cannot bridge the gap, job modifications should be considered.

It is important that disabled persons should, if possible, actively participate in the development and selection of appropriate aids and job adaptations.

(1)

Design Solutions for Specific Disabilities

Introduction

Having outlined the general principles of job design and adaptation for the disabled, examples of adapting jobs for some specific disabilities are now discussed. The main disabilities are:

- behavioural disabilities (disturbed self-awareness, reduced capacity for learning, reasoning and exercising judgement)
- communication disabilities (impaired vision, hearing disabilities, and speaking disabilities)
- personal care disabilities
- locomotor disabilities
- body disposition disabilities (limited forces of limbs extremities, reaching disabilities, sitting and standing disabilities)
- dexterity disabilities
- situational disabilities (dependence, endurance, and environmental disabilities).

Though all the above disabilities exist and are a problem to some extent in Angola, the major ones aggravated by the war situation which will be dealt with in this report are: locomotor, and body disposition disabilities.

Locomotor Disabilities

Locomotor disabilities restrict an individual's ability to move both him/herself and objects, from place to place.

To overcome locomotor disabilities, orthotic and prosthetic appliances as well as technical aids may be supplied, and the environment must be designed appropriately.

Prosthetic and Orthotic Appliances

Walking with the aid of a prostheses or stick/crutches results in a higher energy expenditure than in normal walking which must be taken into consideration when matching job requirements with the disabled worker.

Workplaces suitable for leg amputees should allow work in a sitting position as well as standing.

Reach dimensions for a person in a wheelchair differ because of varying sitting heights and widths of different types of wheel chairs, and the different body heights of the persons using a wheelchair. (fig. 23)

Dimensions of recommended corridor width for stick and crutch users are given in the diagram on the next page. (fig. 24)

MINIMAL REACH DIMENSIONS

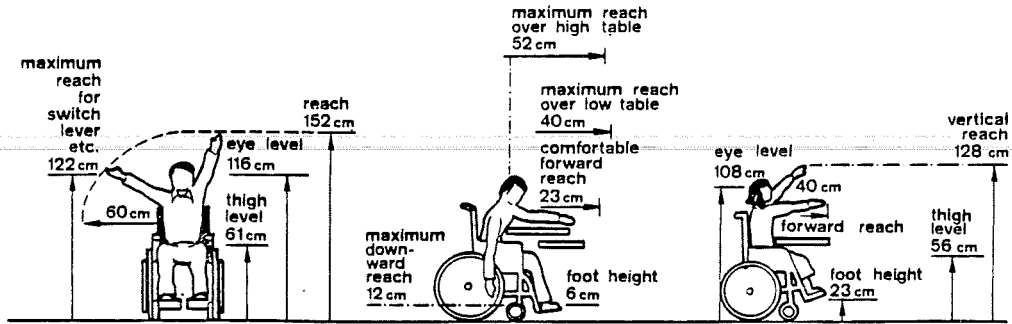


Fig. 23. Minimal reaches to be considered in designing for wheelchair users. (Adapted from UNESCO, 1982)

CIRCULATION SPACE

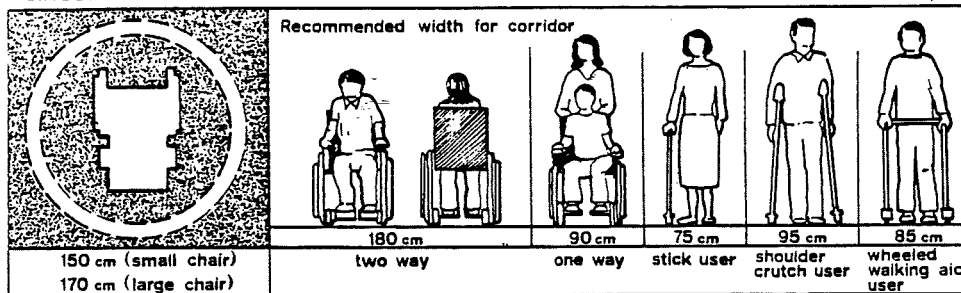


Fig. 24. Minimal circulation space for wheelchair, crutch and stick users. (Adapted from UNESCO, 1982)

Body Disposition Disabilities

Body disposition disabilities refer to an individual's ability to execute certain tasks associated with the positioning or use of certain parts of the body.

Disabilities of the Extremities (limited forces of limbs and extremities)

Amplification

For workers disabled by weaknesses in their limbs which prevents them from exerting the required force with their arms and/or legs, the provision of mechanical aids can be very helpful. For example, a control may be lengthened to produce a greater mechanical advantage and a reduced demand on the operator. (see fig. 26) Compressed air may also be used to reduce the physical load of an operation so that the worker, instead of having to exert considerable force on a control, is required merely to press a button or pull a trigger. Power-assisted controls may serve similar functions.

The forces required for lifting may be reduced by providing mechanical devices, many of which are employed in industry as a matter of course. A very simple device for lifting and transporting small items of furniture is shown in fig 28, the lengthening of the handle increases its mechanical advantage.

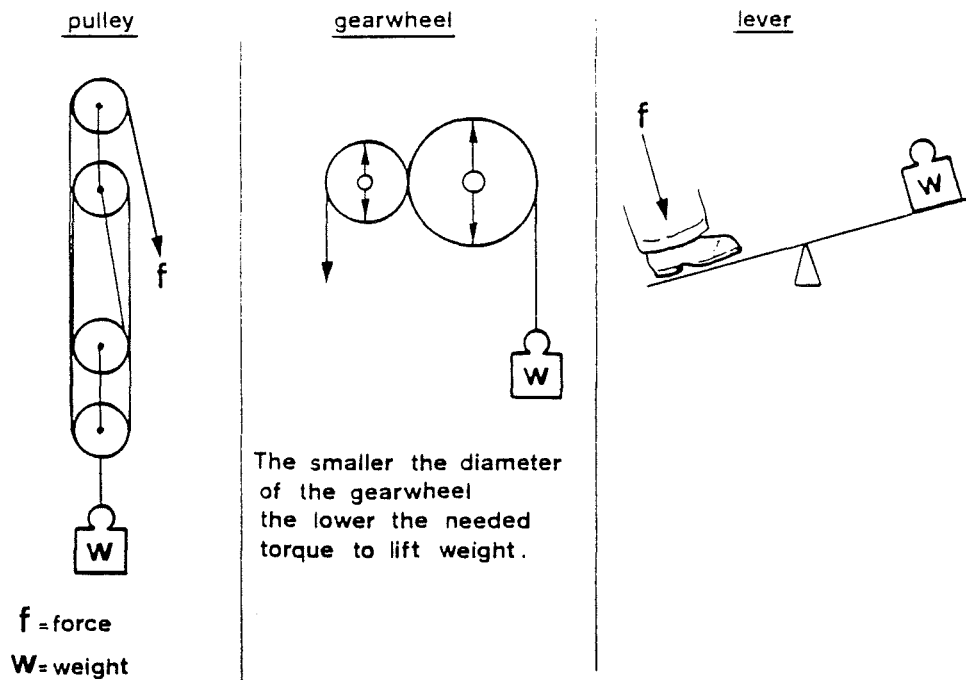


Fig. 26. Mechanical devices to reduce required forces and torques.

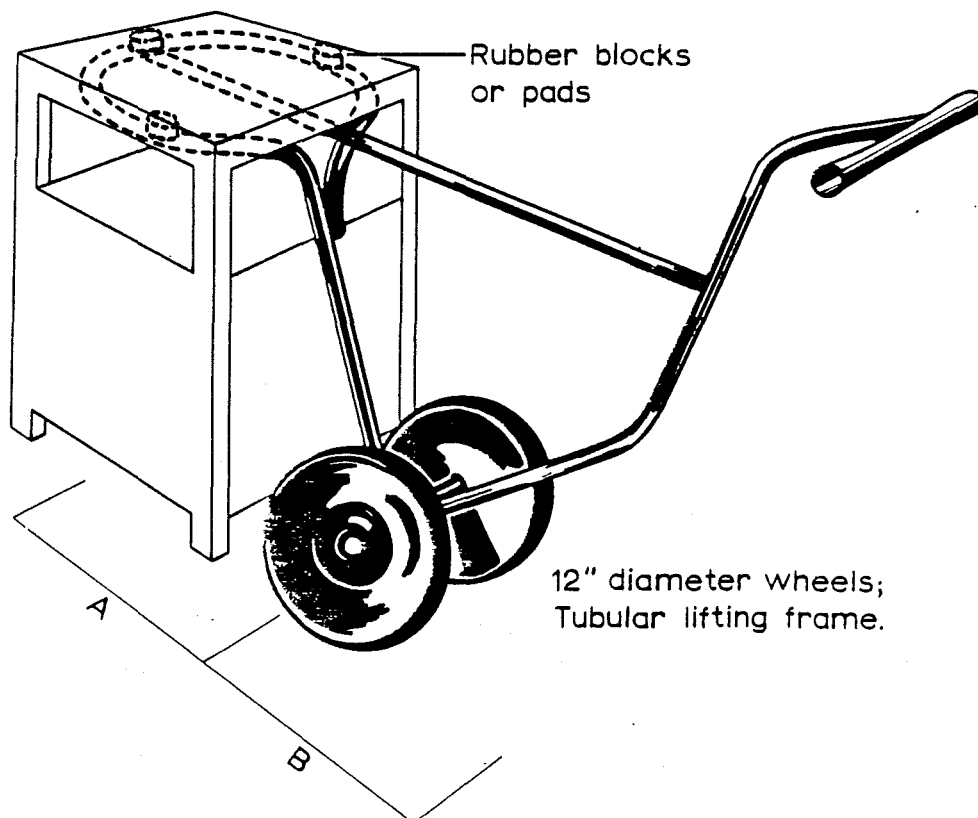


Fig. 28. A device for lifting and transporting furniture. By increasing the ratio $B : A$ the mechanical advantage obtained is increased, thereby allowing a load to be lifted with less effort and by means of a "pushing down" action.

(Photo by courtesy of Remploy Ltd., London, United Kingdom)

Supplementation or Support of Functions

The problem of workers who are unable to support the weight of a tool or of one of their arms, but who can still carry out activities with the tool or with their hand, should be tackled from the point of view of providing support for the tool or the impaired limb.

A sling support for a weak arm, or the counterbalanced suspension for tools, assists a disabled person to work with unimpaired hand and finger dexterity. Similarly, the provision of an adjustable bar arm-rest (fig. 31) can be of great help to a typist. The construction of a small moulded trolley mounted on ball bearings, on which a disabled worker can rest part of his weak arm, will help considerably in allowing him/her to write or perform other handwork by allowing the arm to move easily from one position to another.

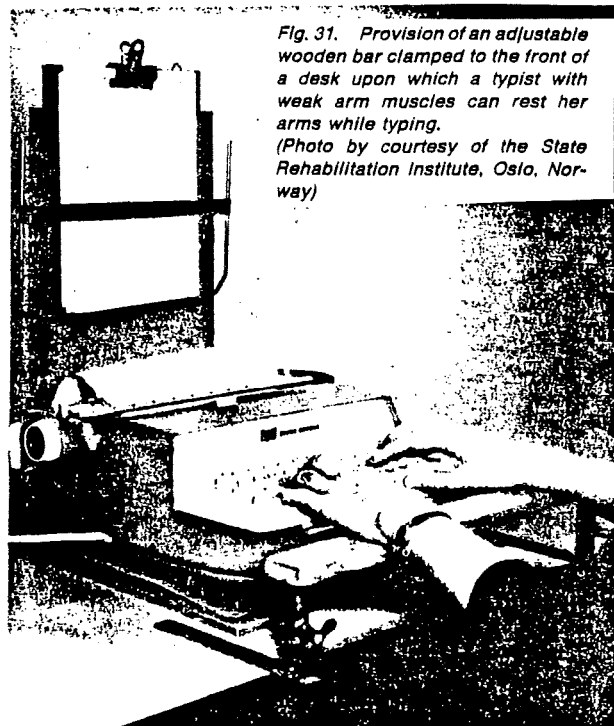


Fig. 31. Provision of an adjustable wooden bar clamped to the front of a desk upon which a typist with weak arm muscles can rest her arms while typing. (Photo by courtesy of the State Rehabilitation Institute, Oslo, Norway)

People with a weak grip may be assisted, where a slender tool, pencil or pen is used, by increasing the diameter of the tool. This may be achieved by wrapping the tool, pencil or pen in moulding clay, a twisted elastic band, a piece of sheet foam plastic or pimple rubber or, as illustrated in figure 32, by passing a pencil through a small rubber ball or a lightweight plastic ball, or by attaching two pocket clips to a jam jar with elastic bands.

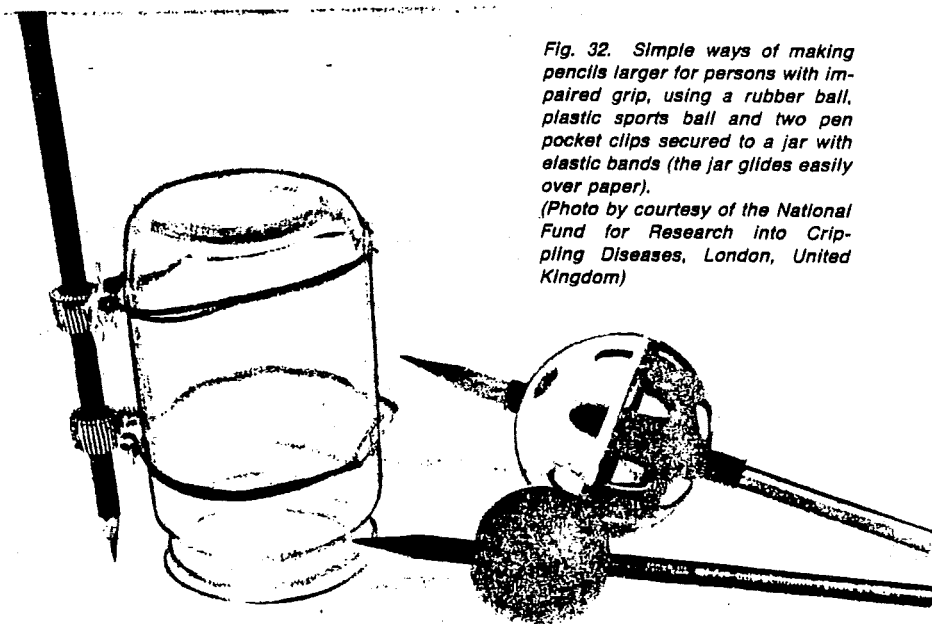


Fig. 32. Simple ways of making pencils larger for persons with impaired grip, using a rubber ball, plastic sports ball and two pen pocket clips secured to a jar with elastic bands (the jar glides easily over paper). (Photo by courtesy of the National Fund for Research into Crippling Diseases, London, United Kingdom)

There are many ways in which machinery may be adapted for those with a weak grip and wrists, the precise details varying with the type of machine used. Amongst the possibilities are:

- different shaped hammer handles, which are easy to produce and help to overcome gripping disabilities (fig.33);
- the use of a screwdriver operated by compressed air or electric motor by a person with impaired ability to turn either wrist;
- in cases of limited capacity to perform the simple activity of holding a small component in a specified position - for example, holding a fine wire in position with the left hand while using a soldering iron with the unimpaired right hand - the provision of a pair of surgical forceps has been found to be very helpful.

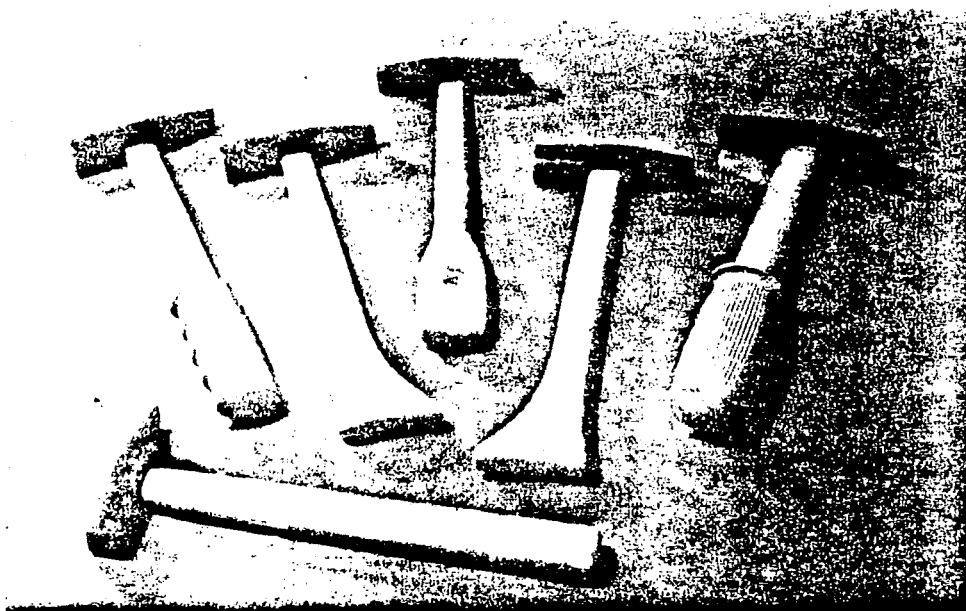


Fig. 33. Different shaped hammer handles for use by persons with a weak grip.
(Photo by courtesy of the Industrial Rehabilitation Centre of the Medical Academy, Poznan, Poland)

Replacement of Function (Prosthetic and orthotic appliances)

In the case of amputations where a suitable prosthesis has been provided, the first measure to be considered is the provision of suitable attachments (orthotic appliances) to artificial limbs which can bring a wide range of holding, manipulating and stabilizing operations within the disabled person's capacity. An example of such an appliance used by a one-armed welder is given in figure 34.

Arm prosthesis: Persons with amputations of lower or upper arm are often given jobs which require the use of only one arm. It is much better however to provide arm amputees with a functional prosthesis, thus enabling them to perform more complicated work tasks and to cope independently with requirements of daily living activities. In designing work for arm amputees, the following points should be considered:

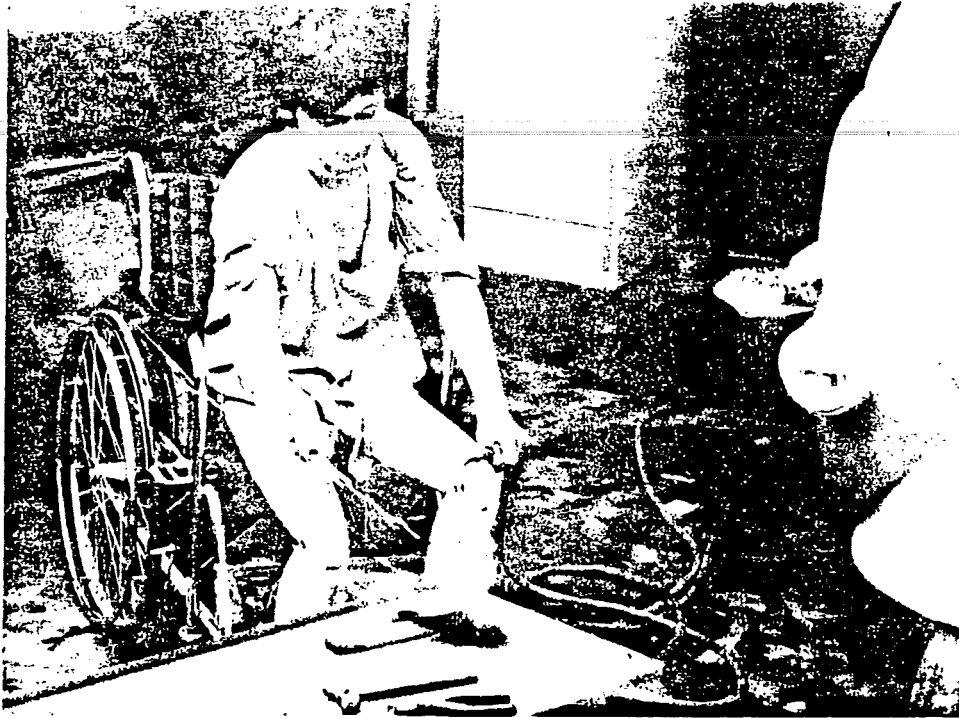


Fig. 34. Specially designed orthotic device for a right-arm-amputee welder enabling him to hold the flux in his artificial right arm while operating the welding equipment with the left hand. (ILO Photo Library, Geneva, Switzerland)

- forces: The forces to be exerted via a prosthesis depend to a great extent on the embedding of the arm stump in the prosthesis. In general, push forces are much easier for the person than pull forces and torques.

- movements: Even with an arm prosthesis, a high level of coordinated movements may be performed but the working velocity is likely to be reduced compared with able-bodied persons.

- working height: For tasks requiring a frequent opening and closing of a hook attachment, the height of the working plane should be 7 cm - 16 cm below the elbow joint in the case of upper-arm amputees and between 3 cm above and 6 cm below the elbow joint for lower-arm amputees. The correct adjustment of the working height is very important for maximizing the work output and minimizing the strain on the worker.

Transfer of work to an unimpaired limb: When a prosthesis does not solve the problem or in countries where orthotic appliances of the required type are not available, the next step is to determine to what extent the work can be carried out by an unimpaired limb. For example, figure 35 illustrates the adaptation of a tap-borer by duplicating on the left of the machine the control normally found on the right so that it can be used by a worker who has lost his right arm. Figure 36 illustrates the conversion of a motor car, for a driver who has had both legs amputated, by transferring the controls from foot to hand operation. Figure 37 illustrates a metal stand which can be adjusted to hold a telephone receiver at a convenient height and angle for a one-armed operator.

Fig. 35. Modification of a right-hand operated tap borer for use by workers with limited right-arm functioning (the control normally found on the right of the machine is duplicated on the left). ▷

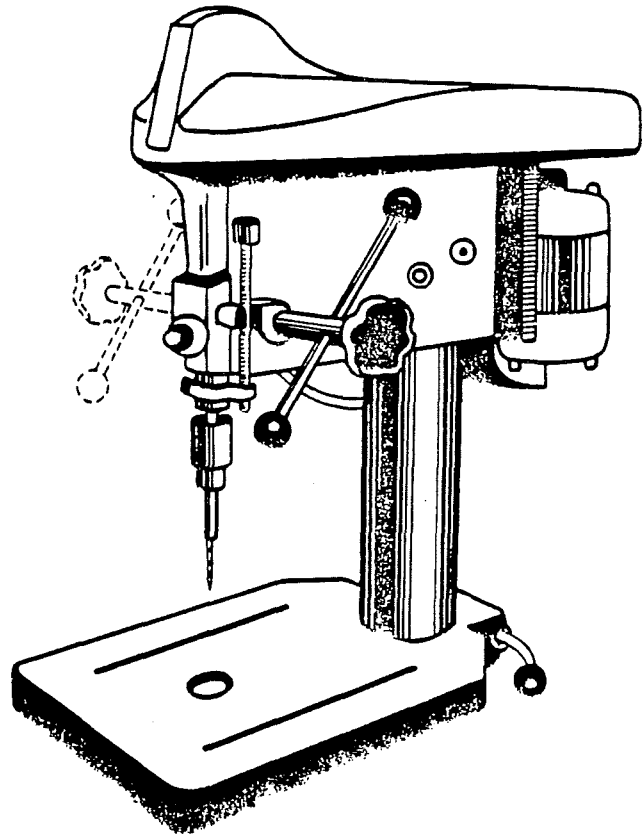
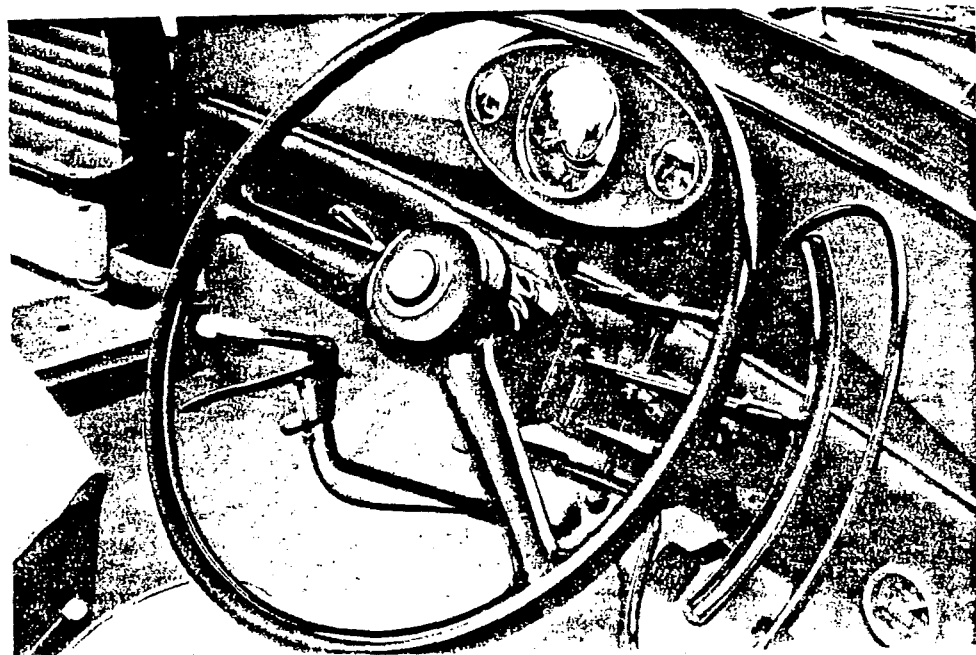


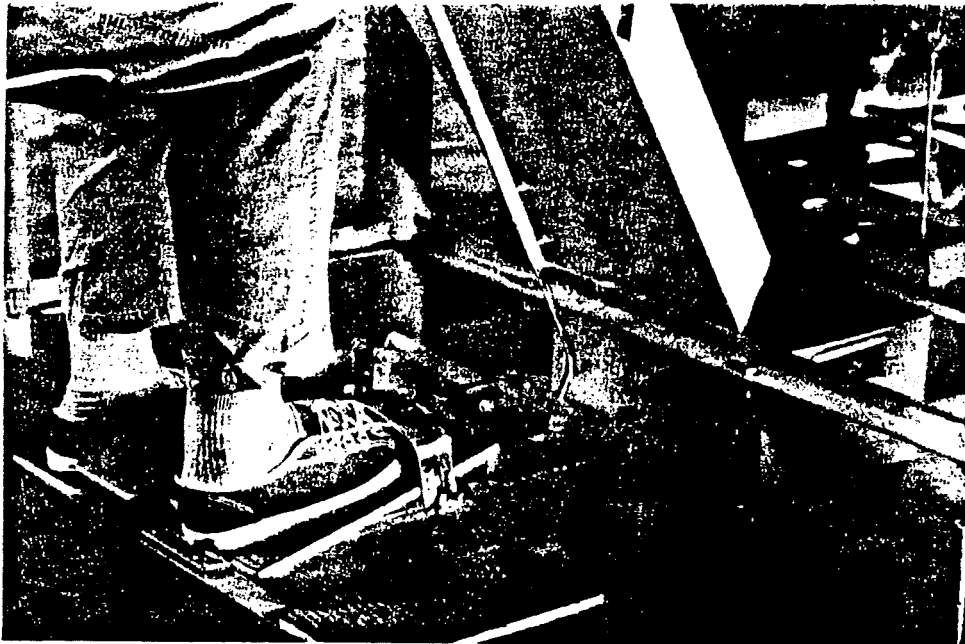
Fig. 37. Adjustable metal stand for telephone used by a one-armed operator. (Photo by courtesy of Gesellschaft für Systemtechnik GmbH, 4300 Essen, Federal Republic of Germany)

Fig. 36. Conversion of foot to hand control on a motor car for use by a legless driver. ▽



From an engineering point of view, it is not difficult to transfer foot operations to hand operations and vice-versa. In the case of amputees and those with limbs impaired as a result of accidents and diseases, it is clearly desirable to attempt to replace controls which would normally be operated by the impaired limb by those which can be operated by an unimpaired limb. Where the legs are impaired, it is very often essential to assist the conversion by arranging for the job to be performed sitting down instead of standing up and this is also very often desirable where the arms are impaired, since the legs are then freed for other activities.

In figure 38, the operation of the drilling machine has been changed from a hand lever to a foot pedal. This adaptation is only appropriate if the hand lever needs to be turned less than 90°, i.e. if only a small drilling depth is needed.



*Fig. 38. Conversion of a hand-operated milling machine to foot pedal control.
(Photo by courtesy of the Industrial Rehabilitation Centre of the Medical Academy, Poznan, Poland)*

Reaching Disabilities

The solution of problems faced by persons whose ability to reach and bend is limited may usually be achieved by rearranging the workplace so as to eliminate the need for such movements.

Stooping, bending and reaching may also be reduced, or completely eliminated, by providing devices which enable the operator to perform his work without leaving a stable standing or sitting position. For example, magnets attached to light extension handles will permit the removal of a wide range of metal components from storage bins which are not within easy reach. Tongs with long extension handles

can serve a similar function, and suction cups attached to lengths of bamboo can also be useful in some circumstances.

For wheelchair users, reaching and bending are often restricted. To compensate for these restrictions, workbenches and tables would be designed so that a wheelchair can fit beneath them. Depending on the stature of a wheelchair user, workbenches and desks should have a height of between 70 and 80 cm.

Figure 41 shows pigeon-holes which have been adapted to compensate for the reduced reach capacities of wheelchair users. The pigeon-holes have been lowered to allow for mail sorting in a sitting posture. According to the extent of reach of the smallest and tallest persons sorting mail, the pigeon-holes have been declined compared to a normally vertical position.

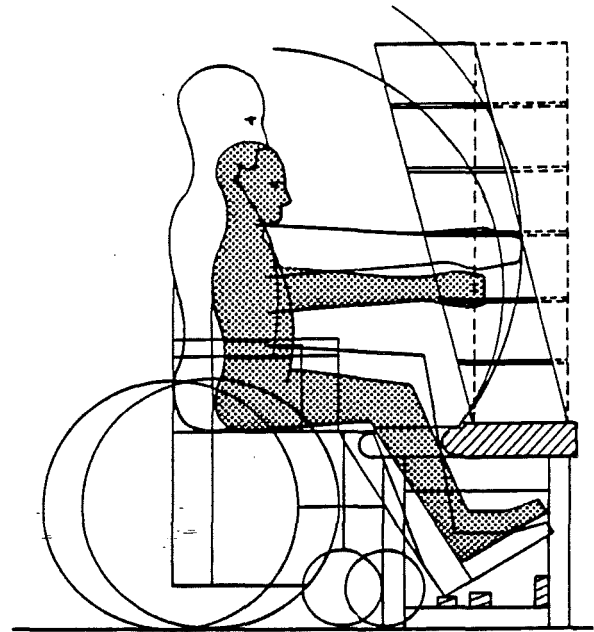


Fig. 41. Adaptation of pigeon holes to allow for mail sorting by wheelchair user. (North and Schumacher, 1981)

Postural Disabilities

In many cases, postural disabilities may be overcome by arranging the workplace so that a worker can change his posture (e.g. between sitting and standing) during the day.

Sitting disabilities: When an individual cannot sit for long periods because of some disability of the back, raising the work surface to permit the operations to be done from a standing position should be considered. By providing also an extra high stool, such as that illustrated in figure 42, the worker can alternate between sitting and standing, according to his/her needs. The stool has to be adjustable in height and backrest. In order to guarantee a correct posture, an adjustable footrest is needed as well.

A. men 155 ± 6 cm
 women 158 ± 6 cm

B. men 40 to 50 cm
 women 32 to 40 cm

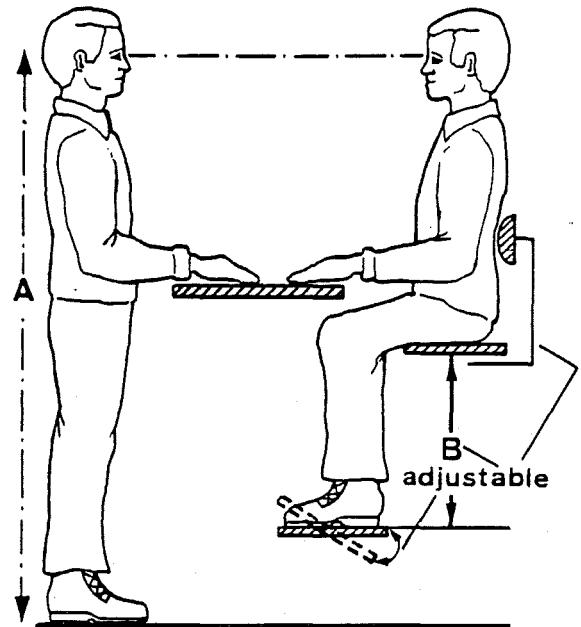


Fig. 42. Adjustable workplace for standing and sitting. (From Bundesanstalt für Arbeitsschutz und Unfallforschung, 1978)

Standing disabilities: To overcome standing disabilities, the workplace may be arranged, as already shown in figure 42.

An aid suitable for minor standing disabilities is the "standing stool" shown in figure 43. The standing stool may be used if only small forces are to be applied, e.g. at drawing boards, lathes, workbenches, etc.

In figure 44, the working plane is lowered by adjusting the height of the vices so that they may be used in standing or sitting posture.

Alternatively, the difficulty may arise because the work cannot be seen properly from a sitting position. This is particularly true in the case of the use of many machine tools which, because of their orientation, require the operator to stand in a forward-leaning posture so that his sight of the cutting tool is not obscured by other parts of the machine. The answer here may be to change the orientation of the machine through an angle of up to 90° or to bolt it to the wall instead of the floor.

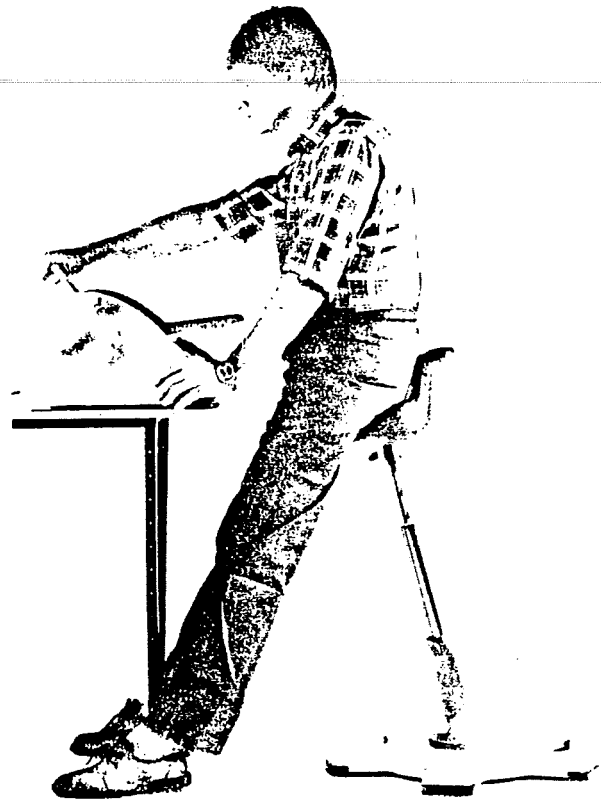


Fig. 43. A special "standing" stool for support of standing posture. (Photo by courtesy of Firma Bima F. Biedermann GmbH and Co. KG, 7450 Hechingen, Federal Republic of Germany)



Fig. 44. An adjustable device for lowering the working plane for use in a standing or sitting posture. (Photo by courtesy of the Swedish Institute for the Handicapped)

In figure 45, a milling machine has been adapted to a wheelchair user by sinking the machine below the job floor level.

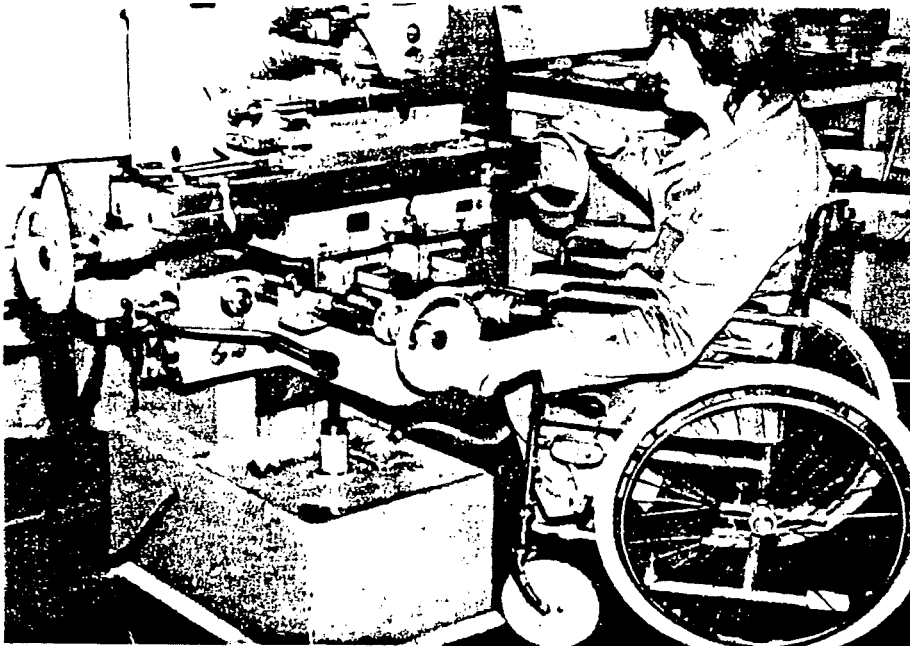


Fig. 45. A milling machine sunk below floor level for use by a wheelchair operator. (Photo by courtesy of Institut für Arbeitsphysiologie an der Universität Dortmund, Dortmund, Federal Republic of Germany)

Kneeling and bending disabilities: Kneeling is sometimes difficult for workers with back or leg disabilities, not because kneeling is ruled out but rather because a kneeling position cannot be adopted easily or because there is difficulty in reassuming an upright position. In such cases, an artificial aid providing support may remove the difficulty. A simple device which serves this purpose, involves a kneeling platform with bars about 18 inches from the ground is illustrated in figure 46.

To compensate for bending disabilities, workbenches, etc. should be adjustable to the body height of the worker or to the work task. For large work objects and operations requiring the amplification of forces by use of the body weight, the workbench may be lowered. For high precision movements requiring small distances between eye and work objects, the workbench should be raised to avoid unfavourable postures.

Fig. 46. A device to enable handicapped people to get up from and down to a kneeling position. Constructed from lightweight tubular steel, it can be reversed and used as a stool. (Photo by courtesy of E. J. Woodman and Sons (Pinner) Ltd., United Kingdom)



TECHNOLOGY

The Impact of New Technologies on Employment Opportunities for the Disabled

The term "new technologies" usually refers to the introduction of microelectronics into a great proportion of occupational and leisure activities.

The evolution of microelectronics made it possible to supply orthotic and prosthetic appliances and technical aids for the disabled which were lower cost, better approximation of human functions, smaller size and easier to use and maintain. One example of the use of microelectronics in vocational and social rehabilitation is the decrease in size and increase in quality of hearing aids.

At the shop floor level, manual intervention in the production process is decreasing while the tasks of process control are increasing which are mostly suitable for the disabled with physical disabilities.

In the manufacturing industry, some assembly jobs have been turned over to robotisation (e.g. motor car industry). But there are still many assembly processes, as well as an increased need for quality control, workshop maintenance and preparation of production with increased automation, which should guarantee suitable work for the disabled.

In factories and in offices - as a result of new office technology and the connected forms of work organization - work at VDU (visual display units) is rapidly being introduced into all sectors of occupational activities. As a result, employment opportunities seem to be on the decrease for persons with visual impairments or restrictions in the movements of the finger-hand systems.

However, employment opportunities for disabled persons who are home-bound or severely impaired in the locomotor system can be expanded by bringing the job to their home through the use of remote terminals and transmitting the information via telephone cables.

Basic Technologies for the Disabled in Developing Countries

In contrast to the (in most cases) capital-intensive and labour-substituting "new technologies", the term "basic technologies" refers to low-cost products and equipment but more labour intensive production processes.

Further characteristics of basic technologies, or in other words, appropriate technologies for developing countries are:

- low in capital costs;

- use local materials whenever possible;
- create jobs, employing local skills and labour;
- are small enough in scale to be affordable by a small group of farmers, employers or self-employed persons;
- can be easily understood, controlled and maintained;
- can be produced out of a small metal-working shop, if not in a village itself;
- presuppose that people can and will work together to bring about collective improvements to their communities, recognizing that in most parts of the world important decisions are made by groups rather than by individuals
- involve decentralized renewable energy sources, such as wind power, solar energy, water power, methane gas, animal power and pedal power;
- make technology understandable to the people who are using it and thus suggest ideas that could be used in further innovations;
- are flexible in that they can continue to be used or adapted to fit changing circumstances;
- do not involve patents, royalties, consultant fees, import duties, shipping charges, or great financial expertise.

The basic technologies approach (which can be used both for products and production processes) is appropriate for the disabled because it increases the available amount of labour in a region. The low costs of production technology favour self-employment or small cooperatives of the disabled.

On the product side, much more emphasis needs to be put on the development of aids for the disabled out of locally available and easily repairable material.

(1)

Implementation

Some practical examples of the ways in which the employment opportunities of disabled persons may be increased by adapting jobs to suit their capacities have been given, but such action is complementary to and not a substitute for the more common methods used in vocational rehabilitation such as vocational guidance, vocational training, selective placement and the establishment of sheltered or production workshops.

Placement Schemes

Successful rehabilitation is a matter of team work, and this principle is equally applicable to the successful promotion of job adaptation and placement schemes, whether they are for able-bodied workers or for disabled persons.

In order for a selective placement officer or team to be successful, he/she must actively seek job opportunities for his/her disabled clients and not wait for the opportunities to present themselves.

In attempting to promote job adaptation schemes for the disabled, the rehabilitation team has to decide:

- which jobs might be suitable for the disabled person;
- what treatment or training does the disabled person need to enter or re-enter employment;
- what part(s) of the job(s) need(s) adapting;
- how the adaptation should be effected.

The members of this team are likely to include the following key people:

- the medical officer, whose role is to identify the impairments and medical contra-indications and state them in terms related to job demands, as well as to indicate any treatment or training required;

- the personnel or employment officer, whose role is to identify the workers for whom job adaptations may be necessary to match residual capacities with job demands and to suggest jobs which, after adaptation, may be suitable for the workers concerned;

- the production or methods engineer, or similar technician, whose role is to consider how the job may be adapted and to organize the essential work.

- the work's manager, whose role is to coordinate the efforts being made, to interpret them and the policy involved to the top management, and to secure the necessary financial support and the allocation of the necessary personnel;

- the workers' representative charged with problems of the disabled, whose role is to help ensure that a job for a disabled person is secured, that it is within his/her remaining capacities and in line with his/her aspirations; also to help with the integration of the disabled worker into the new working environment.

The situation is likely to be different and more difficult in underdeveloped countries, particularly in those where high unemployment and under-employment prevail. Where industrial development is limited and labour supply considerably exceeds demand, it will be difficult to persuade an employer to agree to go to the expense, limited though it may be, of adapting a job to suit the needs of a disabled worker - unless, of course, the worker is skilled and experienced - when the employer can readily meet his requirements by employing able-bodied workers and without incurring any such expense.

This fact does not excuse rehabilitation workers from making efforts to secure cooperation. They should explore every avenue and, in particular, they might devote considerable attention to the feasibility of adapting jobs in agricultural and similar work and in cottage and rural industries, which may well offer better employment opportunities for the disabled.

Open Employment

The majority of disabled persons perform the same jobs as their able-bodied colleagues without the need for any job adaptation or any restrictions in work performance. When they do, these disabled persons are working under the conditions and provisions of the open labour market. Open employment generally calls for a certain adaptability on the part of disabled persons to a changing working environment.

Sheltered Employment

Sheltered employment can take place within an enterprise or be a sheltered workshop.

Sheltered employment within an enterprise fulfills the following tasks:

- buffer employment until a workplace is found, is vacant or has been adapted in order to accommodate a disabled person;
- temporary employment of e.g. pregnant women, convalescents;
- "enclave" employment (where groups of disabled persons work as separate units under special supervision;
- retraining for a new occupation;
- long-term employment for employees who are no longer able to cope with the demands of open employment.

Sheltered Workshops are established for severely disabled persons either as a means of:

- providing permanent employment for those who are unlikely ever again to be able to work under ordinary working conditions; or
- developing the capacity of those who may ultimately be able to return to such work.

In their design and construction, architectural barriers such as narrow doorways, entrance steps, etc. should be avoided or eliminated so as to enable all kinds of handicapped workers to enter the premises without difficulty.

Sheltered workshops are also potentially excellent locations for the study and development of job adaptation, since their clients may require special arrangements of and adaptation to equipment in order to be able to work at all.

The trend in sheltered workshops is to aim at viability and concentrate on providing production work frequently on the basis of subcontracts for particular firms or by developing its own products. This results in a much larger field for the exploration of the possibilities of job adaptation with a view, not only to widening the range of subcontract work which might be undertaken, but also to increasing the types of severely disabled persons for whom employment could be found.

Homework

Work performed by the home-bound is usually simple, on a small scale and, by its nature, does not call for the use of complex or elaborate machinery. The equipment required can generally be adapted without much difficulty. The possibilities of adaptation should also be examined in order to bring work within the capacity of those who are the most severely disabled of all.

Financial Aspects

Experience has shown that the cost of adaptation in many successful cases has been surprisingly low.

Where a firm is able to retain an employee disabled in its service by adapting his job to suit his residual capacity, it is very likely that the cost of the adaptation will be less than that of recruiting a new worker and giving him/her the necessary training. In addition, the problem of recruiting a new qualified worker which is a special problem in developing countries is avoided.

Where a firm adapts a job to provide employment for a disabled worker not previously in its employment, the cost of the adaptation must be added to that of the worker's recruitment and training, and some extra expense is necessarily incurred. However, when assessing the cost in such cases, the extra expense incurred in recruiting a disabled person may well be offset by the fact that such a worker is generally keen to do his best, is less likely to change jobs and tends to be less prone to absenteeism.

Establishment of Specialist Teams

The cost of job adaptation might also be reduced by establishing in some central organization, a small specialist team to which firms might refer their adaptation problems. This would also have the advantage of rapidly developing a really expert group in the area in a way which individual firms could not hope to achieve.

Coordination, Research and Development

In the vocational rehabilitation field there is a great need for coordination with other rehabilitation services, effective documentation of the work and success of groups and enterprises in adapting jobs for the disabled as well as developing and designing technical aids appropriate for use and production in developing countries.

Conclusions

The comments made in this chapter may give the impression that job adaptation for the disabled is a complex process calling for the use of many unusual skills and supporting resources.

While maximum effectiveness may call for the deployment of all possible resources, considerable success in job adaptation has been, and can be, achieved by lone workers operating with very limited resources in the corners of crowded workshops.

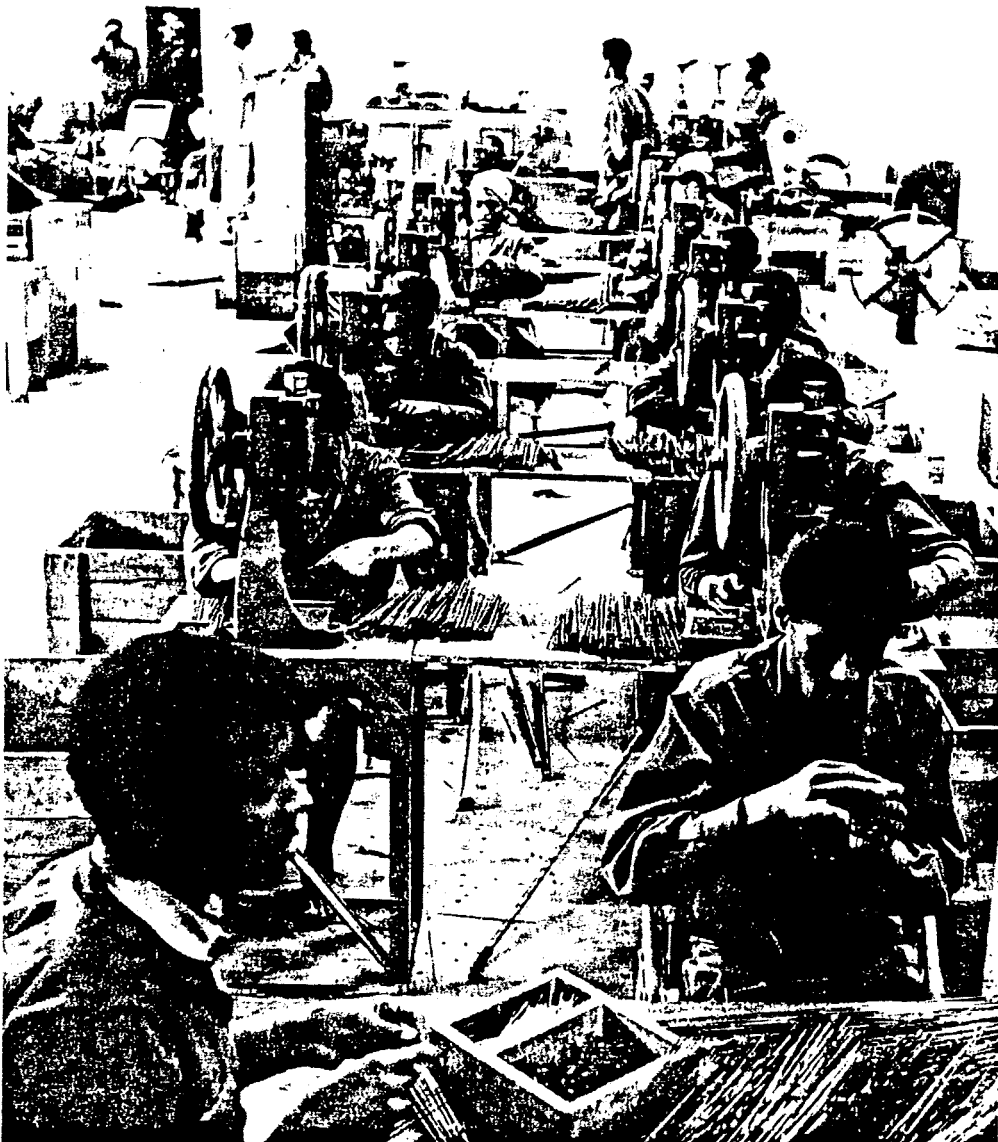
Adapting jobs for the disabled does not demand high-level knowledge, skill or vast resources. It calls for creativity and imagination. These features have characterized past developments, and it is on them that future achievements largely depend.

Projects

The United Abilities Company, Ethiopia

Beginnings

The United Abilities Company was started in the early 1960's by the Ethiopian government with assistance from the ILO. At that time, apart from a small school for the deaf and two schools for blind children, there were almost no social services for the handicapped. An initial feasibility study indicated a strong potential national market for umbrellas which were used for protection against the sun and rain and also for use in religious ceremonies. Nearly all umbrellas were being imported. Research and study of umbrella assembly showed that the processes required to produce an umbrella were relatively simple and that manufacturing norms, necessary raw materials and equipment were such that the work was suitable for the



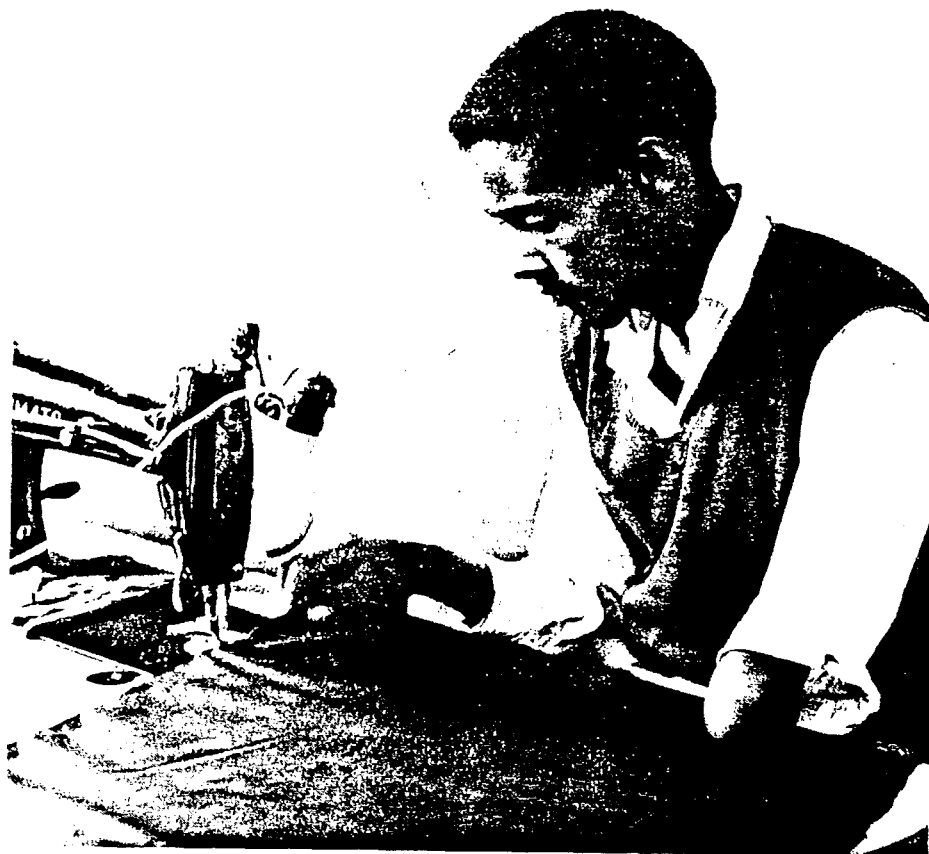
employment of disabled persons and could be started on a small scale with reasonably low capital investment. It had been decided from the beginning that the new factory would be run on commercial lines and that the normal disciplines of an industrial concern would apply to the disabled.

As the Company could not provide at that time residential facilities or transport, it was declared policy that the disabled employees should be capable of independent living and be self-sufficient.

Recruitment of Workers

The initial recruitment of workers was not a sophisticated selection process. Some came from the Municipal Home for Beggars; some were taken off the streets; some came from other welfare institutions maintained by the government or other voluntary agencies. The first group of trainees included 18 physically disabled, 5 deaf and 4 blind persons. The chief criterion for their selection was a reasonable probability of their completing their training satisfactorily. There were many more candidates than jobs available and there always remained a long waiting list of potentially suitable employees.

In the initial orientation period, it was often found that those disabled who came from small centres or off the street adjusted more quickly to a work routine than those who had received institutional care. Since none of the disabled had any experience of workshop life, it was felt appropriate to insist on the normal discipline



This worker uses the stump of his arm to manipulate the umbrella cloth on the sewing table.

of a commercially operated factory. Bad time-keeping and unauthorized absence were not accepted. This approach had a marked influence on the subsequent development of the project as a production rather than a sheltered workshop.

Initial Training and Job Organisation

It was the objective to set up a viable production enterprise with as large as possible a workforce of disabled men and women. In other words, the intention was to develop a factory with labour-intensive manufacturing methods. As far as vocational rehabilitation techniques were concerned, the main emphasis was directed towards matching the residual abilities of the individual worker with the demands of the various assembly processes. To facilitate this, the main steps of assembly (15 in all) were broken down into simpler stages (some 40 in all), thus allowing for a wide range of physically and mentally handicapped workers to be employed. In many cases, the disabled themselves suggested improved methods of production as they gained experience. It should be emphasised that the machinery and equipment installed in the umbrella factory were not specially adapted for use by the disabled.

The formal training period for some tasks was very short (two weeks), for other more prolonged (two months) depending on the intricacy of the job content and the dexterity of the trainee. The basic principle followed was job analysis and a division of labour amongst the various disabled on a team work basis. Sections were created and supervisors were designated. Every disabled worker was taught all jobs in each section so that he could readily be switched from job to job.

The advantage of the system is that it is possible to dispense with a good deal of special equipment for certain categories of handicapped persons which is beyond the acquiring capacity of developing countries. As jobs were broken down into basic elements, the skills required to perform such limited activities became reduced.

The recruitment and training of assembly workers was a central task in the establishment of the workshop; however, there soon arose the need to introduce staff, in preference disabled persons, into the various administrative and supportive tasks and posts. This required that disabled people, who were completely unversed in such matters, had to be taught office management, stock-keeping of raw materials and finished products, and wage and cost accounting. Suitable persons also had to be selected and trained as salesmen.

The United Abilities Company expanded and by the third year the workforce (entirely disabled) had grown to 170 workers who were producing over 400,000 umbrellas annually. A year later there were almost 200 disabled staff making over 600,000 umbrellas, which was thought to be the maximum marketable in the country. The addition of an auxiliary production unit for the manufacture of metal components and parts for the umbrella frame provided some 90 more workplaces, thereby bringing the total number of disabled persons engaged in the trade to nearly 300.

Management Staff Supervision

Almost from the start, the disabled were placed on a full 48-hour working week. The use of production oriented rules and regulations created an atmosphere of natural competition and achievement which served as significant work incentives.

The employees were also encouraged to follow further training programmes such as correspondence courses or evening classes.

A new employee was assessed during a 1-2 day trial work period and then placed on a three month probationary period. Daily production records were maintained for each worker. Job rotation was practised for a large proportion of the workforce.

There were clear and strict instructions in the use of all equipment and machinery. Although certain hazards are inevitably associated with power driven equipment, the rates of injury are very low and no serious accidents have occurred.

On the shop floor, supervision was the responsibility of a production supervisor with section supervisors and which involved regular and continuous checks on production and quality.

Salaries

All workers received a salary on the basis of the functions they performed and on the positions they held or their seniority. Periodic general wage increases were awarded and the Company also offered incentive bonuses for high productivity. Other fringe benefits included insurance, pension rights, and medical and social services within the factory premises. All workers pay income and educational taxes and contribute to community development schemes. Wages have exceeded the average wage for similar jobs performed elsewhere in the country.

Need for Skilled Management

The success of any production workshop project depends to an important extent on the capabilities of the manager, supervisors and instructors. The manager must be allowed to manage and must be commercially oriented with good business acumen. The instructors must first of all be craftsmen; and they must be able to teach what they know and to transfer such skills and knowledge to their trainees. In addition, they must be aware of the special needs of individual disabled workers, and possess the imagination for making practical adjustment and placement decisions.

Conclusions

The United Abilites company in Ethiopia is an example of a specialised small-scale industrial enterprise which provides regular employment for disabled workers. Its success stems from a number of points which are:

- undertaking a thorough market survey and feasibility study;

- basing the production workshop on both economic and rehabilitation objectives;
- emphasising on labour-intensive production system;
- linking job analysis and selective placement;
- establishing small production groups and interpersonal cooperation;
- emphasizing the importance of flexible staff training and development;
- localising management authority;
- being part of a wider and supported policy of rehabilitation, training, integration, placement and employment of the handicapped;
- having government support; and
- aiming at a reasonable turnover of workforce.

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Umbrella assembler

Przyjazn Invalids Cooperative, Poznan, Poland

The cooperative was founded in 1950 by 38 war invalids. The main activities of the cooperative then were shoemaking, carpentry and tailoring. These activities were chosen because the founders had the requisite skill to undertake them. The initial capital of the cooperative was nothing more than the tools owned by the founding members. After the cooperative was registered in the court, credit for additional capital became possible. However, work in an old damaged building with simple production tools was neither paying nor satisfactory. Further the cooperative was unable to face the situation arising out of the large-scale manufacture of shoes, furniture and garments through highly mechanized means. In 1960 therefore, the cooperative switched to new lines of production - processing of plastic materials, coils and sub-assemblies for electrical motors. Besides the production units, the coop maintains a rehabilitation centre to provide basic rehabilitation to all its disabled employees numbering 436.

When the cooperative was first established, shoemaking, tailoring and carpentry were chosen because these were the fields in which the founders of the cooperative possessed some technical skill. Besides, during the early postwar years, there was an acute shortage of consumer articles and the cooperative was therefore able to push its sales without much difficulty. But the old trades ceased to remain paying and new lines of production had to be sought. In choosing new lines of production, the cooperative was greatly aided by the state-owned industries. The industries gave the machines to the cooperative on hire-purchase and also made available the services of technical personnel. All the products of the cooperative were purchased by the industries, whose production in turn constitutes an integral part of the national development plan.

The cooperative has 650 employees among whom 436 are disabled. There is no particular age limit for entry into the service of the cooperative. Candidates with disabilities who are capable of performing certain jobs are referred to the cooperative for employment by the regional medical commission. Totally blind candidates are not considered for employment by the cooperative because such candidates are usually provided with employment by a special cooperative for the blind.

The cooperative has on its roll 110 homeworkers. These are employees who do not attend the cooperative's workshop but attend to the jobs assigned to them in their own homes. Homeworkers generally belong to one of the following categories: 1. they are too severely handicapped to attend the workshop, 2. they are disabled mothers with small children who cannot therefore afford to attend the workshop on a regular basis for family reasons, or 3. they are unable to attend the workshop because the transport facilities required are lacking in the area.

Homeworkers are generally assigned simple operations which do not involve any specialised skills and which can be undertaken in the home without difficulty, after an initial spell of vocational rehabilitation. To make sure that homeworkers perform the tasks assigned to them in a satisfactory manner an instructor of the cooperative goes to the homes of the workers to put them properly on the assigned tasks. The cooperative has to arrange to send the raw materials to the homes of the workers, and also arrange to collect the finished material from their homes.

Payments to the homeworkers are made on "piece-work system". However if on this basis a homeworker is not able to earn at least 1,400 zlotys per month, the deficit up to 1,400 zlotys is made good out of the rehabilitation fund. All homeworkers get 15 percent additional payment on their earnings on piece-work basis. This is to compensate them for using their own home space and power for the work of the cooperative. The cooperative has appointed one manager of homeworkers and three vocational training instructors to be in charge of the homeworkers programme.

Apart from distributing a share of the net profits to its members, the cooperative has also been extending various other kinds of assistance, such as assistance to members who require personal appliances including motor cars, provision of special equipment to invalid employees doing certain types of work, assistance regarding housing, etc.

An average worker in the cooperative receives 3,800 zlotys per month and the better workers earn up to 6,000 zlotys per month. As a result, the workers of the cooperative enjoy fairly good living standards.

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Cheshire Home, Khartoum, Sudan

The Cheshire Home was established in 1974 in the capital of the Sudan, Khartoum and run by a staff and committee of local Sudanese people, with the help of a volunteer physiotherapist from the UK. The Home was set up for the rehabilitation of handicapped children up to 15 years of age disabled by polio, cerebral palsy, congenital deformities and road accidents.

The treatment given at the home was rehabilitation through surgery, physiotherapy, education and the supply of aids and appliances. The centre consisted of a school room, toilets, kitchen, a dormitory for 12 children and two nannies and a physiotherapy room. About 900 children were being treated on an outpatient basis by the end of 1982 while some stayed at the centre for short periods of time. There was a staff of 10 with one physiotherapist and a local nurse. Doctors worked part-time.

Up until 1980, the Cheshire Home relied upon a government-run workshop in Khartoum to supply basic callipers for the children, but there were problems because they could not supply enough and took far too long to make. Because of this, very few patients could be treated and even when the callipers were in fact made, they were soon outgrown due to the time between measuring and final fitting.

Consequently, the centre decided to set up a workshop that would initially produce callipers out of local materials and to eventually improve upon the original (Huckstep) design, design other orthopaedic aids and train a local Sudanese counterpart to take over the running of the workshop.

The workshop was originally set up with a small grant of 3000 Sudanese pounds (about £1,500 Sterling) to construct a simple building and to purchase various hand tools, a welder, benches, etc. More funding was then obtained to purchase the materials and spares.

By using locally available materials to produce the appliances, the cost was kept very low. For example, one calliper cost about 50 pence Sterling and a wheelchair about £25 Sterling in comparison to £500 Sterling for a wheelchair imported from the U.K. For those who could afford it, a fee was charged for the appliance and in this way about 30% of the cost of the material was regained.

A wide range of mobility aids was produced; many types of callipers for different disabilities, walking frames, and specially adapted aids for special cases.

In an average month, 30 children were given new orthopaedic aids, mostly callipers, backed up with various walking aids. The time between prescription, measurement and final fitting was normally between 2 to 14 days, depending on the urgency of the case and the work load at the time. All repairs were dealt with the same day. Most children returned after 6 months for new appliances because they

were either outgrown by that time or worn-out because of vigorous every day use. Because the time delay was so reduced, people were willing to travel long distances to be fitted with their appliance because they knew that they would receive prompt attention. This was the main reason for the number of children treated to rise from around 80 in 1980 to 900 children in 1982.

Also, because the centre was able to give immediate treatment and was independent of the government workshop, they were able to produce and supply other types of aids other than the basic calliper such as those needed by children with cerebral palsy and bone diseases, accident victims of bus crashes in Khartoum and bombing victims from nearby Ethiopia.

(20)



Fitting simple long leg callipers

Photo by Wendy Wallace

The Jairos Jiri Association, Zimbabwe

The work of the Jiros Jiri Association began in the 1940's by Mr. Jairos Jiri who established rehabilitation Centres throughout Zimbabwe in order to provide care, treatment, training, education and sheltered employment for disabled Zimbabweans. The objectives of the Association are:

- to assist, provide treatment and rehabilitation for those suffering from all forms of physical disability.
- to establish and equip Centres to provide the above and include schools, clinics, training and employment facilities and welfare services for the disabled while supporting preventative measures against the causes of disability.
- to cooperate with the Government of Zimbabwe and international agencies to assist with expertise and financial support for the betterment of all activities.

The Association main areas are children's centres, training centres, and sheltered employment.

Children's Centres

There are six children's centres in Harare, Waterfalls, Makuwapasi, Kadoma, Gweru and Pumula.

Most centres provide post-operative care, physiotherapy, training and primary or secondary education and accomodation for children with physical disabilities. One has an outpatient physiotherapy department which caters to children too young to be enrolled and gives instruction to parents of children who are discharged. The budgets of these centres range from Z\$78,000 to Z\$509,000 depending on their size and number of services offered.

Training Centres

There are three main training centres which specialize in vocational and agricultural training.

Vocational Training

The Bulawayo Training Centre provides accomodation and training facilities for 204 trainees annually. Courses are offered to young men and women with varying disabilities in the following fields:

- Clerical Work - typing, bookkeeping, switchboard, filing and reception.
- Technical - electrical repairs, including television repair work, carpentry, tailoring, leatherwork, welding, and metal work.
- Homecraft - home economics, cookery, knitting and sewing.
- Art and Craft - carving, basket and mat making, batik work.
- Adult literacy classes are also held.



Bookbinding—Bulawayo Training Centre

Photo by Roel Burgler (Netherlands)

The centre provides a clinic able to cater for post-operative cases and physiotherapy facilities are provided. Recreational facilities are also provided. An Employment Development Officer works in close liaison with the instructors to obtain employment for the students on the completion of their courses. As many as possible are absorbed by the Association to work in various capacities.

Agricultural Training

There are two agricultural training schemes:

Masvingo - is a 10 hectare project and provides agricultural training for up to 30 students annually. Instruction is given in irrigated market gardening and small areas of commercial cropping. Small livestock projects are also undertaken. A well equipped workshop provides for courses in welding and tin-smithing. Trainees showing an aptitude for agriculture are given a second year of training at Burnside and those more inclined to technical skills receive further training at the Bulawayo Centre.

Burnside - is a 92 hectare farm on the outskirts of Bulawayo and gives second year agricultural training to 15 students in commercial market gardening and cropping in addition to animal husbandry courses and dry land cropping. Endeavours are made to give those who successfully complete the course an

additional year of sheltered employment in agriculture to gain experience before being placed on open labour markets or self-reliance projects or cooperatives.

Sheltered Employment

Sheltered employment is provided for the twofold purpose of making provision for the independence of the disabled and to ensure a steady source of income for the operating costs of rehabilitation activities. The sheltered workshops and farms are meant to be transitional in preparation for independent life.

Luveve Furniture Factory (Bulawayo) is a productive well equipped factory giving employment to 60 workers. An adjoining Hostel provides accommodation for single men and a vegetable garden was established to help cater for their needs.

The Orthopaedic Workshop (Harare) is situated in the grounds of the Harare Children's Centre and supplies the orthopaedic appliance requirements of the Association and the needs of individuals and other organisations. It is an important aspect of self-sufficiency for the Association and besides providing sheltered employment, contributes considerably towards saving funds previously used to purchase expensive appliances. The complex comprises well equipped workshops, fitting rooms and a waiting room.

A variety of mobility aids are produced at the Orthopaedic Workshop and include all types and shapes of boots, callipers, artificial limbs, crutches, etc. They also make their own type of unfoldable wheelchair made from local resources but the production rate is very low.

Zimunya Factory (Mutare). Materials are provided for the manufacture of cane furniture, baskets and mats for both men and women employed at the factory. Contract work from the surrounding area is also undertaken in metal and woodwork. Accommodation is provided for those who have difficulty in travelling to and from work.

Agricultural Sheltered Employment. This type of employment is provided at Burnside (Bulawayo), Gwanda, Gleneagles (Harare) and Silobela (KweKwe District) giving employment to a total of 31 workers. Both Gwanda and Burnside are viable productive units and it is planned as funds become available for the development of water reticulation to increase the viability of Gleneagles and Silobela. Commercial cropping market gardening and livestock production are undertaken at all these Centres.

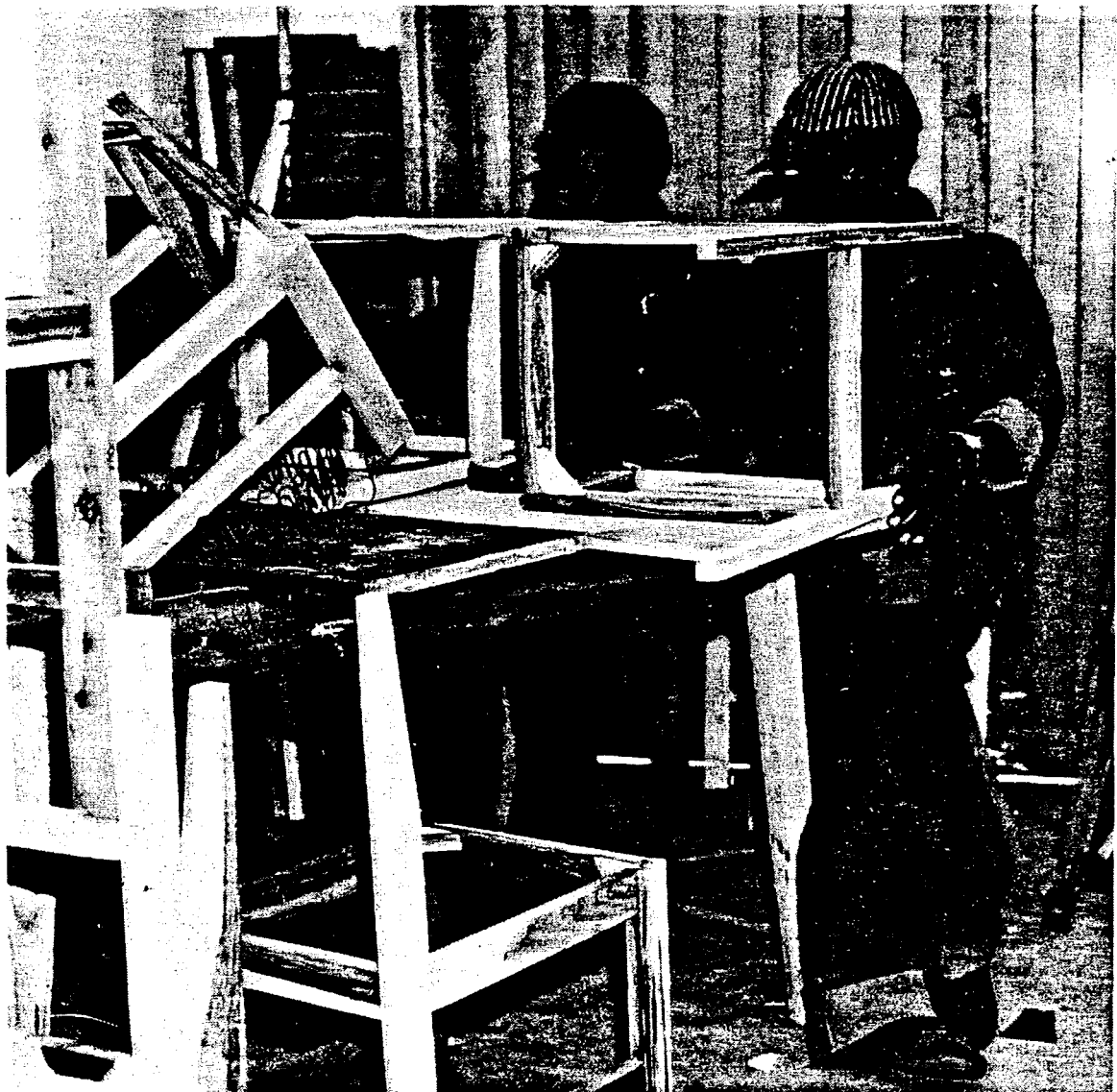
Bulawayo Production Unit: For those people too disabled to work elsewhere, a Production Unit is operated at Bulawayo Training Centre where mat

making, basketry and metal work is undertaken together with contract work such as book binding and leatherwork.

Cooperatives

Because of a lack of employment opportunities in the country, the Association has also embarked on a programme to encourage the disabled ex-trainees to engage in small business either individually or in cooperation with others (cooperatives).

Training is undertaken in all aspects of the skills required to establish self-supporting cooperatives. This includes management, bookkeeping and accounting, production and marketing. To date two cooperatives have been established under the administration of the Association, one by women in tailoring and another by a group of young people in leatherwork. Assistance for those wishing to undertake similar schemes is available.



Sheltered Employment—Luveve

Photo by Roel Bergler (Netherlands)

Commercial Fund-Raising Activities

Craft Shops are established in Harare, Mutare, Bulawayo, Gweru, Kadoma, KweKwe and at the Victoria Falls. These generate a valuable source of income for the maintenance of rehabilitation activities while providing an outlet for the workshop production and rural craft from sources throughout Zimbabwe.

Sunrise Band. This group of predominately disabled people travel extensively giving concerts in urban and rural areas. Proceeds of their concerts benefit the needs of the disabled people cared for by the Association.

Future Proposed Developments

Future developments include outreach programmes which aim to promote the educational and medical and income generating needs of disabled persons in rural areas to enable them to be integrated in social development programmes. Also investigations for a programme called Project With Industry are complete and it is hoped to get the project underway in the near future. This basically envisages the Association supporting a trainee under-going training with a commercial or industrial concern until such time as the candidate qualifies to become a productive employee.

(from The Jairos Jiri Association handout, and letter from J. Chiviru, Education and Training Officer, 28 August 1986)

Prostheses

General

A prosthesis is an artificial limb used to replace a lost limb. A prosthesis is clearly the first choice solution for a disabled person who has lost a limb since it allows the person to reestablish a normal lifestyle usually without any other special equipment or aids.

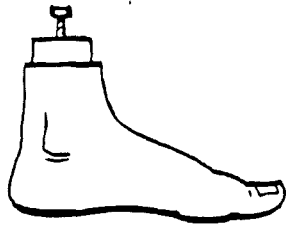
The fitting and making of prostheses is a large and complex subject unto itself and therefore will not be gone into in great detail in this report. Very detailed descriptions on how to fit and make prostheses can be found in On Stump Socket Lamination by W.Kaphingst and S. Heim and Below-Knee Prosthesis and Gait Training for Amputees by Operation Handicap International.

There has been impressive progress in several countries in developing low cost prostheses such as the Zimfoot in Zimbabwe and the Jaipur Foot from India. Both are prosthetic footpieces for lower limb amputees which permit barefoot walking and have enough mobility to permit squatting and walking on uneven terrain. It resembles a natural foot and is made of rubber and wood. There is also a Jaipur Above-Knee prosthesis which also allows the user to sit cross-legged.

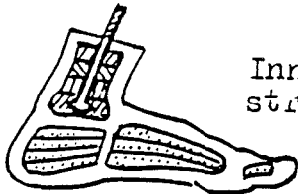
Pylons which replace an amputated leg are also made at the Khartoum Cheshire Home in Sudan and construction details are shown in the illustrations. Though the pylon may not be as cosmetically attractive as a more elaborate artificial leg, it is inexpensive and easy to make and therefore makes it more accessible to more people. Other related orthopaedic aids such as long leg calipers, shoes and clogs are also shown.



Orthopaedic center in Bulawayo (Loretta FitzGerald).



Jaipur Foot

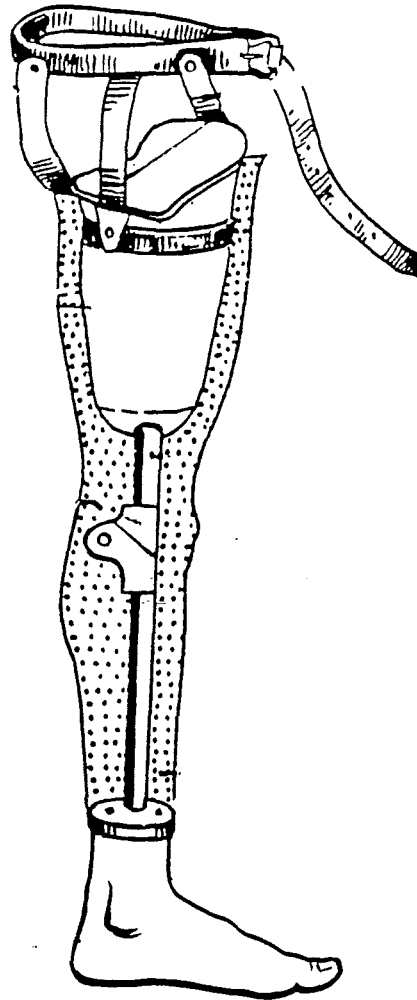


Inner structure

Showing dorsiflexion



Squatting



(6)

Pylon

USE To replace an amputated leg.

DESCRIPTION A simple fixed pylon, with a padded ring top, and a wood and rubber rocker type foot to absorb shock. It is non adjustable in height and non articulated and so very simple to make. Some height adjustment can be made in the wooden foot. The weight of the body is taken through the ring top and held on by a soft leather laced up sleeve giving a comfortable overall pressure on the leg.

(i) for ring top and metal frame:

MATERIALS 8mm or 5mm rod. Foam padding.
 Hard wood. Soft sheep skin.
 3mm metal flat. Bolt and nut,
 Rubber. 4cm long.
 Laces.

MEASURE

- 1 Stand the person upright on the one leg with normal footwear. (e.g. barefoot)
- 2 With a steel tape, measure from the ground, hard up to the top of the crotch. (fig 1)
- 3 At an angle, the circumference of the leg and its diameter.

Diameter + 10cm
for padding:

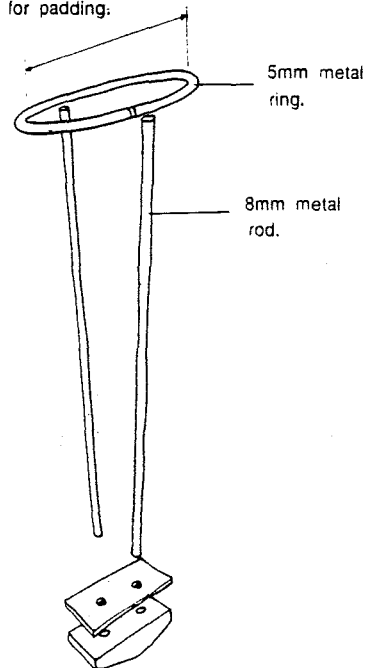
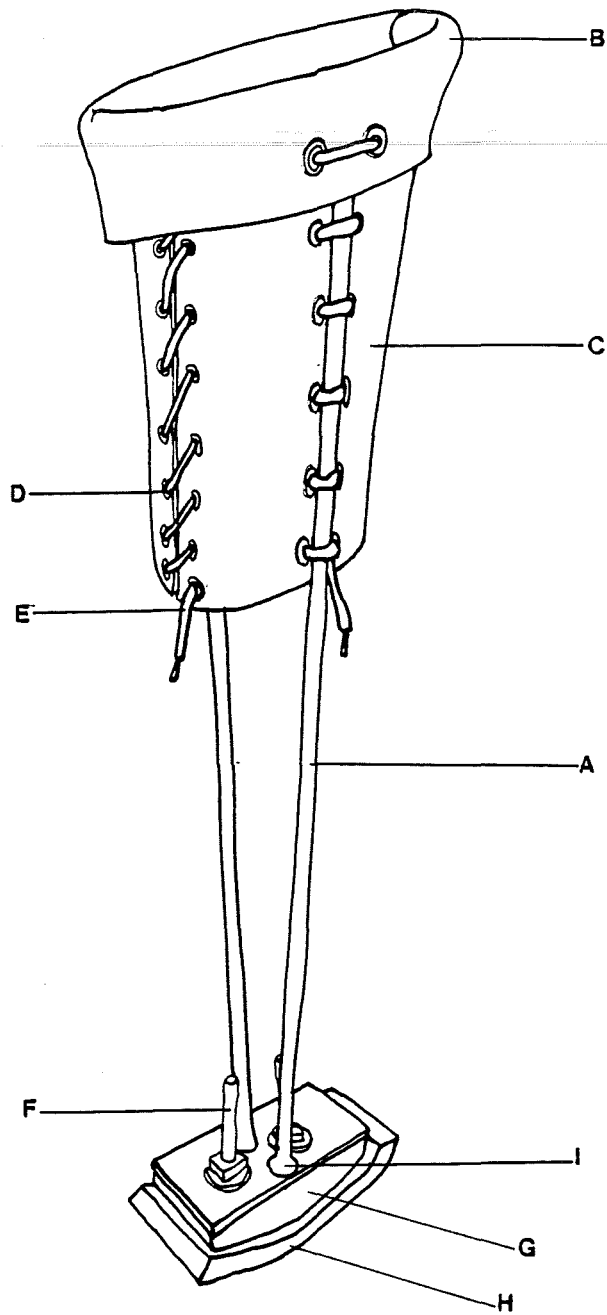


Fig 11



PYLON

KEY

- A Metal frame
- B Ring top
- C Leather sleeve
- D Eyelet
- E Lace
- F Bolt
- G Wood
- H Car tyre rubber
- I Welded joints

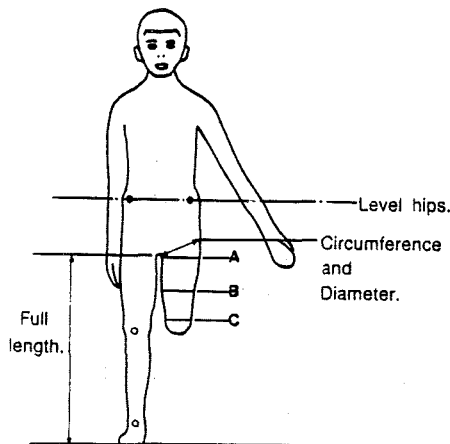


Fig 1

HOW TO MAKE

- 1 Cut out metal to correct lengths.
- 2 Make up the ring in 5mm rod to the measured circumference and diameter of the leg, leaving room for the padding between leg and metal (about 5mm) (fig ii)
- 3 Spot weld all the pieces together (drawing a full size pattern will help). Check the measurements and finish weld.
- 4 Use some hard wood and make the rocker foot, drill both wood and metal base and bolt together. Varnish the wood.
- 5 Use some car tyre rubber for the foot, fix by glue and nail.
- 6 Pad the ring carefully all round and cover with soft sheep skin. Press out all creases in the leather as these could cause sores on the skin.

Simple Long Leg Calliper

USE For bracing a flail or flexed leg.

DESCRIPTION Made in mild steel rod. To fix into clog or shoe. With a half ring padded top, very simple leather work which is glued and riveted, therefore very cheap, and easy to make. Note that many different ways of strapping have been tried on these designs and the ones shown have been found to be the most effective. For example the ankle strap serves two purposes, one to clamp the calliper to the clog and, two, to act as a back stop for a dropped foot.

MEASURE

- 1 Lay person down on a table. Level hips if possible, press down knee flat on table and hold foot upright.
- 2 Measure the length of the inside leg from the base of the foot to the top of the crutch. (fig 1)
- 3 The diameter of the top of the leg, by placing a ruler above the leg and look down vertically.
- 4 Check for:
 - i Knee flexion
 - ii Hyperextension
 - iii Apparent or real shortening of the leg.
 - iv Foot problems, valgus, varus and foot drop.
 - v Sores and open wounds etc.

MATERIALS

- 5mm or 8mm Mild steel rod.
- Leather: 3mm cow skin upper for straps
- Soft sheep skin
- Buckles
- Rivets
- Glue
- Foam padding

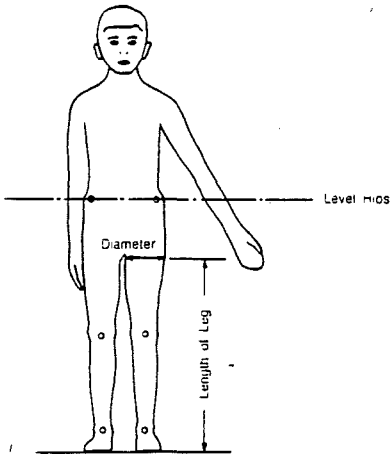
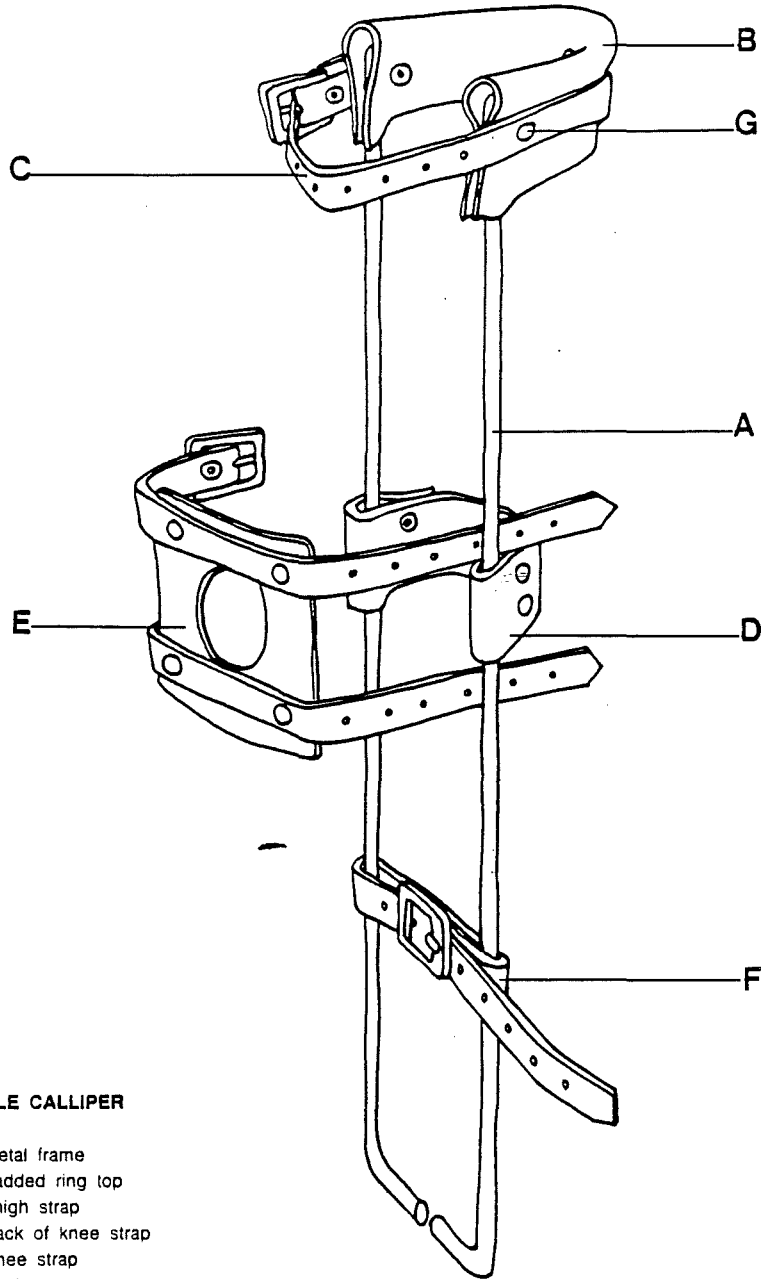


Fig 1



SIMPLE CALLIPER

- A Metal frame
- B Padded ring top
- C Thigh strap
- D Back of knee strap
- E Knee strap
- F Ankle strap
- G Leather rivets



Shoes

USE To give overall support to the foot and ankle, to be used with a calliper.

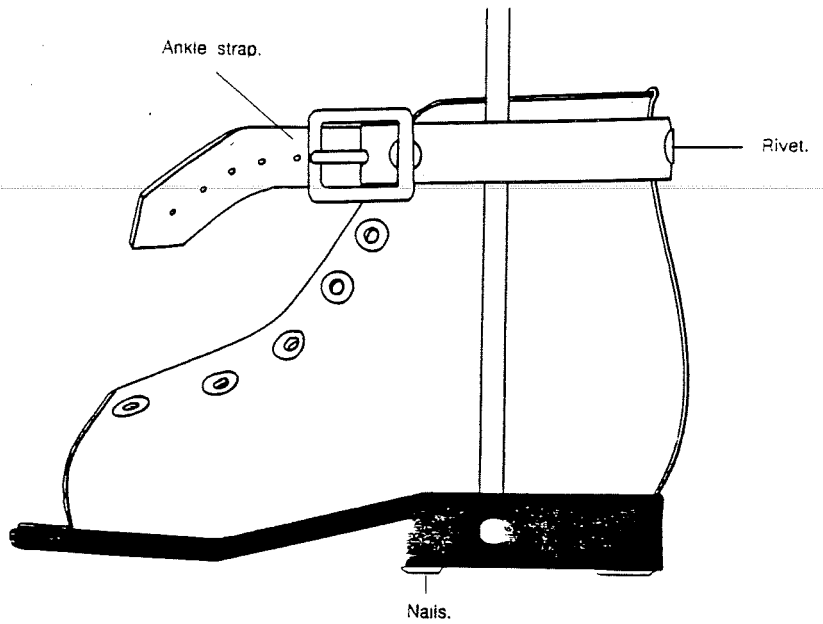
DESCRIPTION If shoes are to be used they should be of strong leather, wide fitting and have a strong lace up ankle support. They can then be adapted to be used with a calliper.

MATERIALS 2 inch round headed nails.

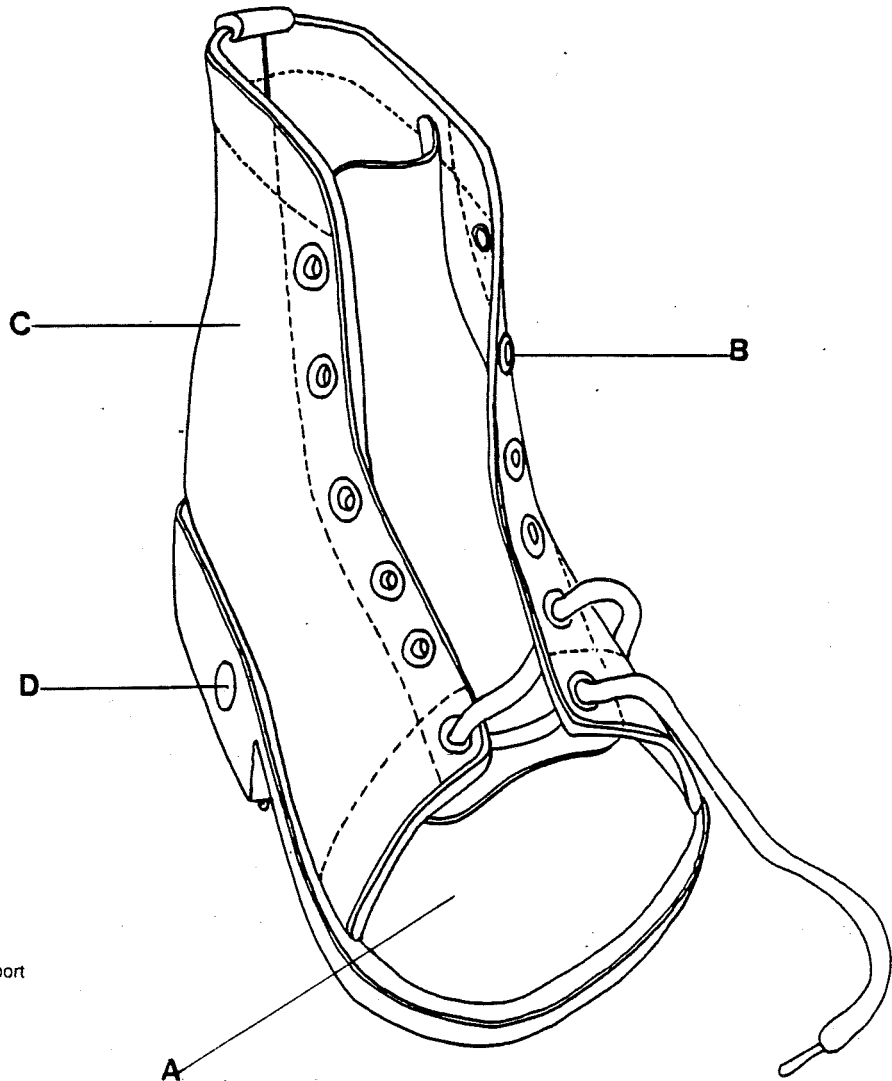
HOW TO MAKE

- 1 First cut the front of the toe out so that the whole shoe opens out. This will help you to, position the foot inside the shoe so that the toes do not curl over and also keeps the feet cooler.
- 2 Strengthen the lace fixing by adding eyelets or an extra strap.
- 3 To adapt the heel to take a calliper, first, drill four small holes in each corner of the heel. Hammer nails through from the inside and clip and bend over. Drill the appropriate sized hole through the heel to fit the calliper.
- 4 Attach the calliper fixing strap with one rivet at the back.

ADAPTATIONS A 'T' strap can be fitted on either side. Rubber sheet can be glued to the inside of the heel for an inside raise. Or cut to the shape of the sole and glued to the outside.



(20)



SHOES

KEY

- A Front cut away
- B Eyelets
- C Strong ankle support
- D Calliper hole

HOW TO MAKE

- 1 Mark out the pattern on the wood, with the toe and heel going with the grain, length of blank and avoiding any faults. (fig 1)
- 2 Cut out the pattern with a suitable saw. A metal hack saw is very good for this as it is strong and can cut round curves.
- 3 Sand and varnish wood.
- 4 Cut out rubber sole and fix with glue and nails to the base.
- 5 Drill hole in position shown for the calliper to slot in.
- 6 Consult the leather cutting table, and cut a length of the 5mm leather to the correct width. That's measurement C + depth of wood. (fig 2)
- 7 Wrap the leather around the side of the clog base and mark off the length needed.
- 8 Cut out the leather in the shape of the pattern shown. (fig 3)
- 9 Wrap the leather around again and mark where the calliper holes go. Use an 8mm leather punch to cut out the holes in the leather to allow the calliper to slot through.
- 10 Apply glue to both leather and wood and wait until the glue feels dry. Then position leather and press firmly together.
- 11 Hammer in nails around the sides.
- 12 Protect the leather by brushing in vegetable oil or a mixture of shoe polish and paraffin.

MEASURE

- 1 Place foot flat on a piece of paper.
- 2 Hold pencil upright and draw around the foot carefully. (fig 1)
- 3 Make a clog pattern from this by using a ruler to straighten off the sides and extend the front to allow for 6 months growth (about 20mm)

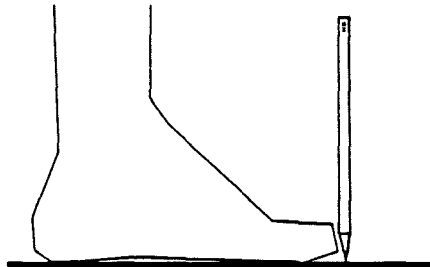


Fig 1



Fig 2

Extra growth.
Grain of wood.

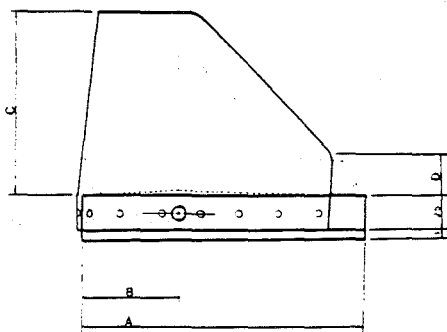


Fig 3

All measurements in cm.

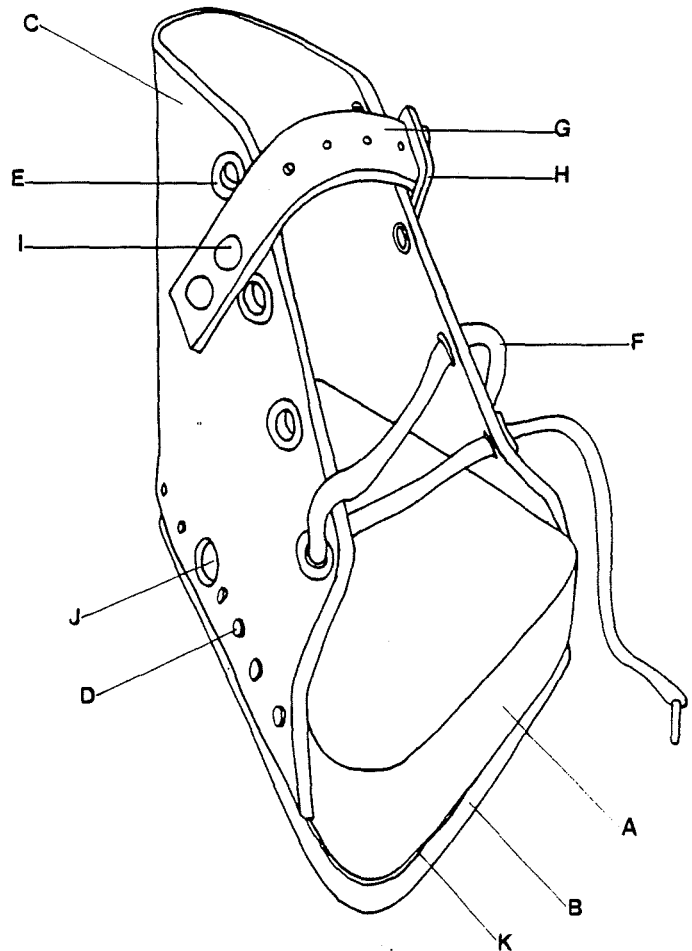
Clogs

USE Used with a calliper, giving good support to both foot and ankle.

DESCRIPTION Made with a wooden base and a rubber sole glued and nailed on. Wood is varnished to protect it from mud and water. And a thick leather upper which can be strapped or laced to the foot.

MATERIALS (for basic clog)

- Wood 25mm to 30mm thick plank.
- Rubber 10mm sheet.
- Leather 5mm cow skin.
- Nails 20mm.
- Contact glue.



CLOG

KEY

- A Wooden base
- B Rubber sole
- C Leather 5mm cow skin
- D Nails
- E Eyelets
- F Lace
- G Strap
- H Buckle
- I Rivet
- J Calliper fixing hole
- K Glue

(20)

Mobility Aids General

Physically disabled people who cannot walk need some form of personal transport. Without it, they often cannot do basic daily tasks in the community.

Purchased Aids

There are a large number of mobility or transport aids on the market available to disabled people in developed countries. These same aids are usually not available to those in developing countries because of their relatively high cost and the difficulty that most countries have with a lack of foreign exchange. In these cases the most logical answer is to manufacture the aid locally. Unfortunately though, setting up workshops to design and manufacture aids is a long time-consuming process even when the necessary materials (wood, steel, bolts, rivets, nails, screws, etc. etc.) are available locally, which they frequently are not. A case could then be made for the short-term importation of mobility aids to temporarily help fill the gap until the aid can be produced locally. There is a danger though that the users may not find the locally made product as acceptable or desirable after becoming accustomed to the more sophisticated imported one.

Most manufactured wheel chairs and hand-propelled tricycles come from the industrialised world. They were developed for use on smooth surfaces. On uneven or soft ground, such aids are unsuitable. They are also expensive to buy and look after, and difficult to repair, because they are usually complicated. (7)

Locally Manufactured Mobility Aids

Introduction

To obtain the necessary mobility aids for the disabled in a community in the third world, the best solution is to produce them locally. Not only can they be functional, effective and inexpensive, but local manufacture also has the following advantages:

- it allows the design to suit the local resources and geography, and the needs of the user;
- it allows the introduction of improvements and the development of new designs;
- it cost less, so that you can provide more aids;
- it produces local employment;
- it uses existing skills and develops new ones. (7)

Manufacturing mobility aids in a developing country is the most sensible solution to the problem. It is also one of the most difficult and the problems involved

should not be underestimated. There are unfortunately all too few examples of success in developing countries. This is not to say that an attempt should not be made. Instead it is only intended to point out how essential it is for any agency intending to undertake such an endeavor to plan extremely carefully and ensure that all the necessary materials are truly available locally and that there are adequate and substantial funds available for the project.

Design Considerations

Before choosing a design or developing a new one, it is important to consider thoroughly the following:

Cost Limitations: Because many disabled people do not have much money to spend, the aid should be as cheap as possible. It is important to balance the cost, performance, and appearance needs of the people who will buy locally produced aids. (7)

Performance and Durability: The condition of local roads and paths may have an effect on the design of an aid. If local paths are rough, the aid will need large wheels and good ground clearance. This may demand the choice of a wheelchair or the adaptation of a trolley design so that large wheels can be fitted. It is unlikely however that any wheeled transport aid would be suitable for use in very hilly areas or on very rough surfaces. The surface of local roads and paths will also influence the strength of the aid. If the aid is not strong enough, it will have a limited useful life, particularly if there are no repair facilities. (7)

The needs of the user : The aid will be used for a variety of activities - work, play, carrying goods, etc. and it should satisfy all the user's needs. For example, tricycles are more suitable for outdoor use and other aids for both indoors and outdoors. A trolley may be more suitable than a wheelchair for a child who needs to talk and play with other children at ground level. If a person needs to carry tools, etc, it may be necessary to fit a basket to the aid. (7)

Disabled people should not spend too much time in a wheelchair and those who can walk a little should use a walking stick or crutches or a trolley to give as much exercise as possible to active muscles. Wheelchairs should have space for carrying walking aids. (7)

Also consider the conditions in which the appliance will be used such as soft sand floors, climate, transport, etc. (20)

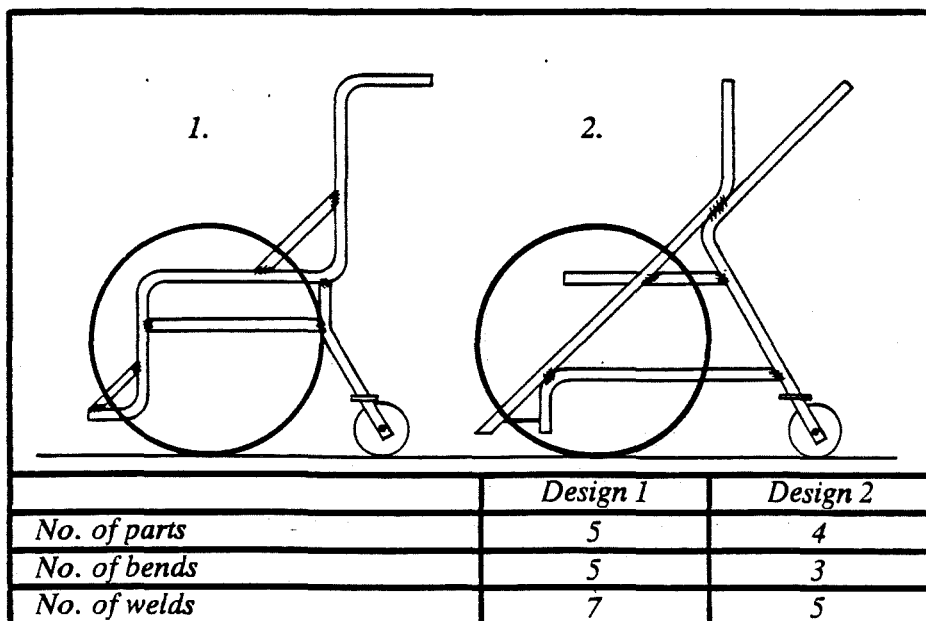
Availability of materials and components: The local availability and cost of materials, tools and components needs careful consideration to keep manufacturing cost down and make maintenance easy. (7)

In many countries steel is a suitable construction material because it is cheap, or because wood is scarce. In other places, however, wood and carpentry skills are the basis of most small-scale manufacture. When choosing or designing an aid, decide which engineering parts can be made locally, and consider the availability of imported parts. Many aids are based on bicycle technology. Bicycle parts are widely, but not always, available. Using locally made parts may reduce costs, and will also reduce dependency on outside suppliers. (7 & 20)

Design Methods

Make the design simple. The design should be simple, cheap and easy to produce, therefore with the minimum amount of working or moveable parts. This would mean many appliances could be made to treat more people, and fewer things to go wrong or get damaged. Repairs could also be carried out by the family or local craftsmen. (20)

Reduce manufacturing complexity and the amount of material used. Complicated aids are often difficult to manufacture and use a lot of material and therefore are expensive to produce. The drawings of the two wheelchairs illustrates this point. The frames are made of tubular steel and use the same manufacturing processes - cutting, bending, and welding. However, design 1 has more parts, and needs more bending and welding operations. It is therefore more difficult and more expensive to produce than design 2. Simple solutions are often more difficult to develop than complicated ones but the time spent making a design as simple as



possible can reduce the cost of the aid. (7)

Standardise material sizes. This will help reduce cost and manufacturing problems through improved stock control and production planning. It is important to standardise though on materials that are easy to find in the area. (7)

Use simple angles. If the product being made has angles, use the simple angles such as 30°, 45°, 90°, etc. which are much more easily marked out, positioned and checked with simple geometric aids such as set-squares. (7)

Wheelchairs

Types

There are four types of wheelchairs: folding pushchairs for outdoor use, rigid chairs for indoor use, folding chairs for propulsion by the occupant or attendant and electrically powered indoor chairs.

Assessment

There are many different types of wheelchairs available on the market and the choice will depend on the needs of the user. The following questions will assist in defining the requirements and therefore the correct choice.

Why is the wheelchair needed?

- lack of power in lower limbs only?
- lack of power in upper and lower limbs?
- lack of power in one side of body only?
- lack of balance?
- lack of coordination in upper or lower limbs?
- lack of stamina or shortage of breath?

How long is a wheelchair likely to be needed?

- temporarily?
- permanently?
- permanently, with changing needs over a period of time?

Who will operate the chair?

- the disabled person?
- the disabled person and sometimes also a helper?
- a helper?

Where will the chair be used?

- indoors only?
- outdoors only?
- indoors and outdoors?
- at home, with relatives or friends, at work or at a leisure location?

What will the person be doing while in the chair?

- sitting in the chair all day or evening?
- transferring to other chairs, bed, WC?
- transferring to car or other transport?
- moving independently in the chair round all or part of the house or at work?
- carrying out all or part of usual daily activities, work or hobbies from the chair indoors or outdoors?

How will the chair be propelled?

- self propelled using the hands?
- self propelled using one hand and one foot?
- self propelled using both feet?
- by electric power?
- by an attendant

What size, weight and shape will the chair need to accommodate?

- size of person seated?
- height and weight of person?
- height and weight of assistant?
- what shapes need to be accommodated?

What home features will affect the choice or need adaptation?

- access front and back? e.g. steps, slopes, width of doors
- doors? e.g. width and direction of opening, type of handle, threshold
- corridors? e.g. width, corners, angles into rooms
- floors? e.g. type of flooring
- kitchen? e.g. who is main user? height of surfaces and equipment?
- living areas? e.g. fixed furniture, movable furniture, heights of surfaces, circulation space
- bathroom and WC? e.g. position of fixtures, heights of fixtures, transfer methods used
- bedroom? e.g. height of bed and furniture, circulation space
- heating and lighting? e.g. type of heating, its maintenance, positions of switches and window opening controls.

What work environment away from home will affect the choice?

- travel arrangements to and from work?
- environmental factors? e.g. access, doors, circulation space, corridors, floor surfaces, WC, offices or work room working heights
- special features? e.g. adapted machinery or equipment, safety regulations

What transport facilities are used or may be needed?

- chair carried in trunk of car?
- chair carried inside car or van either folded or opened
- help needed to transfer or stow chair?
- space needed for transfer of user at home, work, leisure?
- frequent travel or occasional travel by train, plane, boat?

What leisure activities may affect the choice?

- types of indoor or outdoor activities undertaken?
- special features or requirements? e.g. lightweight chair, stable chair, chair to travel over rough ground.

Features

Pushing Handles

- on most chairs a pushing handle is fitted on either side of the backrest
- on a chair with a reclining backrest, the handles are lowered as the backrest is inclined which make pushing a chair in this position for long distances tiring for the attendant
- a bar to join the two handles is available for some chairs.

Backrest

- fixed rake backrest vary from 10° to 25° behind the vertical depending on the model. Too great a recline may allow the user to slide forward in the chair and prevent him from being able to propel the chair
- on some chairs the backrest is adjustable in rake to semi- or fully-reclining
- a folding backrest enables the chair to be folded compactly and stowed more easily in a car boot.

Seat

- seat canvasses are available in different widths
- for sideways transfer the wheelchair should be at the same height as the bed or WC
- a cushion may be necessary to provide additional comfort
- a cushion can be fitted with a plywood base to provide more even distribution of a person's weight

Armrests

- fixed armrests are available for those who need more security in their chair
- detachable armrests are fitted for ease of sideways transfers
- domestic or desk armrests are necessary if the user requires close access to a table or working surface
- on some chairs the armrest must be reversed for the insertion of the tray

Cross-brace

- chairs are usually strengthened by single or double cross-bracing
- a single cross-brace is set beneath the centre of the chair and allows a user to propel the chair with his feet without knocking his calves against the struts

Wheels

- propelling wheels vary in diameter from 460 to 610 mm
- the larger the wheel, the longer the wheelchair and the greater the turning space required
- a larger wheel is easier to propel but impedes sideways transfer
- rear-propelling wheels are suitable for most disabled people
- chairs can be propelled by the handrims but as these add weight to the chair, some users prefer to remove them and propel the wheels

-some chairs are available with a single adapted wheel for propulsion by a person with the use of only one hand.

-non-propelling wheels may be fixed or castor

-fixed front wheels make the chair less manoeuvrable and it can be turned in a limited space only by tilting it onto the back wheels. Front steering castors are necessary for manoeuvrability and essential if the attendant is slight or frail or the wheelchair occupant is heavy

-small front castor wheels should be avoided if there are thresholds or rugs to be negotiated indoors; outdoors they are liable to become embedded in uneven ground or cracks or halted by small obstructions

-tires may be solid or pneumatic. Solid tires are suitable for indoor use. they are easier to propel than pneumatic but they give a less comfortable ride. They do not puncture or need reinflating. Pneumatic tires are suitable for indoor use and give a comfortable ride outdoors. Although lighter weight they are harder to propel than solid tires because there is increased friction. Pneumatic tires should be kept firm since soft tires and uneven pressures cause uneven steering and make self propelling difficult.

Brakes

-brakes are operated by levers and act on the tires or rims. The length of the levers can be extended if necessary. An adaptation can be made for one-handed use so that a lever on one side controls the brakes on both sides

Legrests

-elevating legrest may be useful for a person with stiff knees or swollen legs

-elevating legrest alter the balance of a chair and care must be taken to ensure that if they are fitted, the chair is stable and safe for the user.

Calf Strap

-a calf strap can be fitted to prevent the feet from sliding backwards off the footplates

Footplates

-swinging, detachable footrest can be swung to the side or detached for ease of transfer or access in a confined space

-fixed footrests may if required in some cases

-the height of the footrest should be adjusted so that the hip, knee and ankle are supported at angles of 90°

-footplates hinge sideways or upwards to give access during transfers

-heel loops prevent the feet from sliding backwards off the footplates

Tipping Lever

-the pusher is assisted in manoeuvring the chair and in getting it up and down kerbs by pushing down on the tipping lever.

Wheelchair Design - 3 or 4 wheel

Wheelchairs can have three or four wheels. Three wheeled chairs with two large driving wheels at the front and one castor wheel at the rear are more suitable because with large front wheels the user can propel the wheelchair over rough ground without help. If castor wheels are used at the front, help may be necessary to move over even small obstructions. This seriously limits the use of the wheelchair. If a single castor falls into a pot hole, the user can tip the wheelchair slightly forwards. The castor then lifts clear of the hole. The careful positioning of the footrest prevents the wheelchair tipping too far. (7)

Wheelchair Propulsion

There are two ways the user can propel a wheelchair; either by pushing on propulsion rings fitted to the outside of the front wheels or by pushing directly on the tires of the front wheels. Propulsion rings increase the cost of the wheelchair but allow the user to control the aid more efficiently. They also prevent the user getting infected by the dirt which is picked up on the tires. (7)

Tires and the Prevention of Punctures

Bicycle tires are used both for wheelchairs and tricycles. Though they provide a comfortable ride and are efficient, they puncture quite easily especially on rough ground. The following are three methods of either reducing punctures or making the tire puncture proof.

1. Puncture Sealants

There are now a number of commercially available puncture sealants which are simple to use. A liquid mixed with small fibres is injected into the inner tube through the valve stem.. The liquid does not fill the tire - only 125ml is necessary for a 26" wheel. As the tyre goes round, the liquid spreads out and covers the inside of the inner tube. When the tire is punctured, some of the fibres in the liquid are sucked into the hole. They block the hole and seal the puncture. One injection of the liquid will seal many punctures. Puncture sealants will reduce the number of punctures, but not eliminate them. They do not protect the tire from punctures in the side wall of the tire and only seal punctures up to 3mm across.

Puncture sealants are available from:

H & M Products Ltd.
P.O. Box 101
London SE9 6TQ
United Kingdom

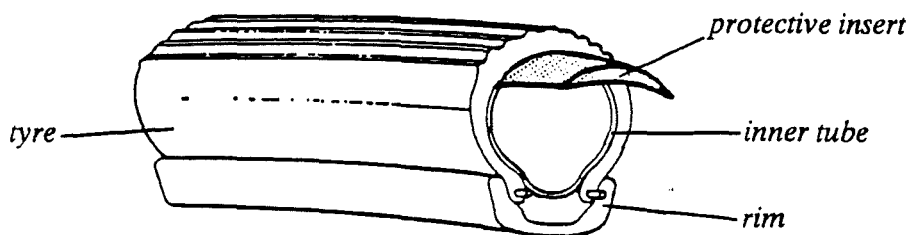
OKO International
Tongstyle Ltd
Brookside
Sandalheath Ind. Estate
Fordingbridge, Hants
United Kingdom

2. Protective Inserts

There are also commercial protective inserts which fit between the tire and the inner tube. They do make the tire puncture proof or protect the side wall, but they do increase the resistance of the tire to sharp objects. They provide a protective layer which is difficult to puncture. No special tubes are necessary but the insert must be positioned correctly.

Protective inserts are available from:

Mr. Tuffy Co.
20 Old Squan Plaza
Manasquan, NJ 08736
U.S.A.



Section of wheel/tyre/tube showing protective insert

(7)

3. Inner Tube Replacements

The inner tube can also be replaced with plastic or rubber hose pipe if you want a maintenance-free tire. The hose pipe should have a thick wall in order to provide a firm ride. Nylon reinforced plastic hose or hydraulic/compressed air rubber hose are examples of suitable types. The outside diameter of the hose should be approximately 5mm less than the width of the tire.

(7)

Examples of Purchased Wheelchairs

There is a great variety of wheelchairs on the market which will suit almost any need. Examples of the type of wheel chairs available are shown in the photographs. Prices on the whole are rather expensive and vary from £100 to £250 for the non-electric variety.

EVEREST & JENNINGS CHAIR 8AU 250-46-770

The lightweight chair can be folded easily for storage and transport.

Backrest Hammock type. Height 420mm, width 460 mm. Can be folded down by lifting the securing catches upwards. The catches protrude at right angles from the chair and the user may catch himself on these when propelling

Seat Width 460mm. Upholstery handles fitted on each side to assist when pulling the seat together to fold it

Footplates Swinging, detachable. Easily removed and replaced. Length of footplates adjustable by means of a nut at the back of the plates. Anti-slip rubber foot mats and heel loops are fitted

Wheels 600mm rear propelling wheels with solid or pneumatic tyres, 203mm plastic front castors with solid or pneumatic tyres. The rear wheels are attached to the rear of the main chair frame instead of the side as on most other chairs. This improves the stability of the chair but increases its overall length by 25mm.

Brakes Push forward 'on', pull back 'off'. Ridged brake block gives a good grip on the wheels

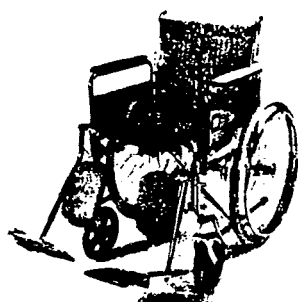
Overall height 910mm
Overall length 1040mm
Overall width 650mm
Weight 22kg

Obtainable from Everest & Jennings Ltd

Approx. price £191

Export available

Note: A range of Everest & Jennings self propelling wheelchairs with a variety of features including detachable desk armrests, detachable and swinging detachable footrests is available in Adult and Junior sizes; a large range of extras is also available. For details of the complete range see manufacturer's catalogue



NEWTON 2PP

The folding chair is available in three sizes. Junior, Standard and Wide and in two seat heights, standard 521mm and high 560mm. A parcel shelf is fitted under the seat. Although the chair is very light to lift into a car boot, especially as armrests, footplates and wheels can be removed, it is difficult to fold and considerable force is required to release the three crossbars which hold the chair open. A frail helper might be unable to manage this. A similar chair (Newton 4PP) is available with four fixed wheels and pneumatic tyres. This gives a comfortable ride but the four fixed wheels make it less manoeuvrable and the only way it can be turned in a limited space is by being tilted on its rear wheels

Backrest High enough to provide support for most users. Rake 10°

Armrests Detachable

Seat width Junior 350mm, Standard 400mm, Wide 425mm

Footplates Hinged. Lift off easily. Shaped footplates with a raised lip at the back to prevent the feet from slipping off. Ridged anti-slip surface. Length adjustable by means of a clip and pin

Wheels 318mm rear wheels with pneumatic tyres, 178mm front castors. Newton 4PP: four 318mm fixed wheels with pneumatic tyres

Extras Backrest extension, desk arms, 500mm cushion with firm base, tray, vanity wallet fitted to armrest, leg apron, elevating legrest, detachable calf strap

Overall height 914mm

Overall length 972mm

Overall width 565, 616 or 641mm

Weight 12kg

Obtainable from Spastics Society, Salisbury Works

Approx. price £215

Export available



NEWTON SELF PROPELLING WHEELCHAIR MODEL R

The chair may be suitable for a person who requires a light chair to propel; it is not sufficiently robust for a person with wild, involuntary movements. Although the chair is very light to lift into a car boot, especially as armrests, footplates and wheels can be removed, it is difficult to fold and considerable force is required to release the three crossbars which hold the chair open.



A frail helper might be unable to manage this. A user travelling independently must be able to stand to fold the chair before stowing it in the car or have strong arms and good balance in order to sit on the edge of the car seat to do so.

Backrest Height 450mm, width 415mm. Slightly angled. Hammock type: material is pulled taut by means of the metal spar in the middle of the back which supports the chair when opened

Armrests Detachable. Push-button release which must be held in position while armrest is removed. Narrow arm pads. 110mm gap between arm pads and backrest

Seat width Standard 400mm, Wide 425mm

Footplates Hinged. Lift off easily. Shaped footplates with a raised lip at the back to prevent the feet from slipping off. Ridged anti-slip surface. Length adjustable by means of a clip and pin

Wheels 520mm rear wheels with chrome wheel rim. Wheels can be easily removed for transport by means of a spring clip. 175mm front castors with pneumatic tyres

Brakes Pull back 'on', push forward 'off'. A spring holds the brakes firmly and springs forward with force on release and may catch the fingers. The brake block is smooth but the spring enables it to hold the chair adequately for transfers

Overall height 927mm

Overall length 997mm

Overall width 616 or 641mm

Weight 14kg

Obtainable from Spastics Society, Meadway Works

Approx. price £215

Export available

Also obtainable on prescription through DHSS

Editor's comment: This is the chair to choose if a lightweight self propelling one is required

CARTERS DETACHABLE ARMS CHAIR 8AU25

The chair, one of the most economically priced in the Carter's range of self propelling chairs, can be folded easily for storage and transport but as the legrests are not detachable the dimensions of the car boot should be checked to ensure that the chair can be accommodated.



Backrest Fixed

Armrests Detachable

Seat width 460mm, Narrow

Adult and Junior 410mm,

depth 410mm

Footplates Lift up but still protrude 180mm from the edge of the seat and may impede transfers. Adjustable in length. Fitted with recessed anti-slip plastic inserts

Wheels 600mm rear propelling wheels with pneumatic or solid tyres, 202mm front castors with solid tyres (pneumatic extra)

Brakes Push forward 'on', pull back 'off'. Ridged brake block to give good grip on the wheels. Very effective brakes which hold chair steady during transfers

Overall height 920mm

Overall length 1040mm

Overall width 650mm

Weight 27kg

Obtainable from Carters (J & A) Ltd

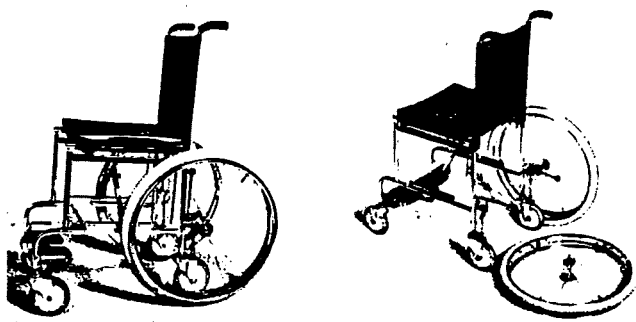
Approx. price £160

Export available

Editor's comment: This chair is particularly easy to fold and re-assemble

Note: A range of Carters' self propelling wheelchairs with a variety of features including detachable desk armrests, detachable and swinging detachable footrests is available in Adult and Junior sizes; a large range of extras is also available. For details of the complete range see manufacturer's catalogue

NEWTON TRAVEL CHAIR



The convertible, folding chair is designed for travel use by an active, independent wheelchair user with strong upper limbs and good trunk control. The rear propelling wheels can be removed when the user is sitting in the chair and the chair converted into a narrow chair moving on two small front castors and two auxiliary small rear castors. The comfort of the chair is adequate for short periods though some users may find the seat depth insufficient. The footplates are sited behind the front castors in order to reduce the chair length. When waiting, most users, especially tall ones, will find it more comfortable to place the feet on the ground since the knees are flexed to an acute angle when the feet are resting on the footplates. On request, the footplates can be set further forward but this will reduce manoeuvrability. The lightweight chair is easy to carry and put into a car, either in the boot or on the seat. Some users will also be able to transfer from it into the car, after removing the self propelling wheels and placing them on the rear seat, and lift the chair across to the foot-well of the passenger seat.

Backrest Height 352mm, width 340mm. Straight (some users may find this too upright)

Seat Width 360mm, depth 350mm

Footplates Small footplates, fitted behind the castor bearings to reduce the length of the chair. Not adjustable. Lift up to give access

Wheels 510mm rear propelling wheels with pneumatic tyres. Chrome-plated handrims. 120mm front castors. Auxiliary 120mm rear castors. Two levers on the back of the chair must be pushed down to lift the chair onto the rear auxiliary castors; by pulling a ring to release a pin the propelling wheels can be lifted off. Once the wheels are removed the levers must be lifted up again to release the rear castors for use

Brakes Can be braked only by using the two levers to lift up on to the small wheels. When self propelling the hands must be used to stop

Overall height 920mm

Overall length with brake levers down 660mm

Overall length with brake levers up 590mm

Overall width with self propelling wheels 540mm

Overall width with castors only 400mm

Weight complete 14kg

with large wheels detached 10kg

Extras Small cushion, carrying bag for propelling wheels

Train travel

If no ramp is available at the station, the chair can be lifted up on to the train by two people holding the handles and beneath the seat frame. The front wheels must be lifted up on to the train and the chair pushed from behind: there is insufficient room to step up with the chair.

With the large wheels removed, the chair can be easily propelled forward on its four castors by the occupant pulling along on either side with his hands on the corridor windows. Propelling in reverse is more difficult. The chair will go through the narrowest doors, including the WC where the door can be closed behind the user. The most awkward doorways to manage are first class closed carriages; it is more difficult to wheel over the carpet in first class compartments. Wheeling over the tracks of spring loaded doors requires extra effort; it is also difficult to manoeuvre over the connecting links between carriages. A helper is needed to carry the propelling wheels as the corridor is too narrow for the user to place them across his lap.

For ease of transfer a seat without a table should be chosen in an open compartment. After transferring onto the seat the chair can be folded easily and fitted into one of the floor-level luggage spaces between the seats or put carefully onto the high luggage rack.

Obtainable from Spastics Society, Salisbury Works

Approx. price £140

Export available

Wheels and chair can be bought separately

Editor's comment: The merit of this chair is its narrow width and length for travelling by train and plane

CARTERS SEMI-RECLINING BACK CHAIR 8AU25-41-774

The comfortable, self propelling chair is available in Adult and Junior sizes. It can be folded for storage or transport in the boot of a large car.

Backrest Can be reclined from vertical to angle of 30°. Height 590mm. Can be further extended by a detachable headrest extension

Reclining mechanism The reclining mechanism on either side of the chair may cause discomfort to the occupant when the chair is in the reclined position; sideways transfer is impeded by the mechanism and a fully-reclining chair is more appropriate for those who transfer sideways. Some helpers may find the adjustment securing screw (a shiny knurled knob) difficult to manage. The screw also has a tendency to slip.

Armrest Detachable

Seat width Adult 457mm, Junior 406mm

Legrests Swinging, detachable, elevating. The position and angle of the calf pads allows slight adjustment. Footplates have recessed anti-slip plastic inserts

Wheels 610mm rear wheels with pneumatic tyres. 203mm front castors with pneumatic tyres

Brakes Brake block ridged to give better grip on wheels. Brakes effective and hold chair very steady during transfers

Extras Detachable headrest extension height 250mm, detachable, adjustable armrests, detachable, or detachable, adjustable desk armrests, or slope arms

Overall height Adult 1073mm, Junior 1991mm

Overall length Adult and Junior 1168mm

Overall width Adult 648mm, Junior 597mm

Weight Adult 108kg, Junior 95kg

Obtainable from Carters (J & A) Ltd

Approx. price £220



Export available

VESSA CADET EXPORT MKII

The self propelling chair folds compactly for storage or transport. It is very manoeuvrable for indoor use though the small castors make it less suitable for outdoor use. A model with reclining back and elevating legrests is also available.

Backrest Folding. Height 420mm

Armrests Locking, detachable desk arms

Seat width 400mm. Alternative 455mm

Footplates Height adjustable. Hinged. Swinging detachable. Fitted with anti-slip rubber pads

Wheels 508mm rear wheels with thick propelling rim, pneumatic tyres. 127mm balloon front castors

Extras Backrest extension, one-arm drive conversion

Overall height 890mm

Overall length 960mm

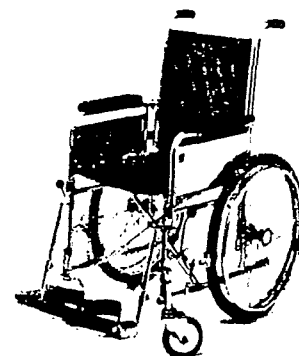
Overall width 580mm

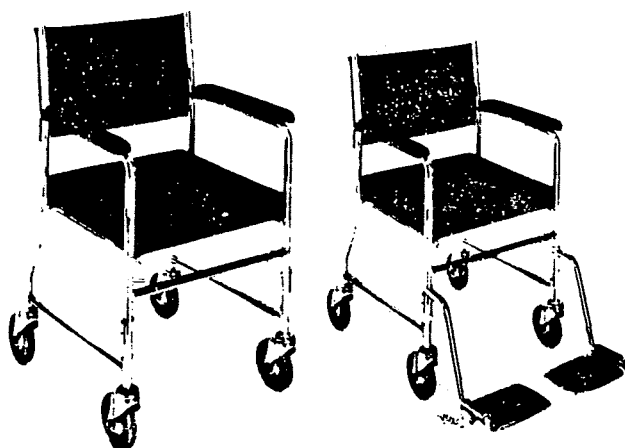
Weight 19kg

Obtainable from Vessa Ltd

Approx. price £220

Export available



CARTERS GLIDEABOUT CHAIR 5HG20 AND 25

A person propelling with the feet may find a small, indoor chair mounted on four castors easier to move than a self propelling chair. The Glideabout chair is extremely manoeuvrable and particularly suitable for use in confined spaces. Brakes (extra) can be fitted for attendant-operation: they cannot be operated by the chair occupant. Care must be taken if the user is transferring independently and the chair should be placed up against the wall to secure it.

Armrests Fixed (5HG20) or detachable (5HG25)

Seat Height 520mm. A low seat model is also available. Width 450mm

Castors Four 127mm swivel castors

Extras Clip-on swinging detachable footrests (locating pins are built into the frame of all Glideabout chairs) braking castors front and rear

Overall height 890mm

Overall length 600mm

Overall width 550mm

Weight 13kg

Obtainable from Carters (J & A) Ltd

Approx. price 5HG20 £64

5HG25 £76

Export available

Also obtainable on prescription through DHSS

Editor's comment: The merit of this chair is its manoeuvrability

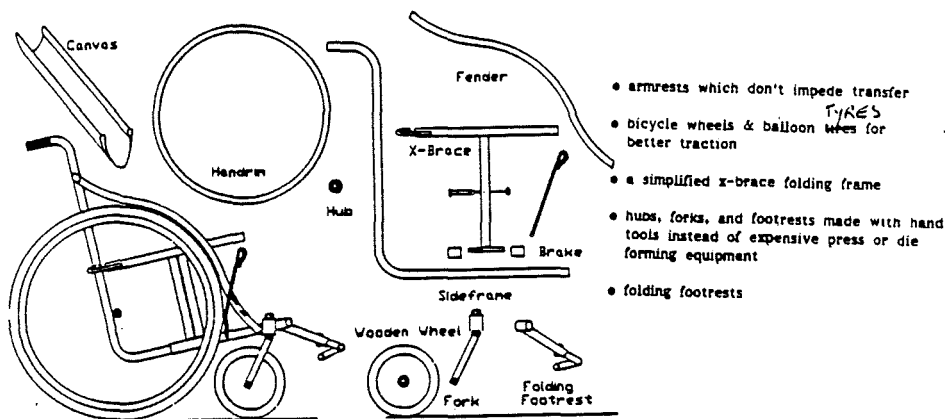
Examples of Locally-Made Wheelchairs

There are a number of designs of wheelchairs that can be produced locally either out of wood or steel. There are now several books which give detailed information on how to design and construct a wheelchair. The following illustrations are examples of wheelchairs that can and are being produced in different countries; the wheelchairs are designed with different features according to the need.

A guide to the manufacture of the ATI-Hotchkiss (Appropriate Technology International) Wheelchair, by Ralf Hotchkiss with Lindi Ramsden.

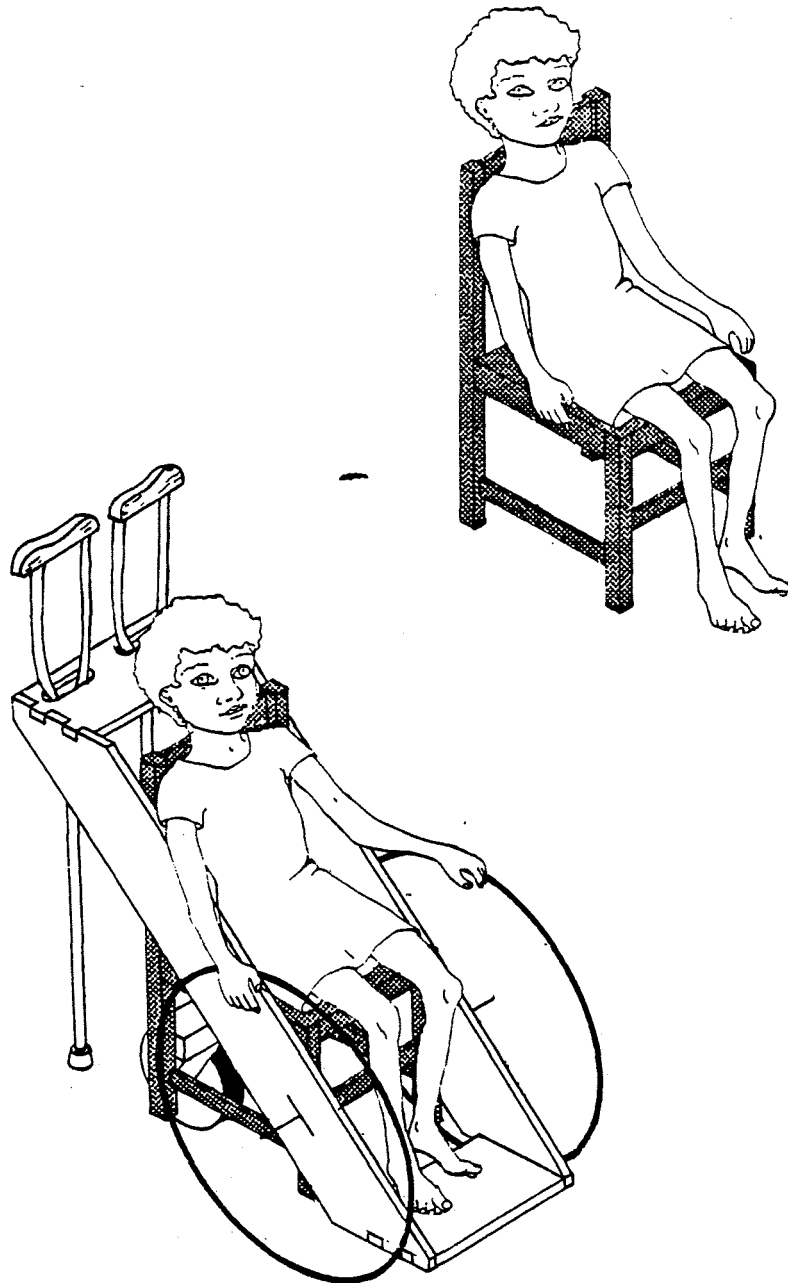
Price: free to developing countries otherwise \$8-10 (price to be decided). Available from Appropriate Technology International, 1131 H Street, N.W., Washington, D.C. 20005, U.S.A.

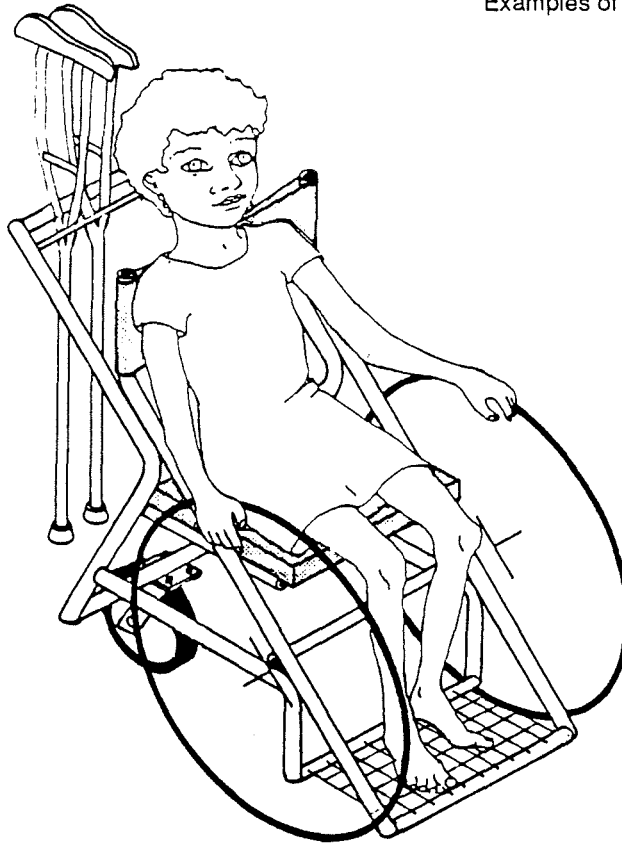
THE ATI-HOTCHKISS WHEELCHAIR DESIGN



Disabled people throughout the world, together with their families, friends, and supporters, are beginning to change the ways that they live, work, and participate in their communities. Refusing to be defined by the attitude that they are a burden on their families and society, and no longer willing to remain hidden from others, disabled people are fighting to become actively integrated into schools, regular jobs, places to live, and public life. A disabled person does not need to be an exceptional human being to become successful. We now know that all disabled people can achieve their own success if they, and those who influence them, have independence and dignity as their goals. Just as a blacksmith needs high quality tools to do a specific job, disabled people need the highest quality equipment to assist them in actively pursuing their goals. People whose mobility needs are not met by crutches or canes need wheelchairs that will enable them to be as mobile, productive, and independent as possible.

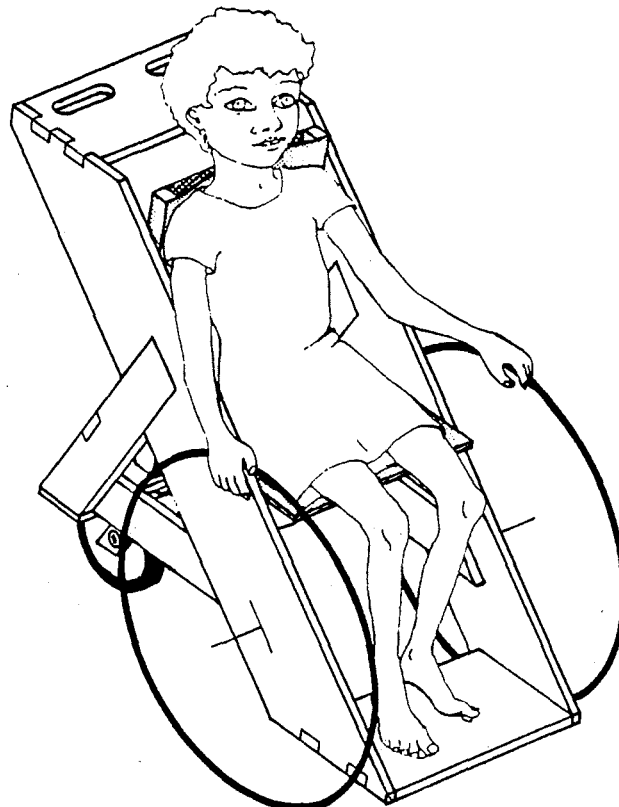
Wheelchair with wooden chair frame





Design C: tubular steel wheelchair frame

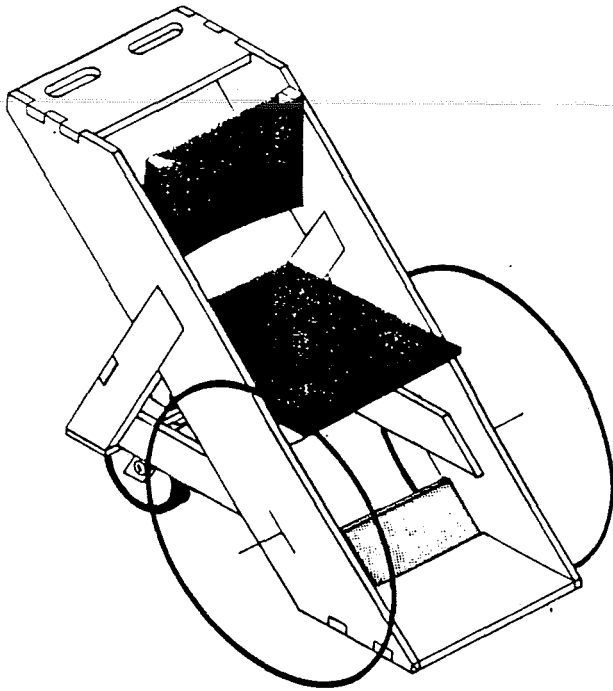
This wheelchair frame is made from steel tube. It has two identical side-frames joined by the pushing bar, the footrest, the cross member and the castor wheel mounting. You join the different parts of the frame by welding. The wheelchair has a canvas seat-back. The user can carry a pair of crutches or a walking stick on the wheelchair.



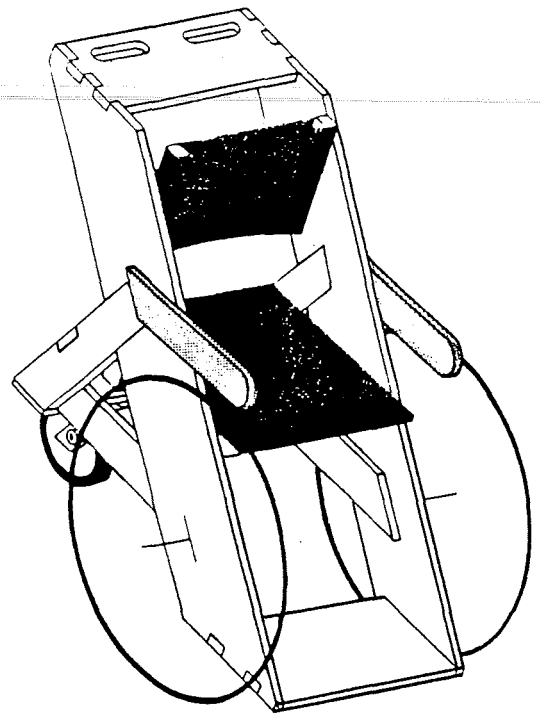
(7)

Design B: wooden wheelchair frame

This wheelchair frame is made from wood and has a canvas seat-back. The user can carry a pair of crutches or a walking stick on the wheelchair.

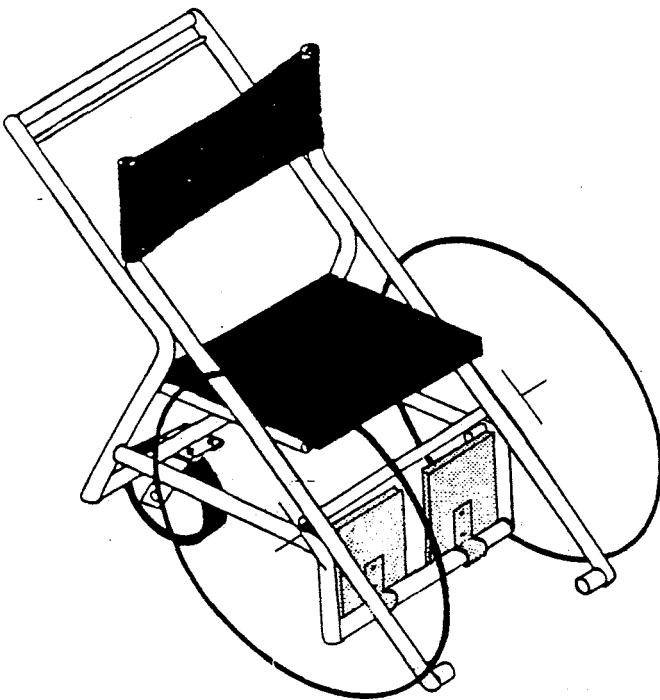


Foot shield



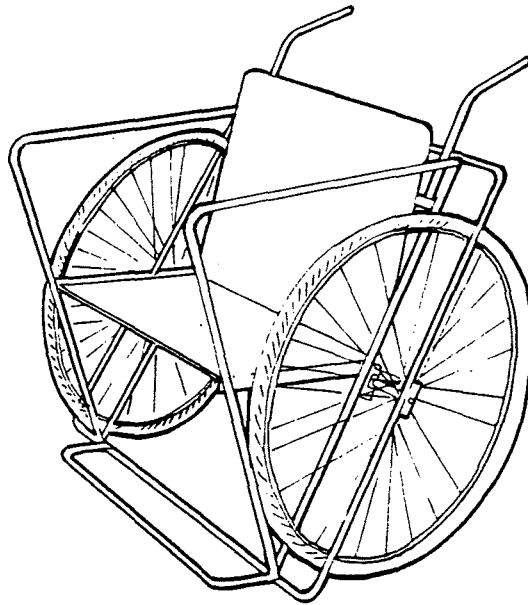
Armrests

(7)



Folding footrests

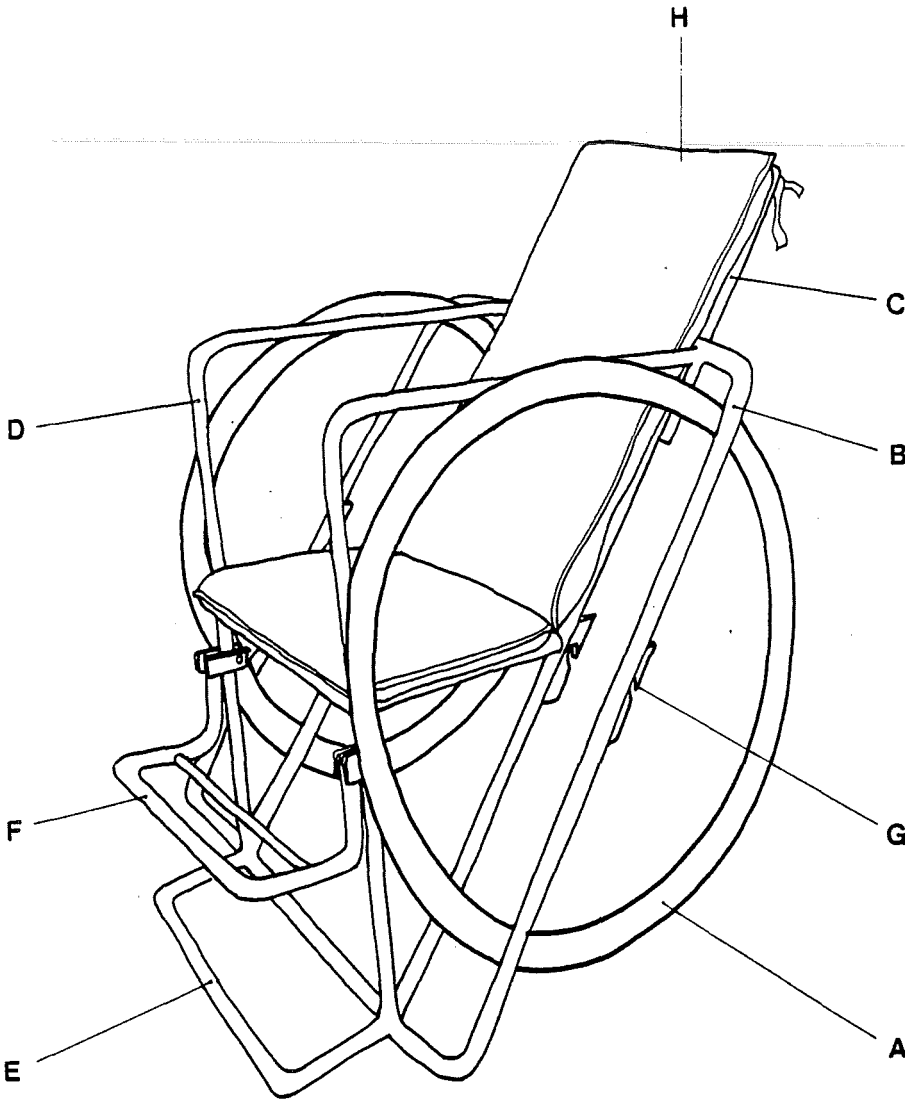
OUT OF HOSPITAL WHEELCHAIR



(22)

This wheelchair employs bicycle wheels to enable it to travel over rougher ground and to cushion the passenger. Again, various additions could be made to increase comfort including flat-topped arm rests, padded cushions and pannier bags for patients' belongings.

The wheelchair is shown with two handles for pushing but these could be joined by a cross bar if desired.



WHEELCHAIR

- A Bicycle wheels.
- B Main 'H' frame.
- C Pushing handle.
- D Side rests.
- E Fixed foot rest.
- F Adjustable foot rest.
- G Wheel fix.
- H Cushions for seat and back rest.

WHEELCHAIR CUTTING LIST

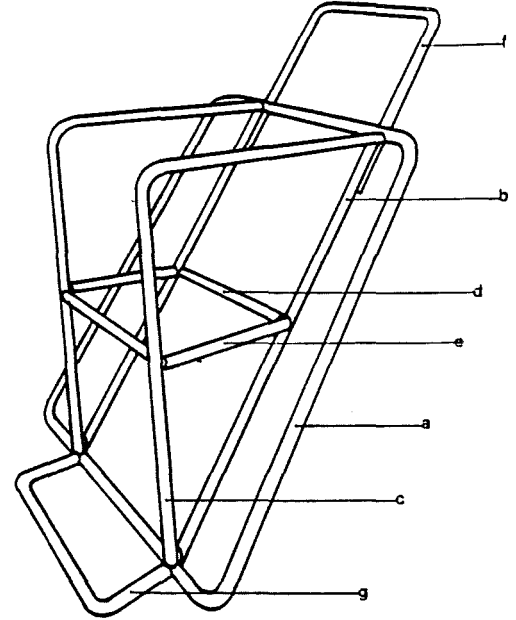


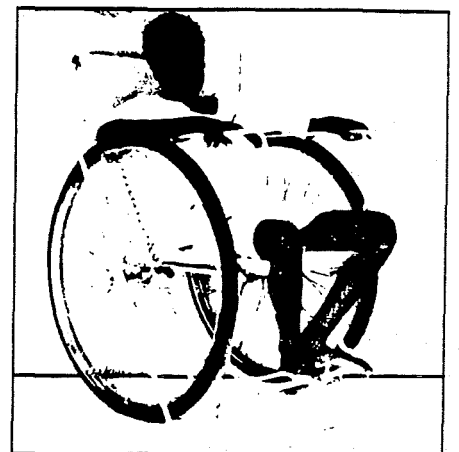
Fig 1

USE Propelled by a helper not the occupant. For transport of a handicapped person around the house or to school. Used by adults or children. With two large bicycle wheels able to cope with very rough ground and soft sand.

DESCRIPTION Based on the original design by S. W. Eaves. Made from 12mm mild steel rod and two bicycle wheels. One size will fit both child and adult with the use of an adjustable foot rest. The seat and back should be made from whatever material available: in the Sudan we used nylon string, you could use cane, metal, wood, cloth, etc. Cushions can also be added for extra comfort.

MATERIALS 12mm rod.
25mm angle iron
2 bicycle wheels and hubs.
Paint.
Appropriate seat.

Part	Length	No. off	Material
a. Main 'H' frame	275	1	12mm mild steel rod
b. Main 'H' frame	78	2	
c. Side handles	124	2	
d. Seat	38	2	
e. Seat	30	2	
f. Back push	96	1	
g. Foot rest	67	1	
h. Adj. foot rest	80	1	
i. Wheel fix	10	4	25mm Angle Iron
j. Adj. rest	4	4	20mm flat
k. Adj rest	30	1	8mm rod



HOW TO MAKE

- 1 Cut out all materials to length on list. (fig i)
- 2 From drawings bend the metal to the correct shape using a lever and vice. (figs ii & iii)
- 3 Construct the main H' frame and spot weld.
- 4 Position sides, foot rest and handle and spot weld.
- 5 Clamp the angle iron (after shape cut) on the

- frame taking care to position correctly. Loosely put in wheels to check alignment. Spot weld.
- 6 Check all angles and complete weld.
- 7 Clean and paint. One undercoat, one enamel.
- 8 Fix seat and back.
- 9 Fix wheels in place, check all bearings, washers, nuts.

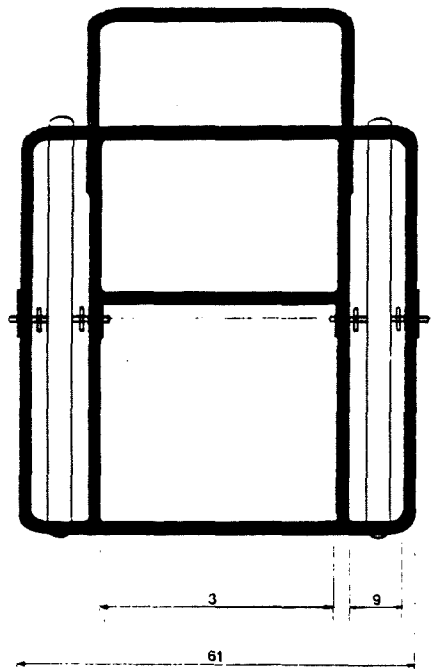


Fig ii Front view.
71cm (28 inch) diameter wheels. 8.5cm width.

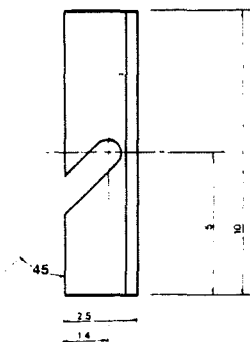


Fig iii Side view.

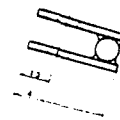


Fig iv Wheel fixing. (i.)

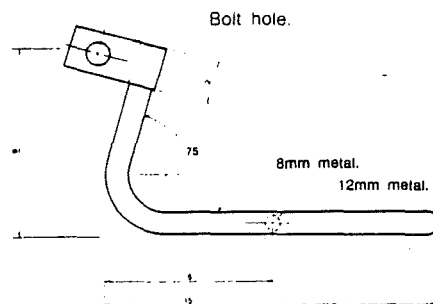


Fig v Adjustable foot rest. (h.)

ADAPTATIONS An adjustable foot rest. (fig v)
Safety belt around waist (and chest) fixed to frame.
Table fixed across the arms. Cushions for extra comfort, if sat in for long periods.

Tricycles

General

Hand-propelled tricycles are one of the most efficient types of aid and allow the user to travel comparatively long distances. They are suitable for both rural areas and urban streets. A tricycle can also provide employment for the user. For example, he/she can collect and deliver, or sell goods. However, tricycles are also one of the most expensive and complicated types of aid. (7)

Examples of Purchased Tricycles

A few tricycles are available on the market, the majority of them being electric or petrol powered, and ranging in price from £500 to £1,000. The one that might be of more interest in a developing country is a hand-propelled tricycle which sells for approximately £150.

KALNOIT ELECTRIC TRICYCLE

The Kalnoit electric tricycle is suitable for indoor and outdoor use by an ambulant person. Its narrow width enables it to pass through doorways. A shopping basket is built-in at the rear.

Side supports Hinged for ease of access

Seat Adjustable in height from 340mm. Width adjustable by moving side supports, depth adjustable by moving back supports. Different heights and widths of side and back supports available. Distance seat to handlebars adjustable. Seat swivels for ease of access

Power source 12v battery

Controls Ignition switch and speed change switch mounted left or right side of handlebars as required. Other control switches mounted centre of handlebars

Brake Service brake mounted left or right side of handlebars, parking brake

Speed Four speeds forward and reverse from 1¼–3mph (2–5km/hr)

Gradient 1:7. Will climb a kerb up to 120mm high

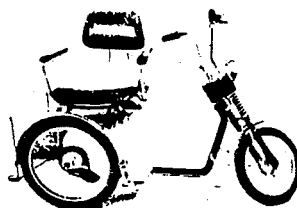
Range Approx. 5-7 hours driving

Overall length and width
1320 × 550mm

Obtainable from
M Y Dart Ltd

Approx. price £900

Export available



THISTLE TRICYCLE MODEL 16KD

The hand-propelled tricycle is easily manoeuvred and can be turned within its own length. The large seat is well-padded; the backrest may need padding for comfort. A front coaster brake, operated by reversing the pedals, enables the rider to control the speed without removing his hands from the drive pedals.

A parking brake is also fitted. The tricycle can be dismantled for transportation in a car or for storage.

Backrest height 826mm
Overall length 1219mm
width 787mm

Obtainable from
Tri-Aid Manufacturing
Co Ltd

Approx. price £151

Export available



Examples of Locally-Made Tricycles

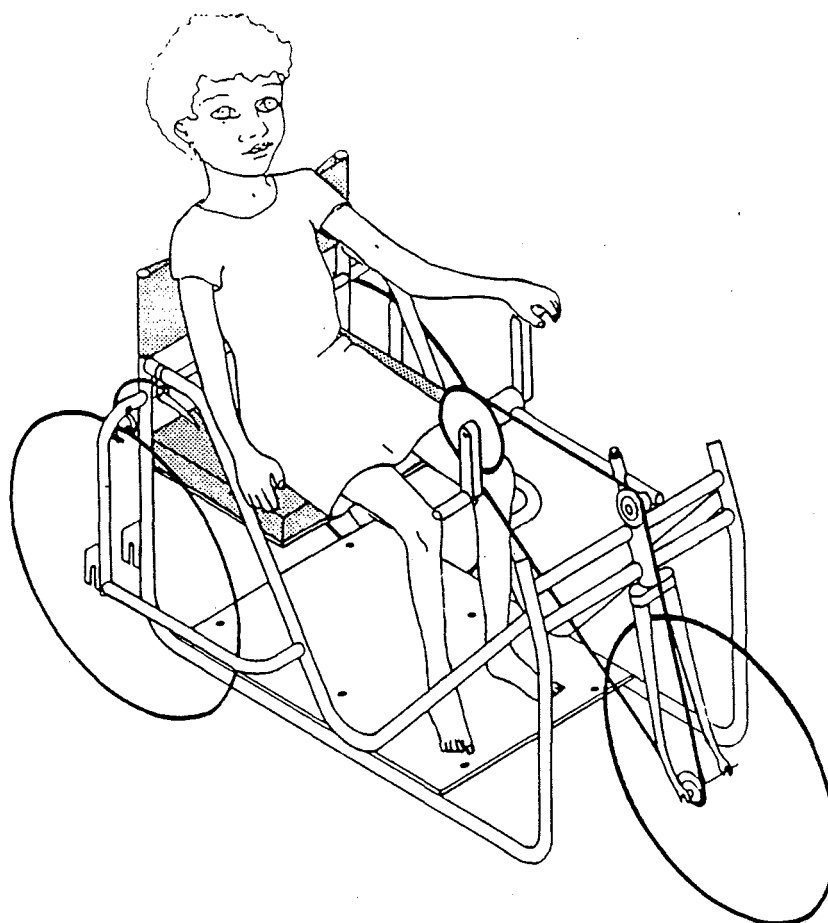
There are also many designs for producing tricycles in a workshop and two in particular are shown here. The manufacturing details can be found in the respective sources.

Design A: tricycle with cycle fork

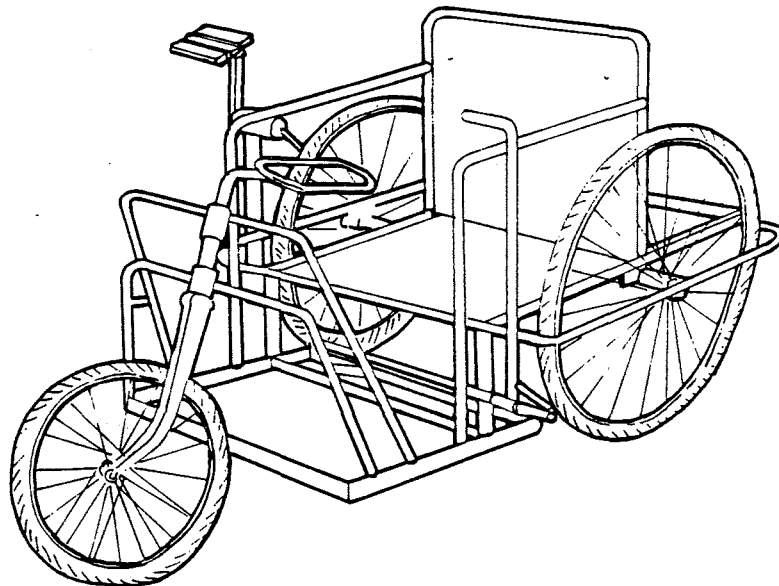
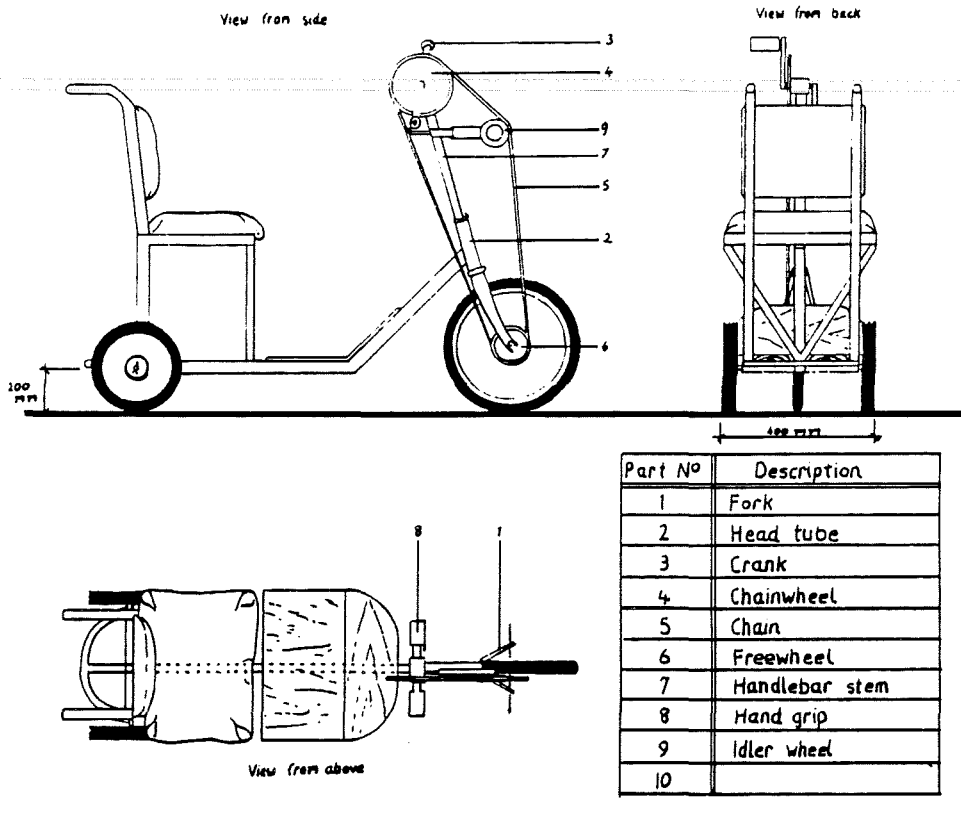
The tricycle frame is made from steel tube. You join the different parts of the frame by welding. The tricycle has a plywood or wire mesh floor. The disabled person can use this to carry a load, a pair of crutches or a walking stick.

The design uses standard bicycle wheels, fork and drive components – chain, pedals, etc. Bicycle forks get narrower towards the top. This makes it difficult to use a direct drive from the chainwheel to the sprocket. To overcome this problem, an additional freewheel is used as an 'idler wheel' to take the chain over the top of the fork.

The tricycle has a canvas seat back, and seat base made from plywood or steel strips. You should position the tubes which support the seat base to suit the measurements of the user.



Examples of Locally-Made Tricycles



(22)

This carriage employs a number of bicycle parts and its large wheels make it suitable for a variety of road surfaces. It is self-propelled by a chain drive from a hand pedal to the right rear wheel (although this could, of course, be constructed for a left hand drive).

The carriage provides excellent mobility potential for the permanently disabled and could be fitted with a tray and storage panniers to enable its owner to earn a living in a variety of street-selling activities.

Ramps

General

Some active, self-propelling wheelchair users, some electric wheelchairs and many helpers pushing wheelchairs will be able to negotiate one step or kerb. However, in some situations a portable ramp may be useful. A ramp may of particular importance to a wheelchair user whose work or leisure involves travelling to places where accessibility is not known. It also provides a means of leading a wheelchair and occupant into a van. the ramp must be of sufficient length that the gradient is not too steep. Folding ramps of different lengths are available; their weight increases proportionately. (47)

Examples of Purchased Ramps

BANSTEAD RAMP

The sturdy aluminium ramp, suitable for use with standard or electric wheelchairs, comprises two hinged gutters connected at each end by adjustable crossbars which allow three widths between the gutters. The ramp is very secure once the cross bars are fixed; fixing may require practice.

Size of gutter 1520 × 178 × 38mm

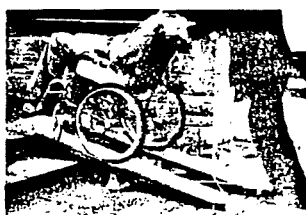
Weight of ramp 10kg

Load capacity: Will take an electric wheelchair and an occupant weighing up to 127kg

Obtainable from
Homecraft Supplies
(Fleet St) Ltd

Approx. price £100

Export available



TYPROD SAFETY RAMPS

A number of solid ridged sections can be used to mount a kerb or small step. The weight of each section helps to keep it in place. The sections can be interlocked to form a ramp of any required width.

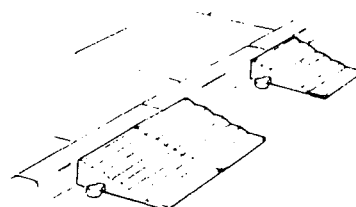
Height, length, width

89 × 305 × 305mm

Weight of each section 5kg

Obtainable from Typrod Ltd

Approx. price
Each section £5



Export available

SIMCROSS RAMP

The sturdy, aluminium, folding gutters provide a secure ramp for standard or electric wheelchairs. As there is no connecting bar between the two gutters to assist alignment, care must be taken to obtain the required width between the gutters. Plates fitted to the top end of the gutters to secure them in position and anti-slip track surface are available as extras. The weight of the gutters may off-set their portability. Non-folding ramps up to a maximum length of 3048mm are also available. Ramps may also be hired.

Walking Aids

General

The great majority of all forms of equipment for disabled people are some type of walking aid. Walking aids are usually needed because of weakness of muscles in the trunk or legs, to ease pain in the bones or joints of the spine and lower limbs and to overcome imbalance which is caused by disorders of the central or peripheral nervous system or of the internal ear. The range of walking aids is very large and ranges from walking sticks to frames for those paralysed and insensitive below the waist. (46)

Walking aids which are usually recommended by a therapist are used to solve mobility problems. If there are difficulties using the aid, there are a variety of solutions which can be used to improve the aids effectiveness. For example, if a person has difficulty in using the walking aid, check that the aid is the correct height and that the user is taught how to maintain a normal walking pattern. If the user has difficulty taking weight on the crutch handgrips, forearm trough or gutter crutches should be used. If there is difficulty manoeuvring a walking frame in a house or enclosed area, often a folding triangular frame may be more appropriate instead of the more stable four-legged one. If there is restricted space in a bathroom, wall-fixed rails may provide an adequate alternative to taking the frame into the WC. Also if the person uses a vehicle frequently, it is more appropriate to use a folding frame which is easier to put into a car or vehicle. (46)

The following is a partial list of walking aids that can be purchased or made locally. Points to consider are included with each type.

Walking Frames

General

A walking frame can provide stable , additional support for a frail, elderly or disabled person and give confidence. It should be prescribed and the person shown how to use it by a physiotherapist since poor techniques may result in falls. Walking frames disrupts a normal gait and should be chosen only after other walking aids have been considered. It is usually not recommended for a young person, apart from therapeutic use. The frame must be the correct height. The frame legs should be fitted with foot rubbers which should be checked regularly and replaced when they are worn smooth since they can become both ineffective and therefore dangerous. Access and manoeuvring space must be considered when choosing a frame for use at home. Rails may provide an adequate alternative to the use of a frame in a bathroom or WC. (46)

Examples of Purchased Walking Frames

The photographs give an idea of the range of walking frames available which can be either fixed height or adjustable. The frames range in size and weight and in Britain the cost ranges from £10 to £20 for basic walking frames and up to £40 for more sophisticated folding and adjustable frames.

Mobile frames are also available for those who would have difficulty lifting a frame and come with or without hand brakes. These frames cost from £50 to £125.

Examples of Locally-Made Walking Frames

There are many types and varieties of simple walking frames that can be made in a workshop with basic tools. A sample of possible designs follows; detailed manufacturing instructions can be found in the original source.

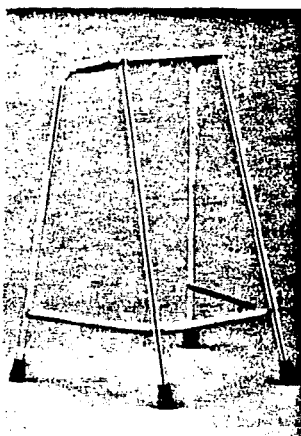
DAY'S 202

Height handgrip to ground
685; 760; 840; 915mm
Width between handgrips
380mm
Width of base 660mm
Depth of base 550mm
Weight 2kg

Obtainable from
Day's Medical Aids Ltd

Price guide £14

Export available



DAY'S 212

Height handgrip to ground
840mm
Width between handgrips,
370mm
Width of base 650mm
Depth of base 500mm
Weight 2kg

Obtainable from
Day's Medical Aids Ltd

Price guide £15

Export available



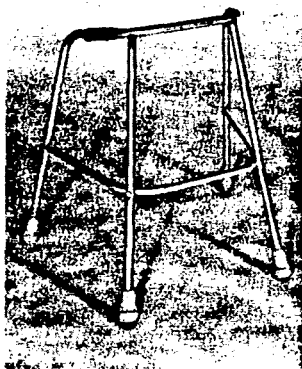
DAY'S 222

Height handgrip to ground
560mm
Width between handgrips
300mm
Width of base 550mm
Depth of base 440mm
Weight 1.1kg

Obtainable from
Day's Medical Aids Ltd

Price guide £14

Export available



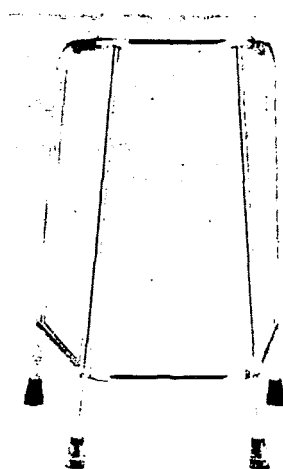
ELLIS, SON + PARAMORE OM 11/S1, S2, S3 AND S4

Available on NHS contract
Complies with BS 4986

Measurements in mm

	OM11/S1	OM11/S2	OM11/S3	OM11/S4
Height handgrip to ground	685	760	840	915
Width between handgrips	350	360	370	380
Width of base	610	610	610	610
Depth of base	530	530	530	530
Weight	1.5kg	1.5kg	1.7kg	1.7kg

Obtainable from Ellis, Son
+ Paramore Ltd



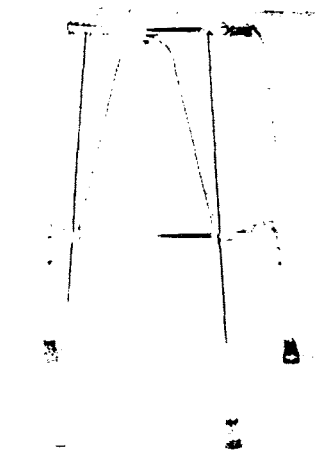
ELLIS, SON + PARAMORE OM 25

Height handgrip to ground
840mm
Width between handgrips
370mm
Width of base 610mm
Depth of base 460mm
Weight 2kg

Obtainable from Ellis, Son
+ Paramore Ltd

Price guide £18

Export available



Examples of Purchased Walking Frames

CARTERS' C429B

Can be folded. A person with disabled hands may have difficulty operating the cable brakes which act on the rear wheels.

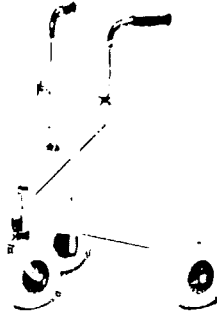
Overall height adjustable

- from 740-880mm
- Width of base 750mm
- Depth of base 580mm
- Folded depth 290mm
- Weight 5.5kg

Obtainable from
Carters (J & A) Ltd

Price guide £102

Export available



CARTERS' C486

Can be folded. A person with disabled hands may have difficulty operating the cable brakes which act on the rear wheels.

Overall height adjustable

- from 770-960mm
- Width of base 730mm
- Depth of base 800mm
- Weight 10.5kg

Obtainable from
Carters (J & A) Ltd

Price guide £101

Export available



CARTER'S C484

Can be folded.

Overall height adjustable from

- 620mm
- 740mm
- Weight 7kg

C484

- 750-990mm
- 620mm
- 740mm
- 7kg

C483

- 745-960mm
- 580mm
- 740mm
- 6.5kg



Obtainable from Carters (J & A) Ltd

Price guide C484 £57
C483 £55

Export available

CARTERS' C485

Can be folded. A person with disabled hands may have difficulty operating the cable brakes which act on the rear wheels.

Overall height adjustable

- from 750-940mm
- Width of base 610mm
- Depth of base 690mm
- Weight 9.5kg

Obtainable from
Carters (J & A) Ltd

Price guide £107

Export available



CARTERS' C492

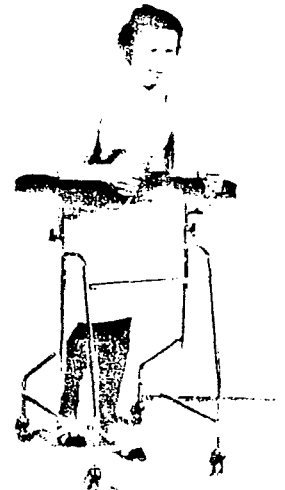
Overall height adjustable

- from 980-1400mm
- Width of base 650mm
- Depth of base 700mm
- Weight 9kg

Obtainable from
Carters (J & A) Ltd

Price guide £125

Export available



CARTERS' C492AC

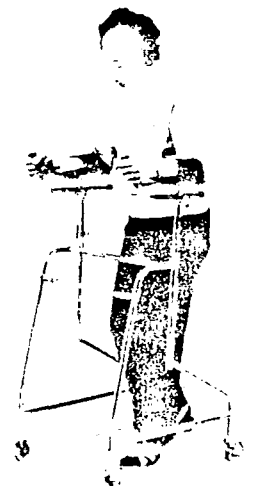
Overall height adjustable

- from 950-1280mm
- Width of base 620mm
- Depth of base 700mm
- Length of trough 160mm
- Weight 8.5kg

Obtainable from
Carters (J & A) Ltd

Price guide £125

Export available



Walking Frame

USE Gives firm support for disabled, in an upright and walking position.

DESCRIPTION Made in 8mm metal rod and welded at all joints. A set of three sizes for children. Leather or plastic hand grips.

MATERIALS 8mm rod.
Paint.
Plastic or leather handle.

MEASURE Measure from floor to gripped hands and elbows flexed. (Fig 1, A)

HOW TO MAKE

- 1 Consult table of measurements and cut metal to correct size.
- 2 Bend the main piece to the appropriate angles with a rod bender.
- 3 Spot weld the front legs on.
- 4 Clamp on cross piece and spot weld. Check and finish weld.
- 5 Paint and fix handles.

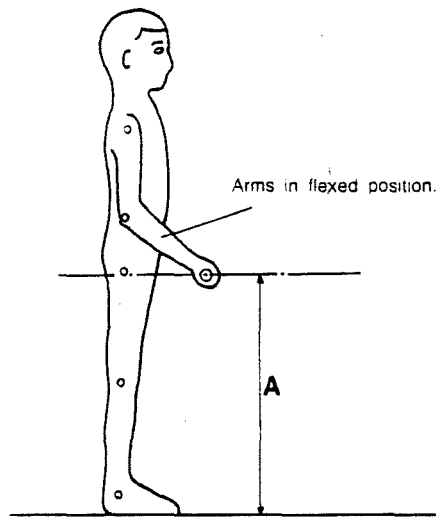


Fig 1

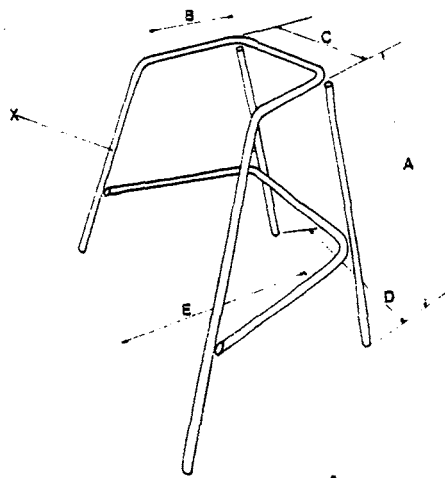
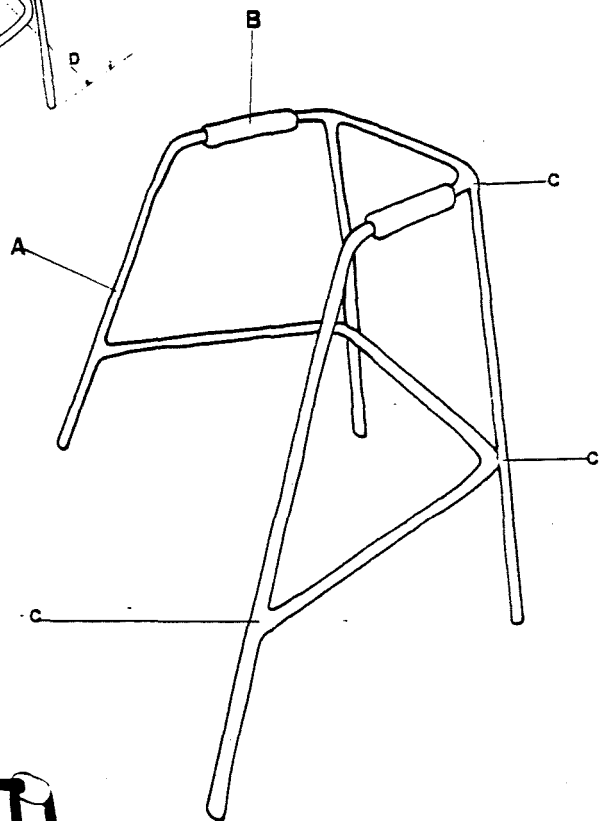
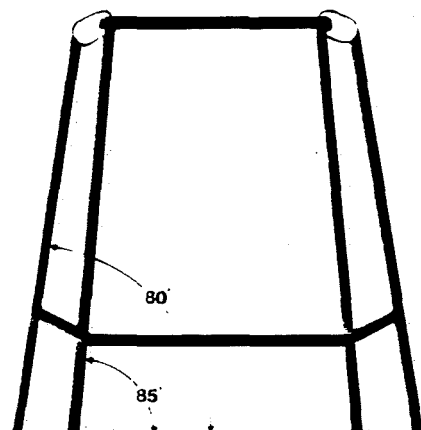
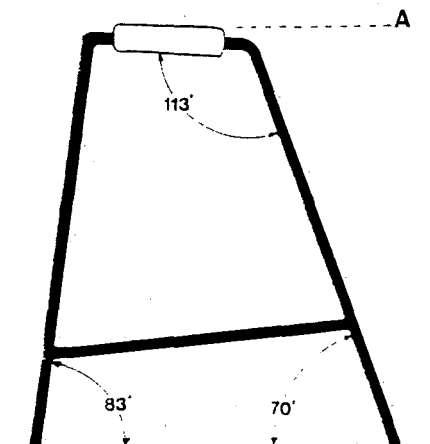


Fig 2



SIMPLE WALKING FRAME

- A Metal frame
- B Hand Grips
- C Welded joints



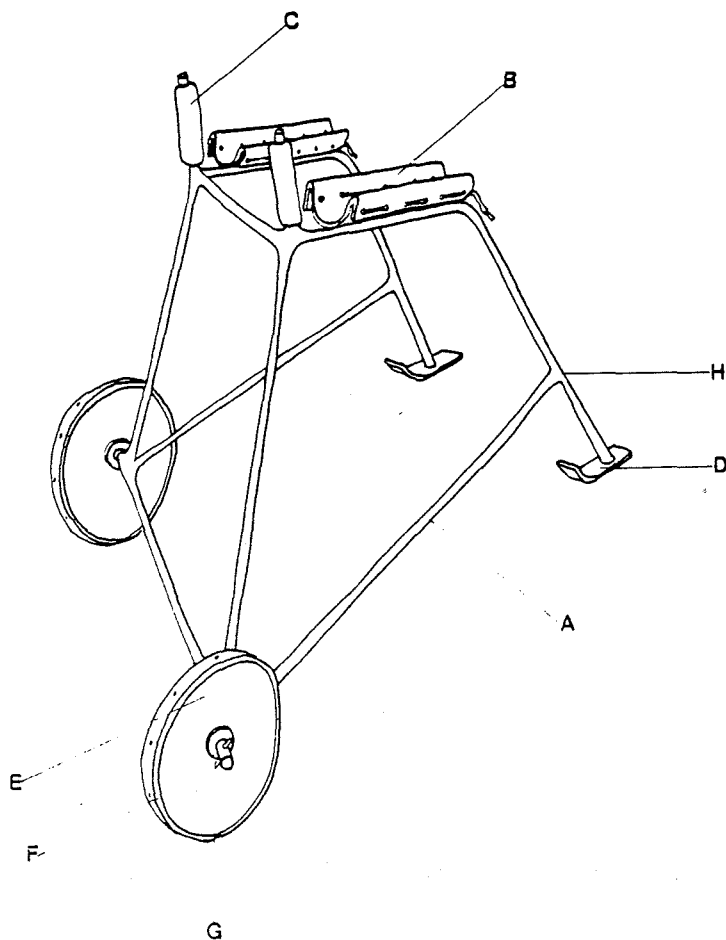
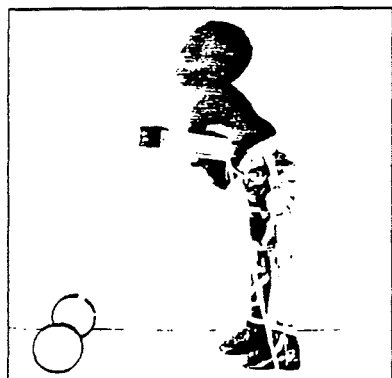
Wheeled Walking Frame

USE For those unable to fit a normal frame. With a gutter support and wheels it takes the weight through the elbows and can be pushed rather than lifted for walking. Particularly suitable for those with O.P. and lacking in muscle around waist.

DESCRIPTION The main frame is made from 3mm mild steel rod. With wooden wheels and metal sledges to cope with sand and rough ground. A metal frame placed over with leather for the gutter support.

- MATERIALS**
- 3mm rod.
 - 2mm flat.
 - 30mm wood blank
 - Rubber.
 - Leather, 3mm cow skin upper
 - Eyelets.
 - Laces.
 - Paint.

HOW TO MEASURE Measure from the ground to the flexed elbow, as shown. Support in parallel bars.



(20)

WHEELED WALKING FRAME

- A Metal frame.
- B Gutter support
- C Hand grips
- D Sledges.
- E Wooden wheels.
- F Rubber
- G Nail and washer
- H Welded joints.

HOW TO MAKE

- 1 Take measurements from the cutting table, and cut metal to length. (fig i)
- 2 Similar to the simple walking frame. Bend the main frame to the correct angles and spot weld together. (figs iii & iv)
- 3 Check all angles and finish weld.
- 4 Construct gutter support and weld on. (fig v)
- 5 Drill holes for wheel fix.
- 6 Clean and paint a nice colour.
- 7 Cut wheel out of wood and fix rubber with glue and nails. These nails will also strengthen the wood. (fig vi)
- 8 Cut out the pattern for the leather cover and fix to the gutter frame with laces.

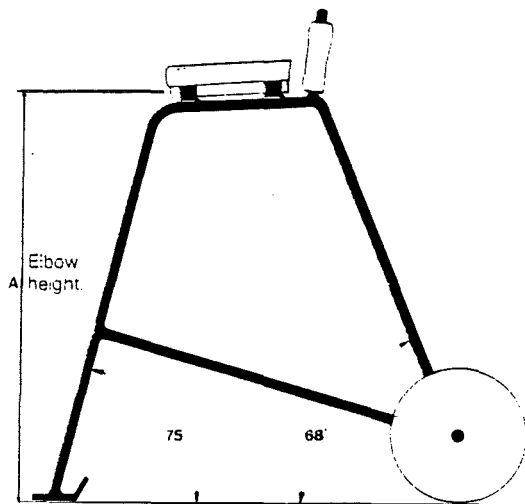


Fig. ii

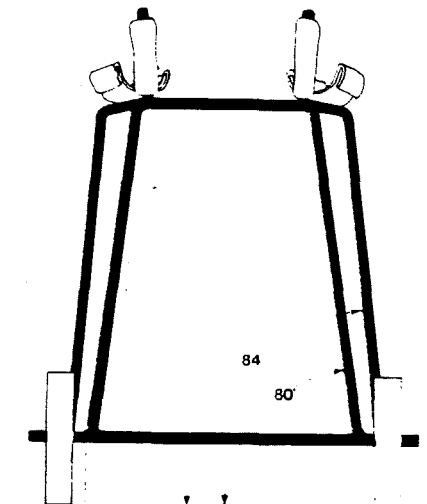


Fig. v

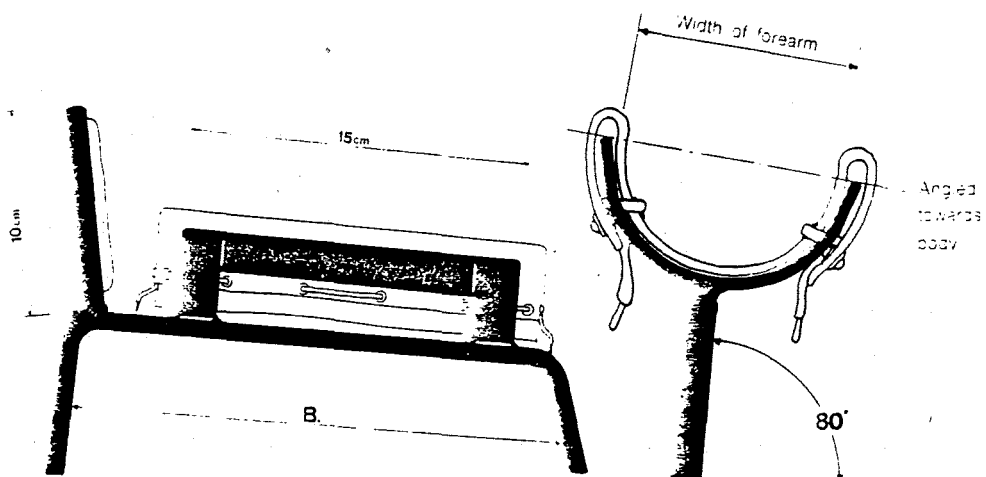


Fig. v Gutter support.

Crutches

General

Full length crutches are used when non-weight bearing is required. The top is gripped between the upper arm and chest wall and the body weight is borne by the hands. Accurate measurement is necessary to ensure effective use. Studies have shown that full length crutches have a higher energy cost than elbow or forearm crutches. (46)

Forearm trough or gutter crutches are often suitable for a person who is unable to take weight on the normal hand grips because of painful or deformed hands. It is essential for the user to use crutches that are the correct height. Some troughs may need additional padding. On most of these crutches all the parts are fully adjustable. Foot rubbers must be fitted to minimize the risk of slipping. (46)

Elbow crutches are used usually when partial weight-bearing is required and are easier to manage than the full length ones. Different types of armband are available and foot rubbers are necessary to minimize the risk of the crutches slipping. (46)

Examples of Purchased Crutches

Crutches are available in wood or metal and either adjustable or non-adjustable. Some are used under the arm and others have a trough or gutter that supports the elbow. Prices range from £10 to £40.

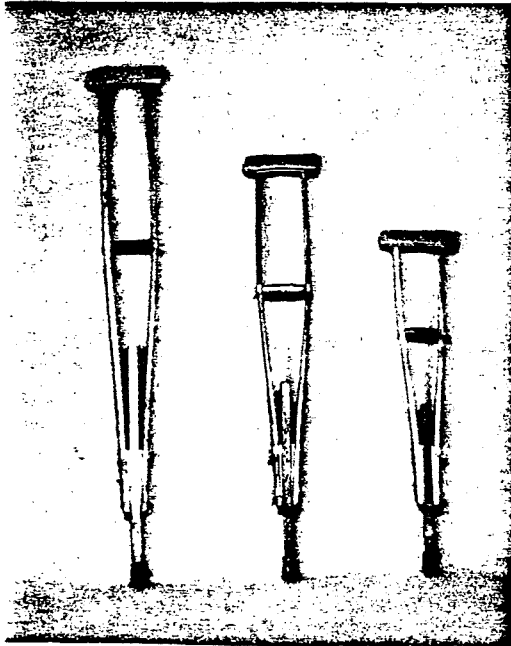
Examples of Locally-Made Crutches

Crutches can also be easily made in wood or metal and either adjustable or non-adjustable. Examples of possible designs are shown in the illustrations.

Examples of Purchased Crutches

DAY'S 165A, 165B AND 165C

	165A	165B	165C
Overall height adjustable from	1225-1525mm	950-1225mm	775-950mm
Handgrip to axillary pad adjustable from	410-570mm	330-450mm	230-350mm
Weight per pr	2.3kg	2kg	1.6kg



Obtainable from Day's Medical Aids Ltd

Price guide £10

Export available

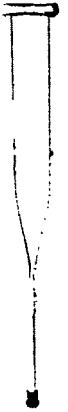
Heavy duty/permanent user

COOPER'S 330

Available on NHS contract
Complies with BS 4997

Permanent user/heavy duty axillary crutches
Overall height 1375mm (or as required)
Handgrip to axillary pad adjustable in four 40mm steps, top position 380mm from axillary top
Weight per pr 2.4kg

Obtainable from Cooper & Sons Ltd



Metal axillary crutches

CARTERS' C408

Overall height adjustable from 1210-1380mm
Handgrip to axillary pad adjustable from 340-440mm
Weight per pr 1.7kg

Obtainable from Carters (J & A) Ltd

Price guide £31

Export available



DOHERTY'S ED645

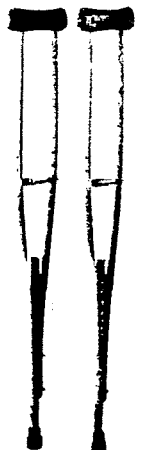
Also available on NHS contract

	Size 1	Size 2
Overall height	960-1220mm	1220-1520mm
Handgrip to axillary pad adjustable from	305-420mm	380-545mm
Weight per pr	2.1kg	2.3kg

Obtainable from Edward Doherty & Sons Ltd

Price guide £14

Export available

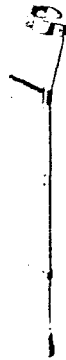


Examples of Purchased Crutches

COOPER'S 450L AND 450M, 460L AND 460M

Also available on NHS contract
Complies with BS 4988

	C450L	C450M
Handgrip to ground adjustable from	635-915mm	460-685mm
Handgrip to armband	230mm	165mm
450L and 450M swivel, split-ring armband		
460L and 460M fixed, open armband		
Weight per pr	1.3kg	1.3kg



Obtainable on contract from Cooper & Sons Ltd

Obtainable (non-contract) from Nottingham Medical Aids Ltd

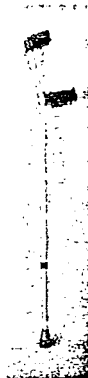
Price guide £12

Export available from Cooper & Sons Ltd

DAY'S 120

Handgrip to ground adjustable from 740-990mm
Handgrip to armband 200mm
Fixed, split-ring armband
Weight per pr 1.2kg

450



Obtainable from Day's Medical Aids Ltd

Price guide £14

Export available

DAY'S 121 AND 121J

Also available on NHS contract

	121	121J
Handgrip to ground adjustable from	635-890mm	510-760mm
Handgrip to armband	200mm	130mm
Fixed or swivel, split-ring armband		
Weight per pr	1.3kg	1.3kg



Obtainable from Day's Medical Aids Ltd

Price guide £14

Export available

121

121J

DAY'S 121JA

Handgrip to ground adjustable from 380-510mm
Handgrip to armband 100mm
Fixed or swivel, split-ring armband
Weight per pr 0.9kg



Obtainable from Day's Medical Aids Ltd

Price guide £14

Export available

DOHERTY'S ED641

Small and medium sizes also available on NHS contract

Handgrip to ground adjustable from 510-760mm; 635-890mm; 760-1020mm
Handgrip to armband 195mm; 250mm
Swivel, split-ring armband
Weight per pr 1.2kg



Obtainable from Edward Doherty & Sons Ltd

Price guide £12

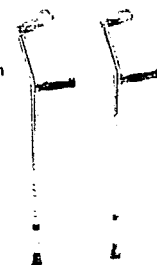
Export available

ELLIS, SON + PARAMORE ELBOW CRUTCH

OM 35J AND OM 35J/C

OM 35J available on NHS contract

	OM 35J	OM 35J/C
Handgrip to ground adjustable from	635-890mm	670-920mm
Extra height crutches are available		
Handgrip to armband	170mm	220mm
OM 35J Swivel, split-ring armband		
OM 35J/C Fixed, split-ring armband		
Weight per pr	0.7kg	0.7kg



OM 35J

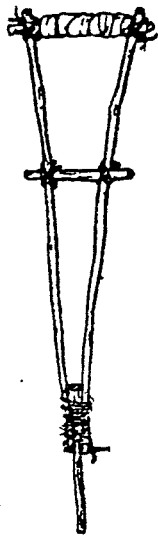
OM 35J/C

Obtainable from Ellis, Son + Paramore Ltd

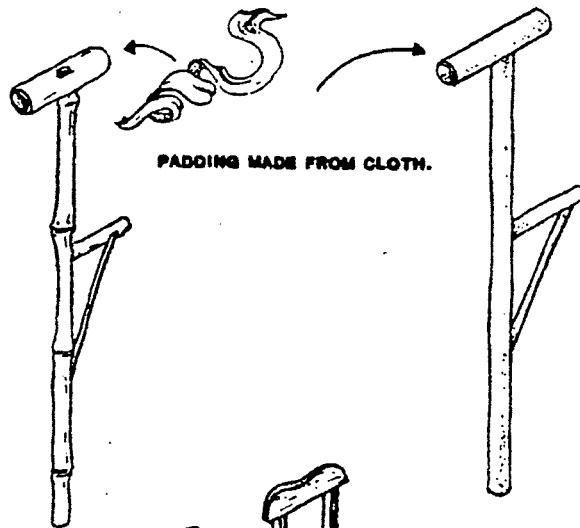
Price guide £6

Export available

CRUTCH

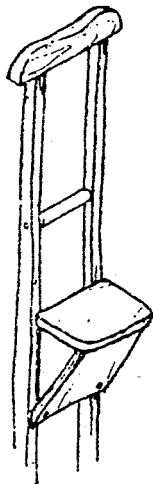


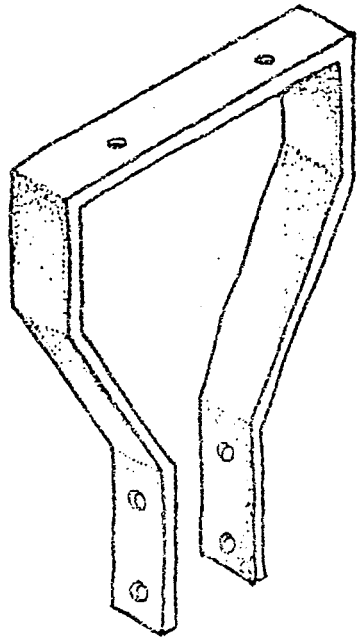
TUBE METAL CRUTCH



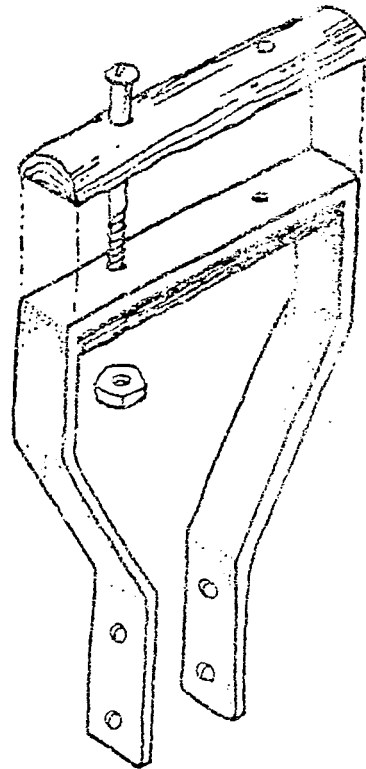
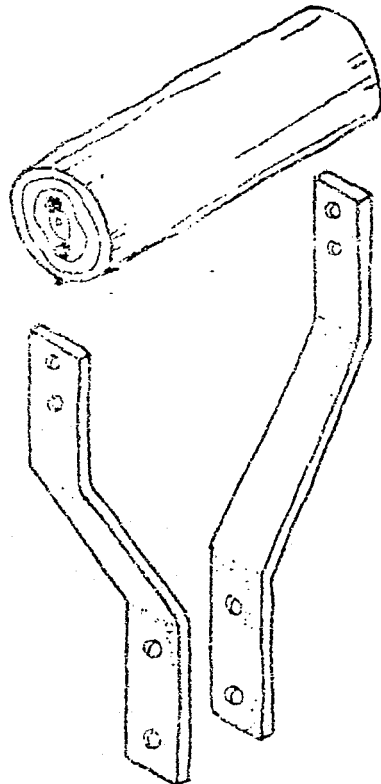
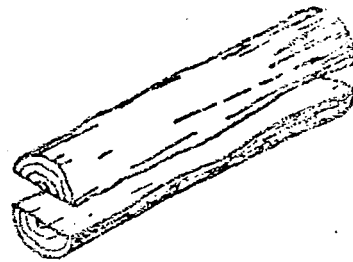
PADDING

SEAT CRUTCH

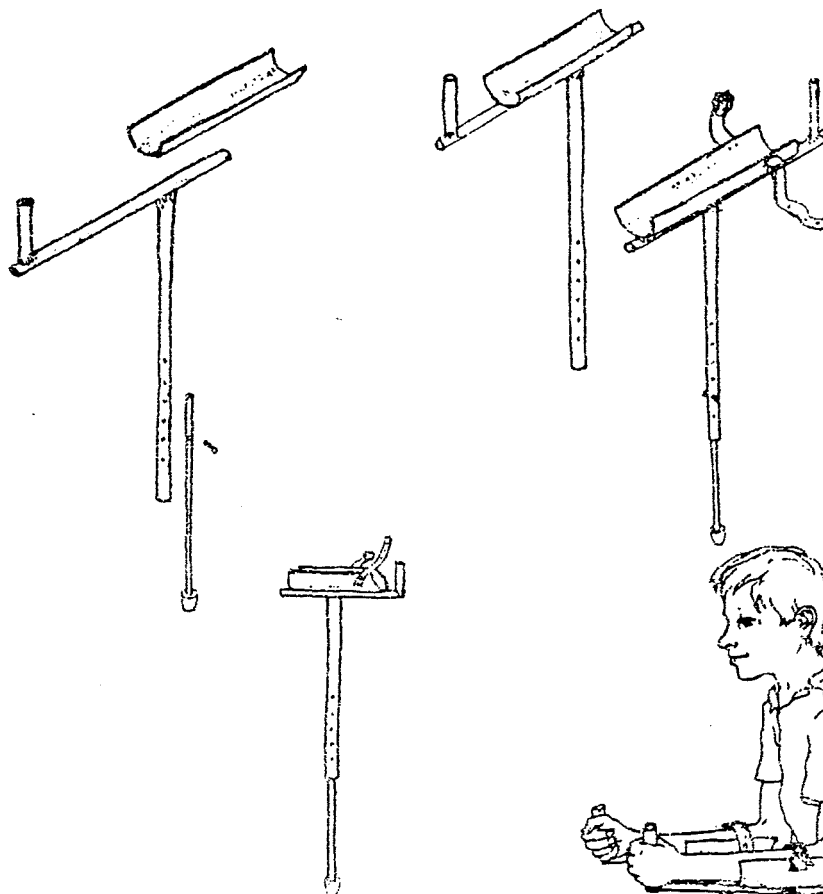




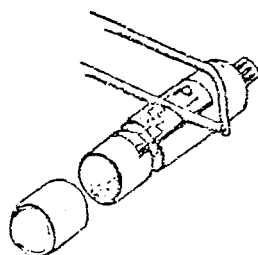
HANDLE



ELBOW CRUTCH

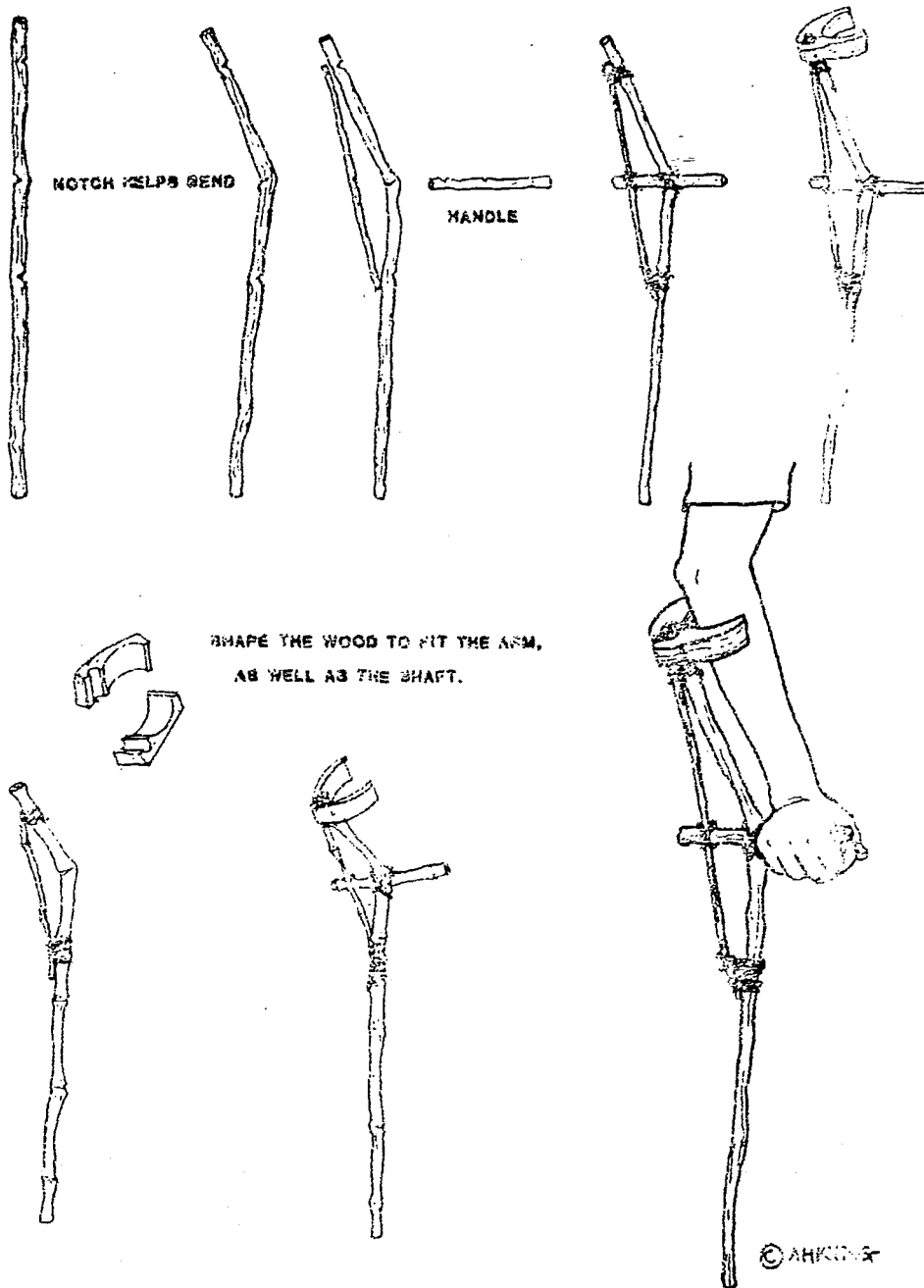


THE ARM HOLDER FOR A CRUTCH CAN BE CUT FROM
A HEAVY DUTY PLASTIC BOTTLE, OR MADE FROM METAL SHEET.



TREE OR BAMBOO CRUTCH

CUT NOTCHES TO STOP STRING SLIPPING.



Walking Sticks

General

There are two main types of walking sticks: the straight wooden or metal stick with a curved or straight top and a more elaborate but stable stick with three or four legs.

A wooden or metal straight stick requires that the person have a good grip, pain-free joints in the arm and adequate strength in both forearm and upper arm. A stick can be used as an aid in partial weight-bearing and to help balance. Like all walking aids, correct and accurate measurement of the person is essential. (46)

The tetrapod or tripod sticks give much greater stability than a single stem stick and may be more suitable where a person's balance and/or confidence is poor. On some models, forearm trough crutch tops may be interchangeable with stick handles. The wider base is more stable than a single stem but it also requires more space and is therefore unsuitable for use in small rooms or where there is a lot of furniture. The wide base may also not fit on the stair tread. (46)

Examples of Purchased Walking Sticks

Wooden or metal straight sticks range from £3 to £15 and tetrapod or tripod sticks cost from £10 to £30.

Examples of Locally-Made Walking Sticks

As can be seen from the examples, a wide range of walking sticks can be made quite easily from wood or metal.

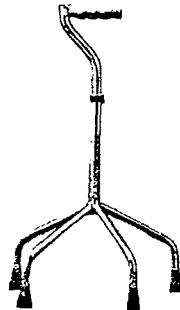
TETRAPODS

DAY'S 474L AND 474M

Available on NHS contract

	474L	474M
Overall height adjustable from	710-965mm	535-710mm
Width of base	380mm	380mm
Depth of base	210mm	210mm
Weight per stick	1.3kg	1.2kg

Obtainable from Day's Medical Aids Ltd



ELLIS, SON + PARAMORE OM 10A/CP

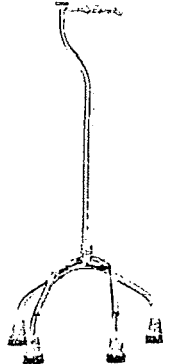
Complies with BS 4922

Overall height adjustable from 740-999mm
 Width of base 310mm
 Depth of base 220mm
 Weight per stick 1.1kg

Obtainable from Ellis, Son + Paramore Ltd

Price guide £12

Export available



COOPER'S 960

Complies with BS 4922

Overall height adjustable from 715-965mm
 Width of base 195mm
 Depth of base 165mm
 Weight per stick 1.2kg

Obtainable from Nottingham Medical Aids Ltd

Price guide £10

Export available from Cooper & Sons Ltd

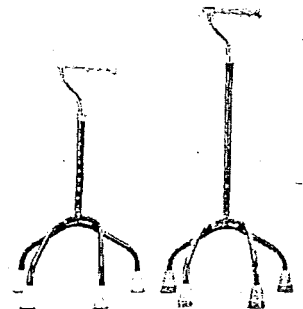


ELLIS, SON + PARAMORE OM 10A AND OM 26A

Available on NHS contract
 Complies with BS 4922

	OM 10A	OM 26A
Overall height adjustable from	710-980mm	580-760mm
Width of base	310mm	310mm
Depth of base	220mm	230mm
Weight per stick	1.1kg	0.9kg

Obtainable from Ellis, Son + Paramore Ltd



COOPER'S 950

Also available on NHS contract
 Complies with BS 4922

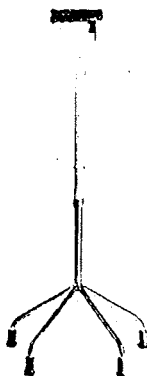
Overall height adjustable from 715-965mm
 Width of base 400mm
 Depth of base 230mm
 Weight per stick 1.4kg

Obtainable from on contract from Cooper & Sons Ltd

Obtainable (non-contract) from Nottingham Medical Aids Ltd

Price guide £10

Export available from Cooper & Sons Ltd



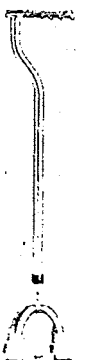
ELLIS, SON + PARAMORE OM 37A

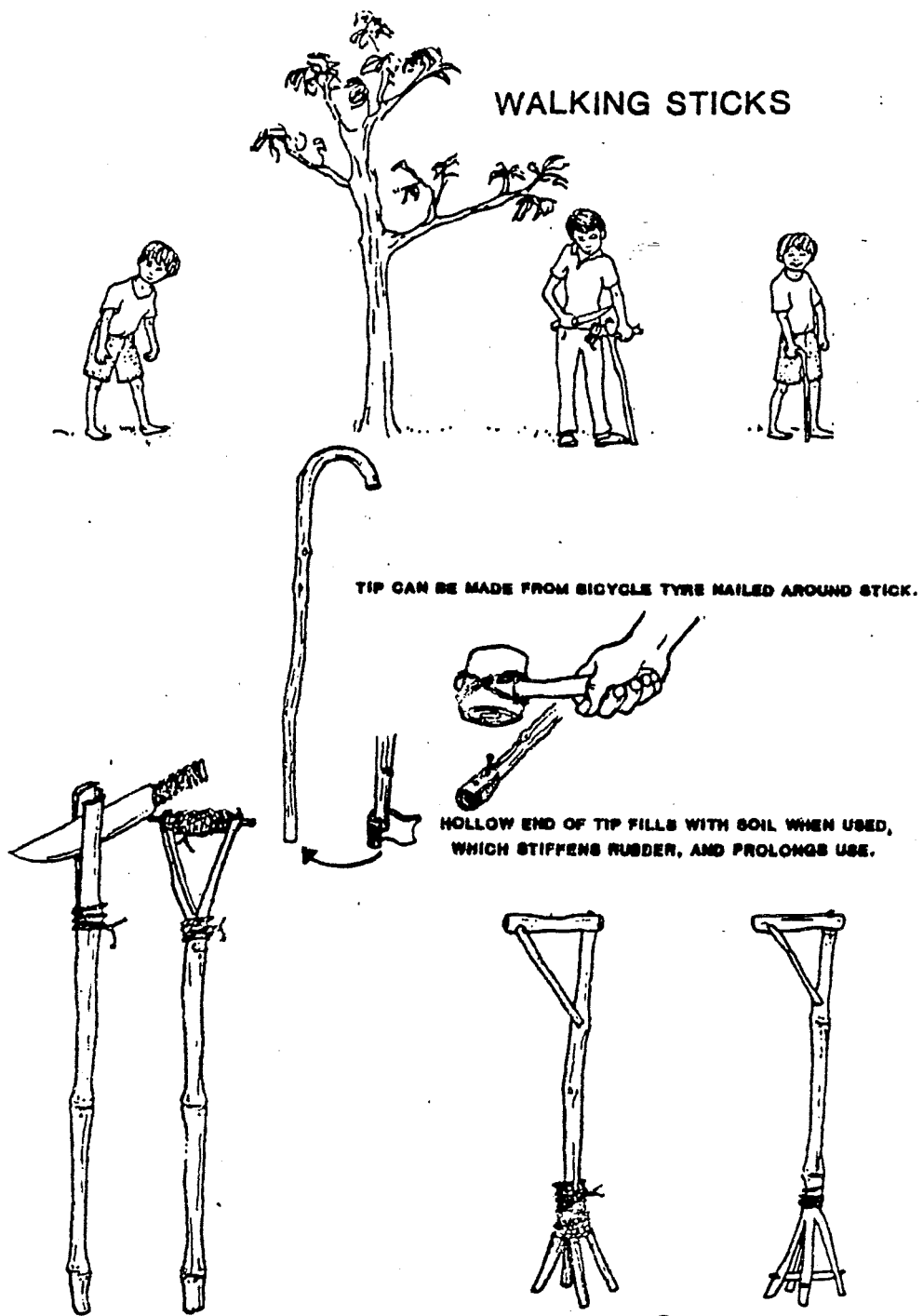
Overall height adjustable from 740-1020mm
 Weight per stick 0.8kg

Obtainable from Ellis, Son + Paramore Ltd

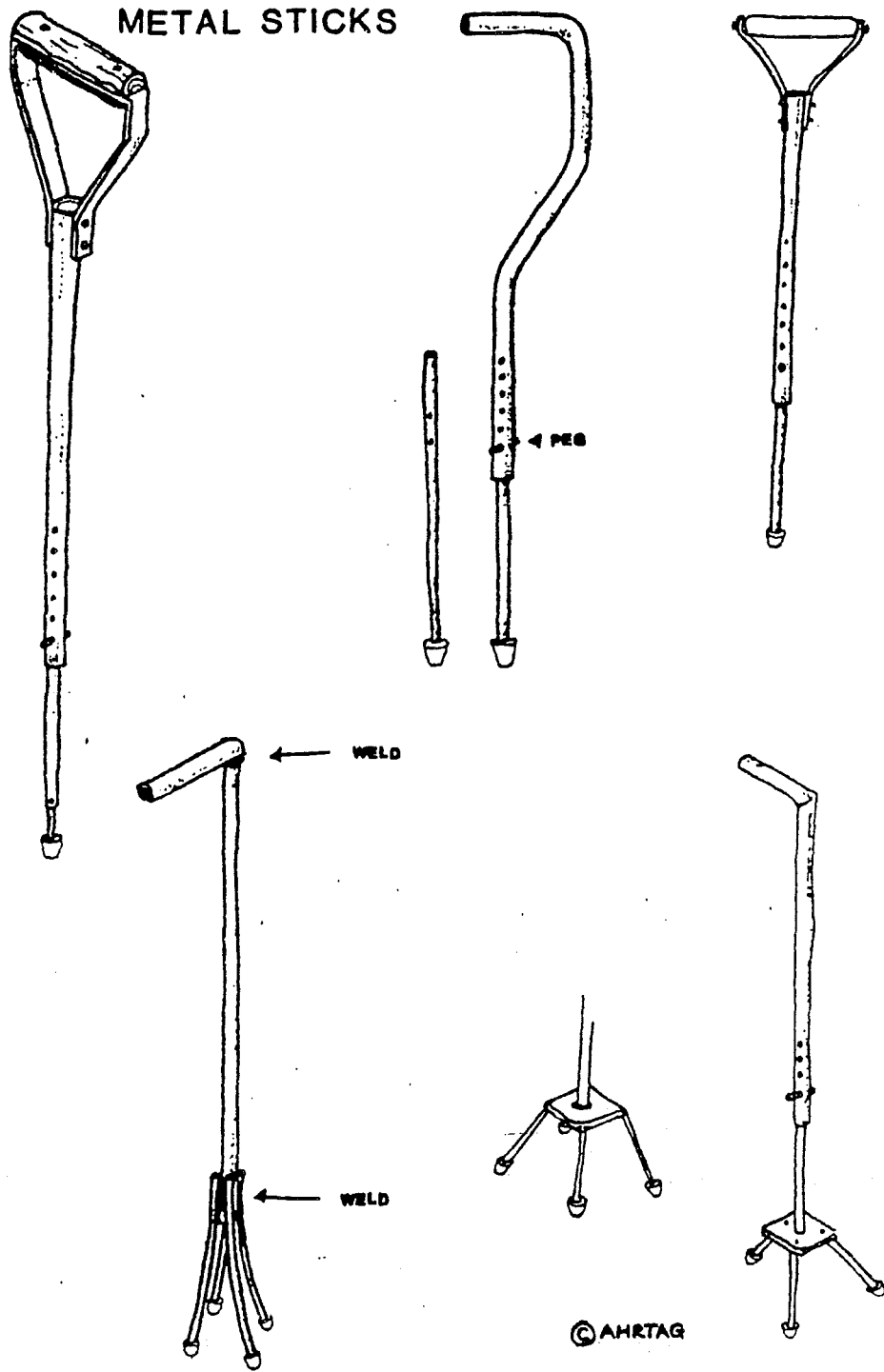
Price guide £11

Export available





© AHRTAG



Other Technical Aids

General

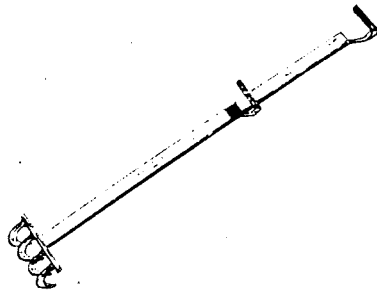
There are a large number of products that are available to the disabled, both those that are purchased and those that can be made locally. The following is a partial list of items and are catagorized in the following activities:

- agriculture - gardening
- carpentry
- sewing
- writing
- opening doors
- cleaning
- food preparation
- eating and drinking
- reaching

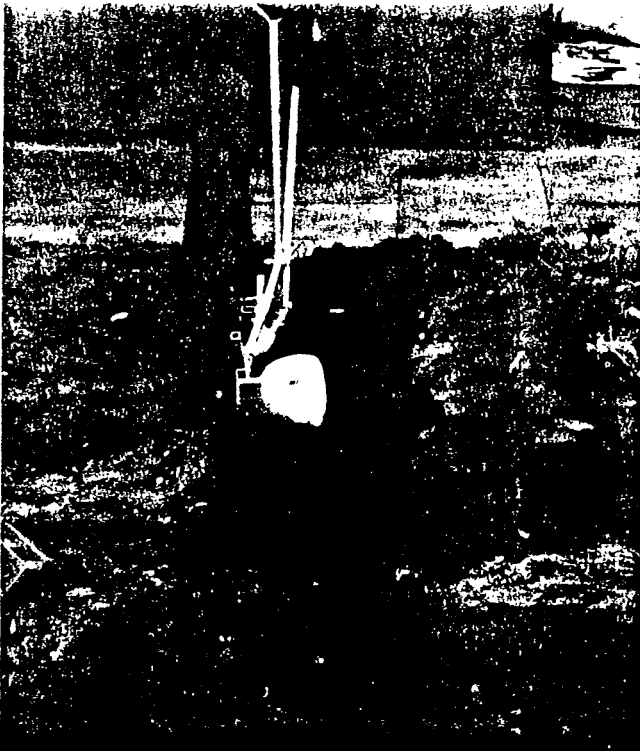
Obtainable from
Dixon Farming and
Garden Aids

Approx. price
Four-tine cultivator £19
Seven-tine cultivator £26

Export not available



DIXON GARDEN LEVER PLOUGH



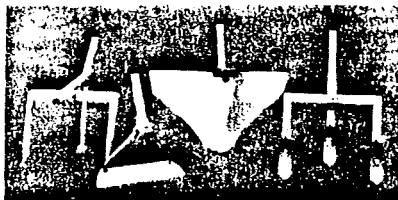
This unique device makes it possible to plough to a reasonable depth with minimum effort. The plough is propelled through the ground by a lever action which can be adjusted to suit the gardener's strength. A range of attachments is available to convert the plough to do ridging and other specialised cultivations. A plough is an excellent substitute for conventional digging and is much cheaper than any mechanical plough capable of carrying out the same job.

Recommendations Can be operated from a sitting position; can be used one-handed; can be used without bending the back

Obtainable from Dixon Farming and Garden Aids

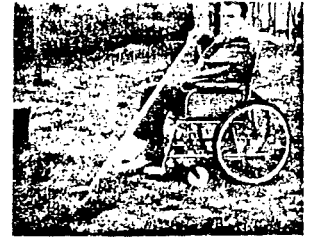
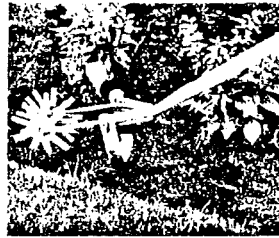
Approx. price
Plough £75
Ridger £17
Cultivator £13
Hoe £15

Export not available



Heavy duty cultivator, hoe, ridger, general purpose cultivator

WOLF SOIL MILLER



Soil Miller DA

The reversible hoe blade with four starred wheels behind it is mounted on a stout 1.5m (5ft) handle and is worked by a push/pull action. With the blade biting into the top surface of the soil the tool can be used to hoe and weed. As an alternative to conventional digging the blade can be pushed in deeper to act as a tiller, breaking down the surface soil. Wheelchair gardeners and others who may prefer to work from the path because of discomfort or unsteadiness when walking on uneven surfaces can cultivate up to 2m (8ft) from the path. The Soil Miller is heavy but can be wheeled into position.

The tool is available in three versions. The Soil Miller DA with its four star-shaped wheels allows the depth of cultivation to be easily selected (the lower the angle of the handle to the ground the deeper the tool works). The Pendulum Weeder GY does not have the four starred wheels, which makes it a lighter tool to carry around the garden. It is ideal for breaking down dug soil to seed tilth. The Multi-Hoe DA-M works in the same way as the Soil Miller DA: with the wheels detached it is used like the Pendulum Weeder GY. By using these tools light soils can be cultivated without digging and by fitting an additional handle XO heavier soils can be cultivated.

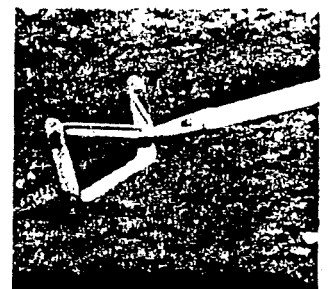
Recommendations Can be used one-handed but requires a strong grip; can be operated from a sitting position; can be used without bending the back

Manufactured by
Wolf Tools Ltd

Obtainable from
Wolf-Tools stockists

Approx. price
Soil Miller DA £14
Pendulum Weeder GY £8
Multi-hoe DA-M £19

Export available

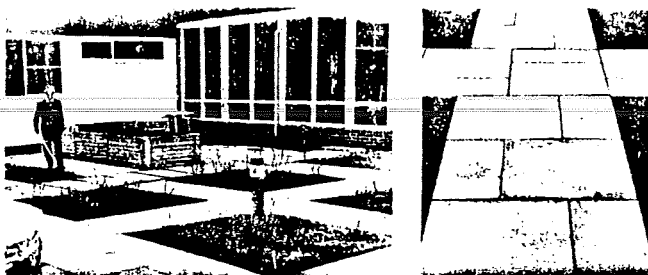


3 Pendulum Weeder GY

WOLF-CULTIWEEDER IE

The lightweight, dual-purpose, three-pronged cultivator with a sharpened blade attached to the back of it, is mounted on a 1.5m (5ft) handle. The three prongs can be used to loosen the soil between rows of plants, especially in heavy or stony soil. With the prongs uppermost the blade functions as a hoe, cutting and clearing weeds between plants. The tool can be pulled through the soil in one continuous movement.

BEDS AT GROUND LEVEL



A paved area round the bed is necessary for both ambulant and wheelchair gardeners. The proportions of concrete to cultivated ground are very important: too much paving will spoil the appearance of the garden while too little will mean that some areas are inaccessible. 914mm (3ft) paths are an adequate width for both wheelchair users and ambulant gardeners. A combination of 610 × 610mm (2 × 2ft) and 610 × 305mm (2 × 1ft) paving slabs make an attractive pattern.

Plots of ground 2 × 2m (7 × 7ft) will make it possible for all the cultivations to be performed from the path. This basic design can be repeated many times over, and although presenting a formal pattern, changing the planting between one bed and another, for example, roses in one bed and annuals in others, adds variety. Roses fit very conveniently into this method of planting: beds 2 × 2m (7 × 7ft) accommodate 9 bush roses (three rows of three). Rectangular beds 2 × 1.2m (7 × 4ft) are especially suitable when growing crops such as tomatoes or chrysanthemums which require tying up frequently. Some ambulant gardeners may need the help of a kneeling stool when working at ground level.

RAISED GARDEN BEDS

The cultivation of plants which require frequent handling is easier when the plants are grown in raised beds constructed as open troughs. Where access is available from one side only the width of these should be restricted to 610mm (2ft) and when access can be obtained from both sides the width should be 1.2m (4ft). A suitable height of bed for an ambulant gardener is 711mm (2ft 4in) and for a wheelchair gardener 457-610mm (1ft 6in - 2ft). Troughs can be constructed from paving slabs or pre-cast concrete fencing panels. More attractive designs can be built in brick or stone work but care must be taken to ensure that they are correctly constructed and sufficiently strong to retain the weight of the soil. Smaller gardens can be made in plant containers, sinks, tyres or barrels.

Permanent planting with alpines provides a very attractive garden. Flowering plants such as geraniums and fuschias, edged with annuals for display during the summer period can be replaced in the autumn by wallflowers and bulbs that will flower in the spring. The choice of vegetables grown on raised gardens should be restricted to salads. Cabbages and larger vegetable plants are wasteful of space.

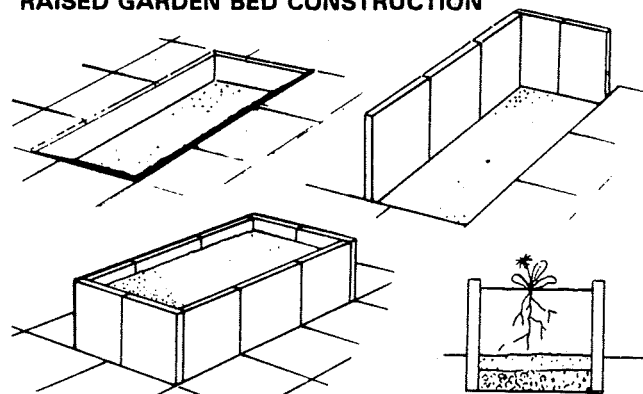
Alpine or rock plants are small and are usually planted close together making it necessary to weed by hand rather than with long-handled tools. Seed beds and salad crops such as spring

onions, radishes and lettuces require close finger work at thinning and harvest times.

To obtain good results feeding with organic fertilizer is recommended two weeks before planting. Mulching with peat will help to keep the top soil moist in warm weather.



RAISED GARDEN BED CONSTRUCTION



The walls of raised beds can be constructed from a variety of materials, pre-cast concrete paving slabs 914 × 610 × 51mm (36 × 24 × 2in) obtainable from builders' merchants, or fencing panels, are particularly suitable. It is important that the walls should be as narrow as practicable. A raised garden bed made in this way must be surrounded by a paved area to support it. A 1.2m wide by 1.8m long (4ft × 6ft 4in) space should be left for the bed when the paving is laid. To construct the bed, the 'long' 914mm (3ft) side of each slab should be sunk 305mm (1ft) into the ground leaving a 610 × 610mm (2 × 2ft) area of slab exposed. The area enclosed by the slab should be forked over, drainage material such as rubble or stones added, and then filled with soil, slightly higher in the centre as the soil will consolidate as it settles.

TOOL HANDLES

The handles of tools vary in shape, surface texture and dimensions. When choice can be made the disabled gardener should select by trial.

Different types of long-handled tools are available which enable the disabled or elderly gardener to reach without bending. Some long-handled tools are supplied with straight handles and some have a curved top section. These have been found particularly suitable for use by a gardener working from a stool or wheelchair and by one-handed gardeners.

Some tool heads are interchangeable on handles made by the same manufacturer, provided they are of the appropriate thickness for the tool head concerned. Some different handle lengths may also be available.

An additional stirrup-shaped handle grip (see below) can be added to the shaft of a large stronger tool, such as a fork, to provide a more comfortable grip and make it easier for a disabled gardener to handle it, particularly when working from a sitting position.

ADAPTED PADDED HANDLES

A thin handle can be made more comfortable and easier to hold by pushing on sponge rubber tubing (Rubazote) which is available in 6, 10, 12, 15 and 17mm bore.



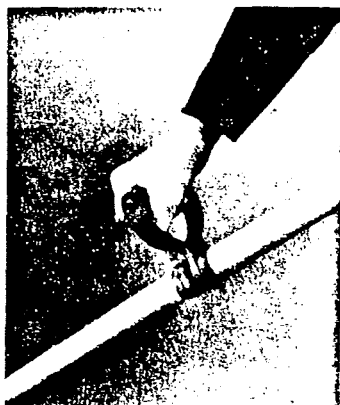
Sponge rubber tubing obtainable from British Red Cross Society, Medical Aids Dept.

Approx. price per 20cm length from 30p

Approx. price per 2m length from £2

WOLF HANDLE XO

Attaching a 114mm (4½in) additional handle to the shaft of a fork, spade or long-handled cultivator provides a better grip and reduces the need to bend when digging. It also enables the gardener to keep both feet on the ground while digging (except when digging heavy clay soil). It is easier for a gardener to dig from a wheelchair if a second handle is fitted. The handle can be adjusted easily to the required position.



Manufactured by Wolf Tools Ltd

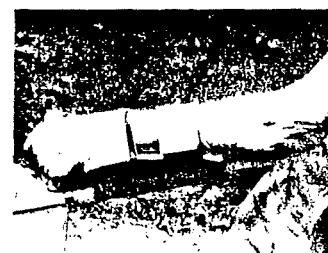
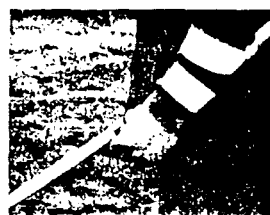
Obtainable from Wolf-Tools stockists

Approx. price £5

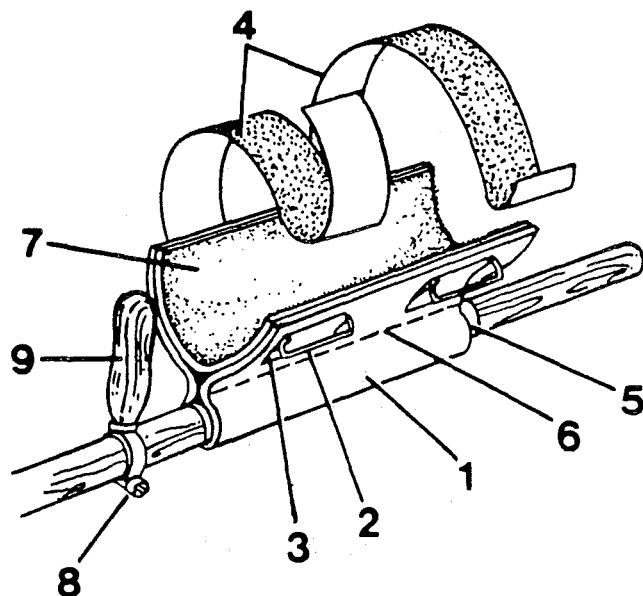
Export available

LONG-HANDLED TOOL ADAPTED FOR ONE-HANDED USE

Not commercially available but can be made up in a hospital department or by a handyman at home



It may be easier to control a long-handled tool one-handed if the forearm is secured in a leather gutter and a handgrip is attached. A wooden handgrip (shown in photo 1) can be fitted as detailed below or an additional Wolf handle XO can be attached (photo 2). The adaptation may also be helpful to a gardener with a poor grip.



HAND TOOLS

TRIGAGRIP TOOLS



The extremely strong but lightweight tools in hard-wearing aluminium alloy have a unique 'trigagrip' handle with an indentation for the thumb and a 'peg' which provides added purchase for the disabled hand. The tools can be washed and left to dry.



Planter The narrow 38mm (1 1/2 in) wide trowel can be used for planting in rockeries or digging out deep-rooted weeds between closely planted subjects
Weight 141g (5oz)

Trowel The 76mm (3in) wide trowel can be used for general planting and digging out weeds
Weight 170g (6oz)

Fork The 76mm (3in) wide fork can be used to break up soil on raised gardens
Weight 226g (8oz)

Recommendations Can be operated from a sitting position; do not require a strong grip; can be used one-handed

Manufactured by Frank Odell & Co Ltd

Obtainable from garden centres and large department stores or, in case of difficulty, from the manufacturers

Approx. price Planter £4
Trowel £5
Fork £5
Set of 3 tools £11

Export available

WOLF-DOUBLE HOE LM

The tool which is mounted on a 305mm (12in) handle, has a narrow (51mm (2in) wide) sharpened blade on one side and two prongs on the other side. The prongs are easily pushed into the soil to aerate it and the blade can be used to chop up weeds. The lightweight tool is well-balanced and is very suitable for use by the more severely disabled.

Recommendations Can be operated from a sitting position; can be used one-handed; does not require a strong grip; can be used without bending the back

Manufactured by Wolf Tools Ltd

Obtainable from local Wolf-Tools stockists

Approx. price £4

Export available



WOLF-MINI GRUBBER LAL

The small 3-pronged cultivator, mounted on a 305mm (12in) handle, can be used to loosen soil between plants. The position of the prongs makes the cultivator suitable for use in stony soil and for breaking up encrusted soil.

Recommendations Can be operated from a sitting position; can be used without bending the back

Manufactured by Wolf Tools Ltd

Obtainable from local Wolf-Tools stockists

Approx. price £4

Export available



HAND TOOLS

WOLF WEEDING AND PLANTING KNIFE KS

The narrow trowel, mounted on a plastic handle, has sharp scalloped cutting edges. It can be used when planting in rockeries or other restricted areas and for cutting the tap roots of persistent weeds and for digging out deep-rooted weeds from between closely spaced plants. Robust and strongly made, the trowel is suitable for deep working.

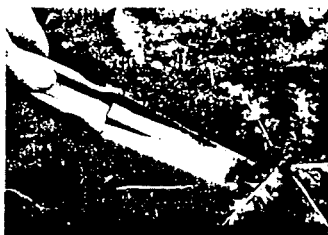
Recommendations Can be used one-handed; does not require a strong grip

Manufactured by
Wolf Tools Ltd

Obtainable from
Wolf-Tools stockists

Approx. price £3

Export available



WOLF-WEED EXTRACTOR IW



The sharp harpoon blade fitted to a 762mm (2ft 6in) long wooden shaft with a T-shaped handle can be used to extract dandelions or other deep rooted weeds from a lawn. The tool must be pushed into the ground, half-turned and pulled upwards to remove the weed and root.

Recommendations Can be operated from a sitting position; can be used with one very strong hand; can be used without bending the back

Manufactured by Wolf Tools Ltd

Obtainable from Wolf-Tools stockists

Approx. price £7

Export available

BARONET FIRM GRIP WEED PULLER

The robust tool, designed to grip and dig up obstinate weeds on cultivated soil (not lawns), comprises a narrow spade and grab mounted on a 610mm (2ft) handle operated by a trigger grip. The puller is intended for one-handed use and retains the removed weed in its grip for transfer to a wheelbarrow or other receptacle. The long handle provides extra reach for use from a wheelchair.

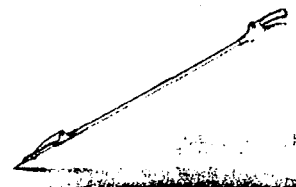
Weight 397g (14oz)

Recommendations Can be operated from a sitting position; can be used one-handed; can be used without bending the back

Manufactured by and
obtainable from
A Wright & Son

Approx. price £15

Export available



ROSE SUCKER CUTTER

Any shoot which arises below the point at which the rose was budded should be *pulled* off: cutting only encourages further growth. The tool should be pushed below the soil following the direction of the root as it leaves the main stem. The growing sucker will be caught between the two sharp, fixed blades and pulled off the root.

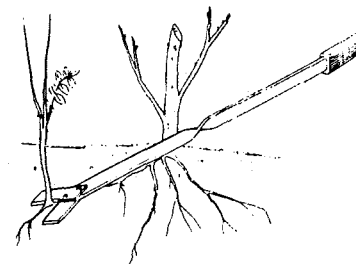
Recommendations Can be operated from a sitting position; can be used one-handed

Manufactured by
Standard Manufacturing
Co

Obtainable from
garden centres,
hardware stores and
ironmongers

Approx. price £6

Export available



DIGGING

Digging and cultivation are usually the heaviest and most strenuous garden tasks. Various methods are suggested which make digging easier and, in some cases, unnecessary. Digging with a fork is less strenuous than digging with a spade; the smaller sizes of fork, i.e. border or ladies', are specially suitable.

Tools designed for breaking down the top soil will enable an adequate tilth to be achieved in many soil conditions. This type of cultivation is of particular help to wheelchair gardeners and to those who have difficulty walking on soil.

The soil must be dry before any gardening can be done. It is sometimes said that the only satisfactory way to treat soil is to dig it in the autumn, leave it rough to be broken down by winter frosts and in the spring break it down to a fine tilth and sow the seed.

DIXON SPADE

The robust metal spade has an extra long handle 1372mm (4ft 6in) enabling the gardener to break and turn the spit while keeping his back straight. The long handle also makes lifting the soil easier. The spade can be used to break up clods of soil by turning the handle. Blade length 229mm (9in), width 140mm (5½in)

Recommendations Can be used without bending the back

Obtainable from
Dixon Farming and
Garden Aids

Approx. price £18

Export not available

**WOLF TERREX AUTOSPADE AD AND TERREX FORK HEAD AG**

The spring and lever action of the heavy steel spade eliminates bending and lifting of soil. The spade should be pushed into the ground at an angle of about 60° (photo 1) until the pedal rests on undug soil. By pulling the handle backwards the spit is broken (photo 2) and soil is propelled from the bottom of the trench to the top (photo 3). The handle is adjustable in length. Spade and fork heads are interchangeable.

The Terrex Autospade can dig the soil to a full spit depth without the gardener having to lift 6-7kg (13-15lb) of soil. The tool makes use of lever action to propel the soil from the bottom of the trench. After the technique has been mastered

the gardener should be able to dig larger areas more easily than by using a conventional fork or spade. The blade of the tool is pushed into the soil and only in heavier soil is it necessary to use a foot on the pedal. The spit is loosened by pulling back on the handlebars and the soil is thrown forward by pulling down the handle.

If a large plot — say 12 × 6m (40 × 20ft) has to be dug, the mechanical advantage of the Terrex Autospade justifies the expense. It is not designed for working in small areas between plants and does a better job when the plot has been cleared of surplus weeds. Choose the fork head AG instead of the spade blade if the soil is of suitable texture to stick together in 'forkfulls', as it is much easier to push a fork into the ground than a spade.

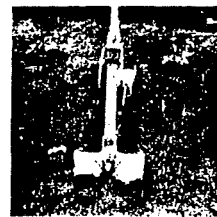


Photo 1

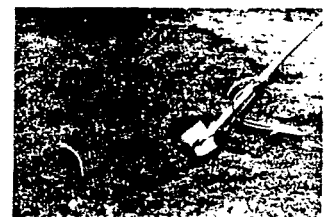


Photo 2

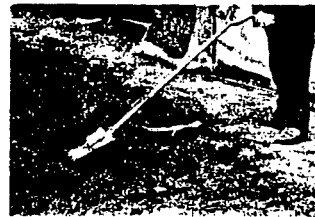
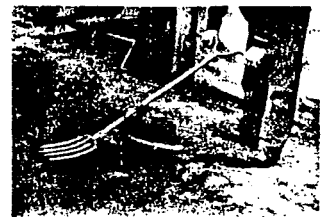


Photo 3



Recommendations Can be used one-handed if a bar is welded across the handlebars; can be used without bending the back

Manufactured by Wolf Tools Ltd

Obtainable from local Wolf-Tool stockists

Approx. price Terrex Autospade £35
Terrex Fork Head £14

Export available

DIXON GENERAL PURPOSE CULTIVATORS

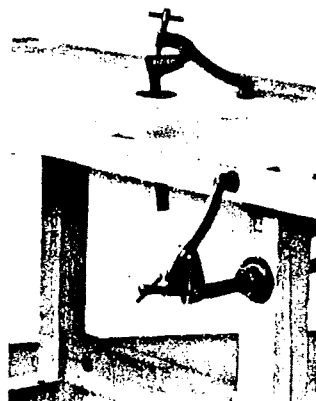
The robust four-tine cultivator is ideal for dealing with persistent weeds such as couch grass: the carbon steel hooked tines pull the weeds out by the roots. The tool can also be used to break up the soil to a fine tilth. The second handle-grip gives better control of the tool and makes it easy to use.

The seven-tine cultivator is especially suitable for raking soil which has already been ploughed or cultivated to a level surface ready for seed sowing.

Recommendations Can be operated from a sitting position; can be used without bending the back

BENCH HOLDFAST

The Bench Holdfast is a clamp consisting of two main components. One section fits in through a hole in the handle, the other is positioned over the article which requires clamping. By tightening the large screw joining the two components, the article is held in a vice-like grip. The Holdfast can be moved, positioned and tightened with one hand. Two collars are supplied for fitting to the bench to protect it from the strain of the tool; additional collars can be purchased.



Manufactured by Record Ridgway Tools Ltd

Obtainable from ironmongers or tool merchants

Approx. price depending on size £16-17 Export available

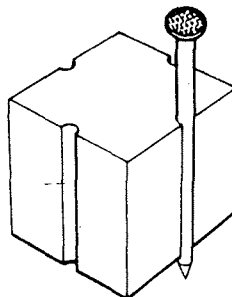
NAILING WOOD

To prevent wood from splitting when a nail is hammered into place the hole should be bored with a metal drill slightly smaller than the nail.

WOOD GUIDE FOR NAILING ONE-HANDED

Not commercially available but shown as an idea to be made by a handyman

A 25mm (1in) cube should be constructed with a groove 3mm ($\frac{1}{8}$ in) deep cut down the centre of each side. A nail placed in one of the grooves to hold it firmly can be positioned accurately over the spot where it is to be inserted and knocked into place by a one-handed user. *Note:* the guide is unsuitable for nails or panel pins less than 3mm ($\frac{1}{8}$ in) long.



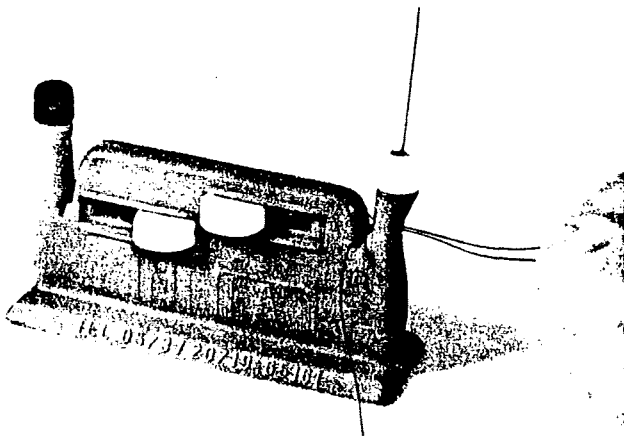
PENELOPE EMBROIDERY FRAME D880

The rectangular wooden embroidery frame which will take canvasses up to 686mm (27in), is particularly suitable for use when sewing sitting in an armchair or while in bed. It is designed so that the next stitch hole can be seen, rather than felt by touch, and enables work to be done with the minimum of fatigue.

Manufactured by
William Briggs & Co Ltd

Obtainable from
needlework shops and
department stores

Approx. price £14

**NEEDLE THREADER**

The threader fits into a small plastic case and is slid out easily from the open side. There is an integral needle case but this has a small tight cap which is extremely difficult to take off. It is recommended that needles are kept elsewhere. The threader has two narrow funnels, one suitable for threading small-eyed needles and the other for larger-eyed needles. Clear instructions for use are given in pictorial form. The threader is easy to use and extremely effective. If a non-slip mat is placed underneath the threader, threading can be done easily one-handed.

Obtainable from Homecraft Supplies (Fleet St) Ltd

Approx. price £1.15

Export available

STIREX SCISSORS

A plastic loop, acting as a spring to part the blades, forms the scissor handles. To cut with the scissors, the spring-loaded soft plastic handles should be squeezed together: only a small movement is necessary. The action is less tiring and easier for a person with a weak grip or hand deformity than that required

to use standard scissors. The scissors are suitable for a person who is unable to use the thumb and finger holes of standard scissors. Scissors with different sized blades with round or pointed tips are available. Weight 56g (2oz).



Obtainable from Homecraft Supplies (Fleet St) Ltd

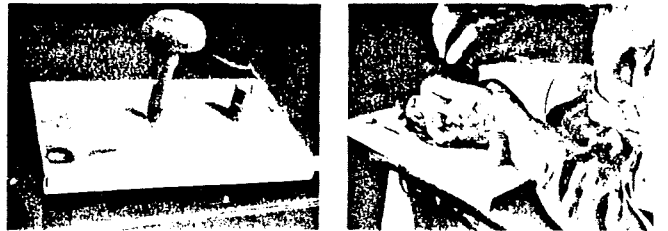
Approx. price from £2.50

Export available

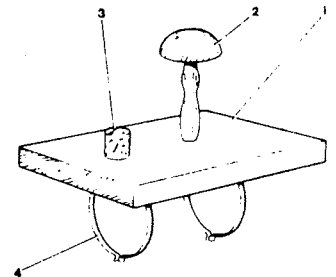
DARNING BOARD WITH CLIPS

Not commercially available but shown as an idea to be made by a handyman

A darning board is useful for a person with a weak grip or one who is sewing one-handed. Two bicycle clips fixed underneath the board allow it to be pressed on to a suitable chair arm and held there firmly.

**Materials**

- 1 Wooden board
254 × 152 × 19mm
(10 × 6 × ¾in)
- 2 Darning mushroom
screwed to 1
- 3 Cork impaled on a nail
through 1
- 4 One pair of bicycle
clips screwed to the
underside of 1

**SANDBAGS AS A SEWING AID**

Not commercially available but shown as an idea to be made by a handyman

Rectangular bags approximately 102 × 203mm (4 × 8in) made from a PVC type of material and filled with sand can be used in a variety of different ways to assist the disabled seamstress. The material to be sewn can be stabilised by wrapping it round the bag; pins can be stuck through it into the sand. When sewing on buttons, the garment can be wrapped round two sandbags placed with a gap between them. The position for the button should be directly above the gap and the button can then be sewn on, passing the needle up and down using the space provided. The bags can be used many times with-

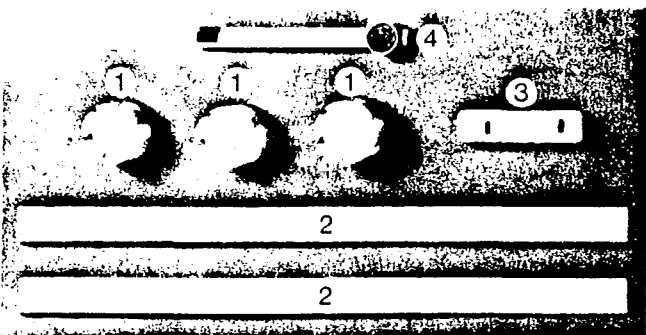
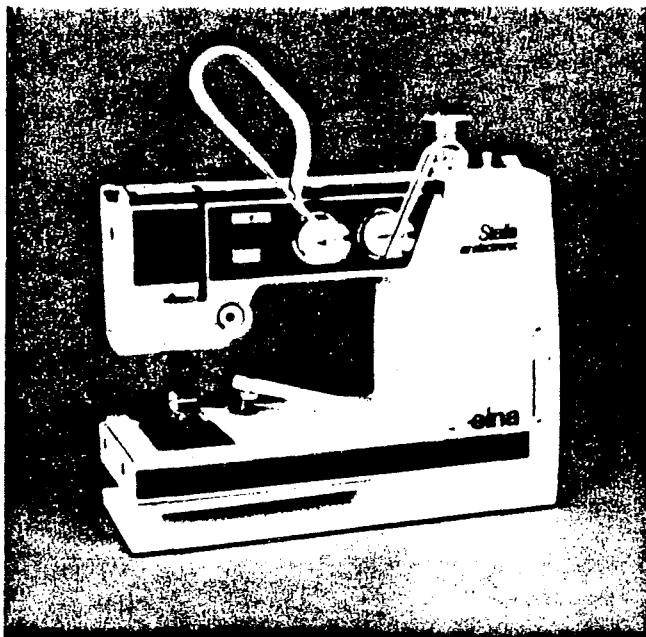
out showing signs of wear and tear; pins and needles will slide along the shiny surface so that the sewing is not caught into the sandbag, and a needle can be stuck into the bag to stabilise it while it is being threaded.



SEWING MACHINES

Whenever possible the intending purchaser should visit a sewing machine centre where different machines can be tried out, requirements and problems discussed and advice obtained. Buying from a department store or through a catalogue where neither advice nor trial is available is not recommended. In most cases a standard machine will be suitable but two machines have been designed specially for the disabled: the Husqvarna and the Bernina, manufactured by Husqvarna Ltd and Bogod Machine Co Ltd. Since changes in these machines are envisaged no details are included here.

ELNA SEWING MACHINES



Elna sewing machines are controlled by an air-switch which can be operated by foot, elbow or any convenient part of the body. A set of accessories for disabled users has been produced and can be fitted to any current Elna model (see photo). The set consists of: (1) adaptors to fit onto the stitch selector knob and stitch width and length dials; (2) two strips of insulated, malleable material which can be bent and shaped as required; (3) an extension for the cloth presser bar lever to reduce the effort in raising the foot and releasing the upper tension; (4) a bobbin extension with one end designed to remove the bobbin from the rotary hook and the other, with a hole pierced in it, designed to hold the needle for insertion into the needle clamp and a conical cavity for tightening or loosening the needle clamp screw.

Details of Elna sewing machines and accessories obtainable from Elna stockists (list available from Elna Sewing Machines (GB) Ltd)

KNITTING PAD ON WAIST BELT

A soft leather-encased pouch with a number of holes punched through the leather on one side is attached to a leather belt which fastens round the user's waist. Its use is to stabilise a knitting needle so enabling a one-handed person to knit. Needles with points at both ends must be used, one point of the needle being pushed through the appropriate hole in the pad. To prevent stitches from falling off the back of the needle a cork or similar 'stop' can be pushed onto the needle point.

Obtainable from
Goodlad & Goodlad

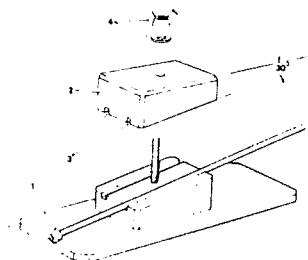
Approx. price £3.50

Export available



ONE-HANDED KNITTING AID

Not commercially available but shown as an idea to be made by a handyman

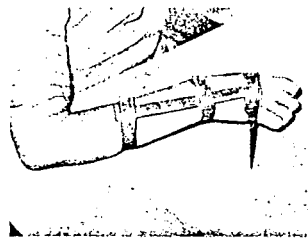


The aid, which must be clamped to a firm surface, allows a one-handed knitter to cast on, knit and cast off. To use, the wing nut should be unscrewed, the upper block removed and a knitting needle placed along one of the grooves with its point uppermost. The upper block should be replaced and fixed in position by the wing nut. The knitting is then firmly held at an appropriate angle for knitting. The screw and upper block must be removed and the needle changed round at the end of every row. It may be difficult to knit using the aid if the pattern incorporates many stitches or a complicated pattern.

WRITING**STOKE MANDEVILLE WRIST EXTENSOR SPLINT TO HOLD A PEN**

Not commercially available but shown as an idea for construction in a hospital department

When there is insufficient grip to hold a pen in the usual way, a fibre tip pen or soft lead pencil can be held in the pocket (see also page 17).

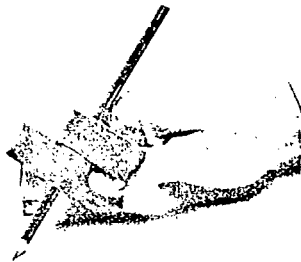
**ULTRALITE FINGER YOKES**

The Plastazote finger yokes can be used as a pencil grip with the index finger resting in the yoke. They can be used singly or in pairs; some users may find two yokes give too wide a grip for easy writing.

Obtainable from
Nottingham Handcraft Ltd

Approx. price per pack
of ten £1.50

Export available

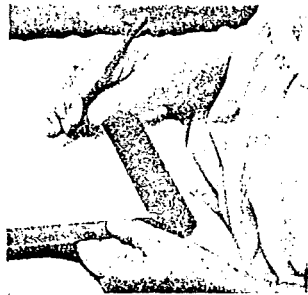
**TRIDENT DIALLING PEN**

Some users may find the lightweight triangular ballpoint pen easier to grip than a standard one (see also page 17).

Manufactured by and
obtainable from
Taylor Pen Ltd

Approx. price 50p

Export available

**MAGNETIC RIGHT OR LEFT HANDED RULERS *continued***

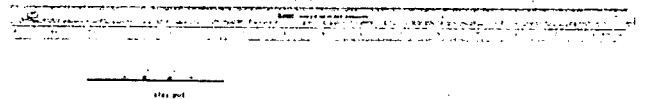
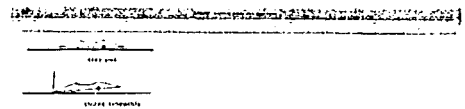
Manufactured by and
obtainable from
Wessex (Aids & Visual
Equipment) Systems

Approx. price £1

Export available

LINEX SUPER RULERS

Two non-slip types are available: on one model a rubber strip prevents the ruler from sliding. By tipping the ruler the rubber is freed from the paper and the ruler slides smoothly on the acrylic rib. On the other model, two rubber strips ensure that the ruler lies firmly on the paper. Marked in mm/inch divisions, the one-strip ruler is available in 200 or 300mm length and the two-strip in 400 and 500mm length.



Obtainable from Pelltech Ltd

Price on application

Export available

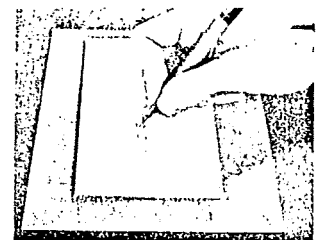
DYCEM

Provided it is kept dry and dust free, a Dycem mat or a piece cut from a Dycem roll, which is slightly thinner, will hold writing paper securely on a table.

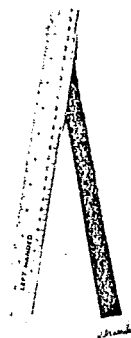
Manufactured by and
obtainable from
Homecraft Supplies
(Fleet St) Ltd

Price on application

Export available

**MAGNETIC RIGHT OR LEFT HANDED RULERS**

The metal ruler, with a magnetic strip down the back for use on a steel writing board, may enable a one-handed person to rule lines or measure. The ruler is suitable for general work but is unsuitable for precise line ruling since the magnetic strip holds the edge of the ruler away from the paper.



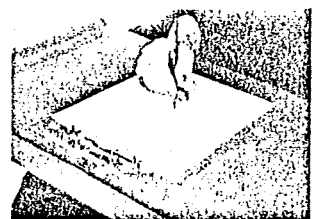
continued top next column

CLIPBOARD

The writing paper is inserted under the strong spring clip and held securely by it but considerable pressure is needed to open the clip and those with weak hands may require help.

Obtainable from
large stationers and office
equipment shops

Price on application



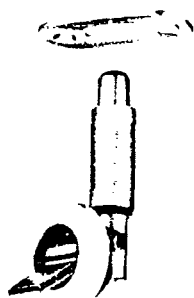
WELLINGTON MORTICE BOLT 8L44

Some disabled people may find the nylon operating lever on the mortice bolt easier to operate than conventional bolts. It is suitable for wooden doors and some wooden windows.

Manufactured by Albert Marston & Co Ltd

Obtainable from builders' merchants or architectural ironmongers

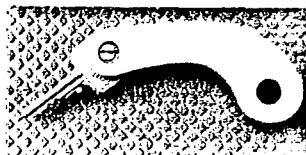
Price guide £2



Export available

YALE KEY TURNER

The moulded plastic key turner is bolted into a Yale-type key creating a large, moulded handle which is easily gripped and is useful for those with impaired hand function. It gives better leverage if there is sufficient clearance around the door lock. Although the key turner is larger to carry than a key it is light in weight.



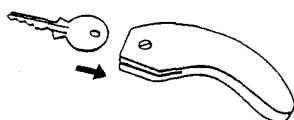
Obtainable as M30 from Homecraft Supplies (Fleet St) Ltd or as Z1580 from Nottingham Medical Aids Ltd

Price guide £2

Export available

PRA KEY TURNER

A Yale-type key can be screwed to the lightweight, moulded key turner. Those with poor hand function may need help initially to fit the key into the aid but, once fitted, it provides a comfortable, large grip which may be a help to those with poor hand function, the visually impaired or those with poor coordination.



Obtainable from PRA Aids for the Handicapped Ltd

Price guide £2

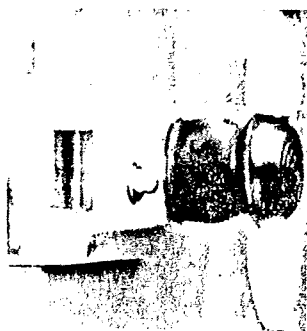
Export available

YALE KNOB TURNER Z1581

The knob turner fits over the inside knob of most Yale-type locks providing an enlarged grip for those with impaired hand function. It can be left in position on the knob.

Obtainable from Nottingham Medical Aids Ltd

Price guide £1



Export available

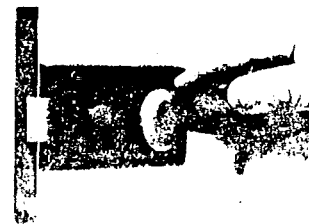
YALE KNOB TURNER M31

The knob turner fits over the inside knob of most Yale-type locks to give 'wing' grip for those with disabled hands. It can be left in position on the knob.

Obtainable from Homecraft Supplies (Fleet St) Ltd

Price guide £1

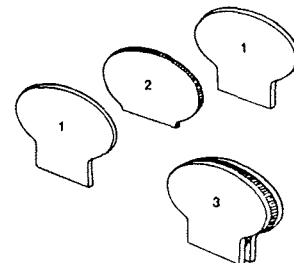
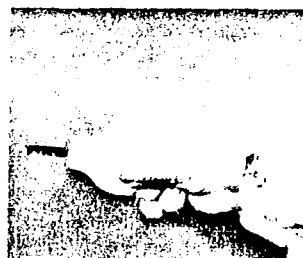
Export available

**ENLARGED KEY HEADS**

Not commercially available but can be made at home

A handle can be made to give an easier grip and better leverage for those with loss of first finger and/or thumb movement.

Materials



- 1 Two pieces 3mm ply or hardboard, approx. 50 x 50mm cut to shape as in diagram
- 2 One piece 3mm ply or hardboard, approx. 50-38mm cut to shape of key head for centre
- 3 The three pieces are glued together and trimmed

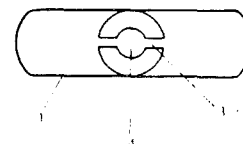
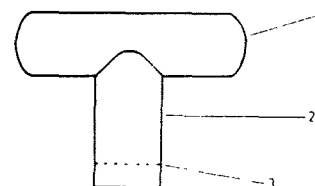
T-SHAPED KEY HANDLE

Not commercially available but can be made at home

This handle can be made to fit a Yale key and most other designs of small keys.

Materials

- 1 125mm length of 35mm dowelling
- 2 90mm length of 35mm dowelling
- 3 6mm wide slot, 12mm deep, cut in end of 2
- 4 hole drilled to fit size of key or tap

**GRIPKIT Z1074**

An adaptation to a door catch or snibb, or to a key can be made using Gripkit epoxy plastic. The two component plastics are mixed and applied by hand and become permanently bonded in about 30 minutes. Gripkit bonds to metal and can be sawn or filed; it will not soften and is not recyclable. *Note:* Gripkit requires

POP-ON

A self-adjusting wire hoop fitted into the waistband of a plastic apron grips the wearer's waist and holds it in place without ties. The apron can be put on and taken off easily with two hands but a one-handed user may find the 'spring' of the wire hoop difficult to manage. A person with painful hands may find the thin wire uncomfortable to handle.



Obtainable from
F W LeGrove & Son Ltd

Approx. price £1

Export available

LONG-HANDLED DUSTPAN AND BRUSH K1

The dustpan and brush can be used from either a sitting or a standing position. The brush handle can be stored inside the dustpan handle.



Brush handle height 750mm
Dustpan handle height 790mm

Obtainable from Homecraft
(Fleet St) Ltd

Approx. price £4

Export available

HANDI-TWIN SETS K35

The attractively designed long-handled dustpan and brush set is made in two-tone hard plastic and has smooth, wooden handles. The pan has a self-closing lid. Hooks on both handles provide convenient combined hanging.



Height of dustpan 826mm
Height of brush 787mm

Obtainable from
Denroy International Ltd

Approx. price £6

Export available

LONG-HANDLED DUSTPAN AND BRUSH

The dustpan and brush can be used from either a standing or a sitting position. The brush has a cranked handle which is comfortable to hold.



Height of brush in working position 762mm
Height of dustpan 648mm

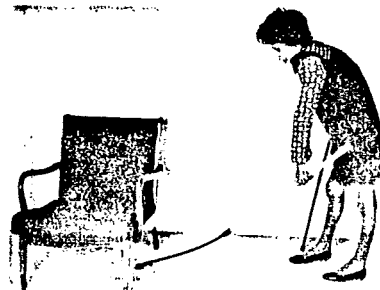
Obtainable from
Mecan aids Ltd

Approx. price £6

Export available

FLEXIBLE FLO W305 AND FLEXIDUSTER W308

With light pressure on the flexible handle, the mop bends to dust under furniture or other inaccessible areas. Both long- and short-handled mops are useful for a person who cannot bend and for a wheelchair bound housewife. The mop heads are easily removed from their wire frames for washing.



Flexible Flo



Flexiduster

Flexible Flo overall length
1371 mm
Weight 269g
Flexiduster overall length
863mm
Weight 227g

Manufactured by
Straight Jane Mops Ltd

Obtainable from
hardware and
department stores

List of stockists obtainable
from the above

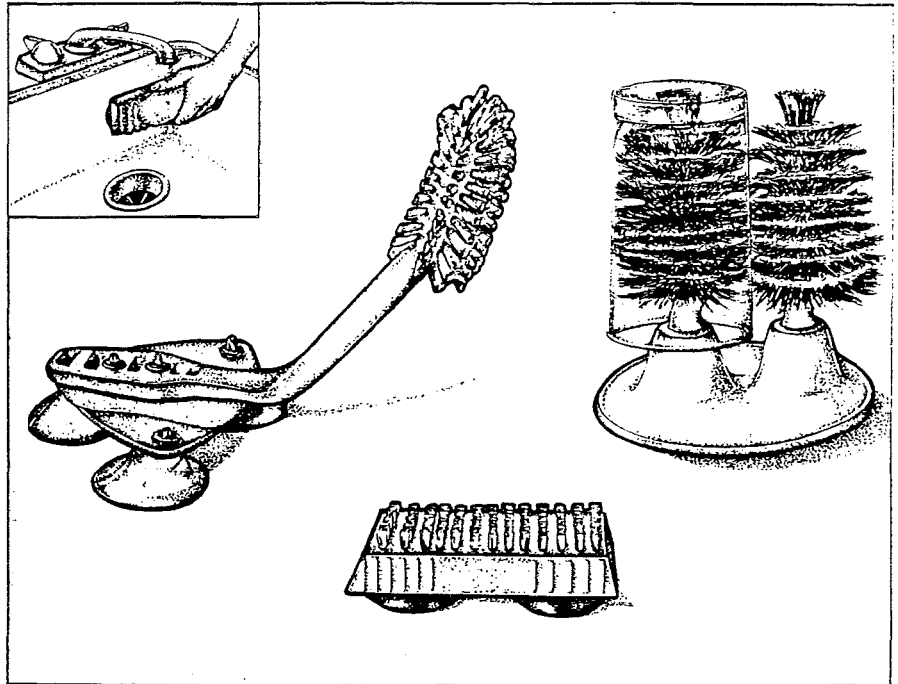
Approx. price from £3

Export available

A dish brush can do most of the work for you when it comes to heavy cleaning. Dish and bottle brushes angled and mounted with suction cups are available at some medical supply shops for under \$10.

Look for sturdy nylon bristles set at the appropriate angle and a handle with a good grip if you will be holding the brush. More pointers on washing:

- Try using a mitt normally made for washing cars — fabric or sponge — to wash your dishes.
- A useful item is the nylon mesh scrub pad, especially for easily scratched non-stick surfaces.
- For that really tough baked-on lasagne, use a metal scrub pad, or even better, soften it by soaking overnight in a solution of detergent, salt, vinegar or baking soda.
- Stains can also be removed by soaking: use a mild solution of bleach and water.
- Remember to clean the outside of a utensil — grease can build up and be harder to remove when baked on.
- Always dry the inside of a pot and store with the lid loose to prevent oxides and off-flavours from developing.
- Wipe cast iron, non-coated utensils with a light coating of vegetable oil after drying.
- Dishwasher detergent can be hard on some surfaces: the abrasives can wear away non-stick coatings, and the chemicals may react with some metals. Follow the recommendations of the detergent and utensil manufacturers.



Attach the brush to the sink or counter and move the dish or glass against it.

Drying

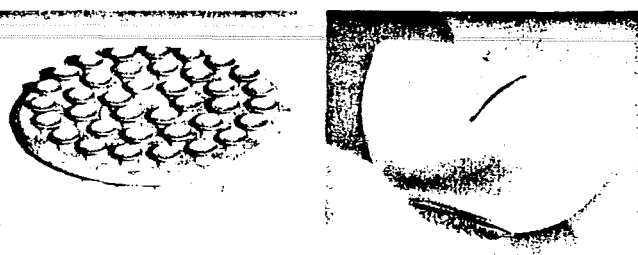
The easiest method of drying is to leave the dishes in the rack to air-dry. The hotter the wash and rinse water, the faster and cleaner the dishes will dry. This is also the most sanitary way of drying, since no bacteria will be transmitted by a towel. Your dishes can then be put away or stored right on the rack covered loosely by a clean cloth.

If you prefer to dry your dishes with a towel, use an absorbent, lint-free linen/cotton tea towel.

To dry dishes while seated, place a clean towel on your lap, set the item on this towel and dry with a second towel in your hands. Use the towel to protect your hands if very hot rinse water has been used and to prevent the wet item from slipping out of your hands.

RUBAGRIP SOAP HOLDER AK1671

The small double-sided suction soap holder can also be used to hold plates, bowls etc. steady.



Manufactured by Croydex Co Ltd

Obtainable from department stores including Boots Co Ltd, F W Woolworth Ltd

Approx. price 50p

Export available

FOOD PREPARATION: STABILISING**DOUBLE-SIDED SUCTION CUPS**

Double-sided suction cups fitted on to the base of a mixing bowl or other utensil will hold it steady on a smooth, dry work surface.

Obtainable from Grundy's (Rubber) Ltd

Approx. Price per dozen £2

Export not available

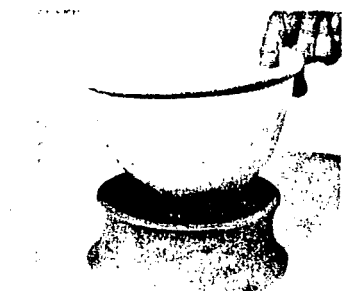
**DUNLOP BOWL HOLDER**

The rubber holder, which adheres firmly by suction to a smooth, dry, work surface, will hold a mixing bowl steady.

Obtainable from Dunlop Ltd

Approx. price £3

Export available

**BOWL HOLDERS**

Not commercially available but shown as an idea for construction by a handyman

Different sized holes in a board which pulls out from the kitchen unit provide a convenient way of securing mixing bowls. *Note:* Although the photo shows a board which has been adapted by a handyman, boards with cut-outs are available as an optional extra from kitchen unit manufacturers shown in the Storage section.

**BREAD BOARD K22**

The board is designed for a one-handed user. Ledges in one corner secure bread for buttering and at the other end bread, meat or vegetables can be spiked for cutting and peeling.

Size 355 x 200mm

**DYCEM PADS**

The plastic anti-slip mats will hold bowls etc. securely on a working surface provided they are kept clean, dry and dust-free. They can be washed in warm, soapy water and must be dried before re-use.

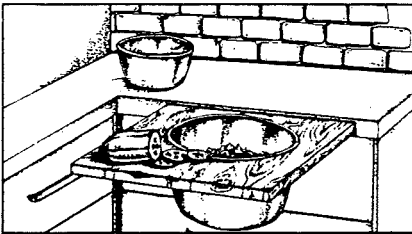
For details see page 43



Mixing and Beating

Bowls should be heavy enough to prevent sliding; a rubber ring on the base, a Dycem mat (from a medical, surgical supplier) or a damp cloth can help too. Bowls with handles are widely available.

A hole cut to size in a piece of plywood or hardwood set over a drawer or sink will help steady a bowl while you use it, increasing your counter-space at the same time. If the bowl is set in flush with the board's surface, you can easily push ingredients into the bowl as they are prepared.

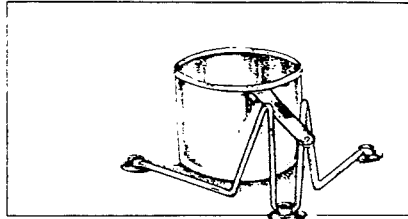


Cut a smaller hole and set the bowl in partway to stabilize it for mixing; easier to remove too.

Blenders, electric mixers and food processors can be a big help; if you buy, make sure the features are useful for your cooking needs and that you can operate the controls.

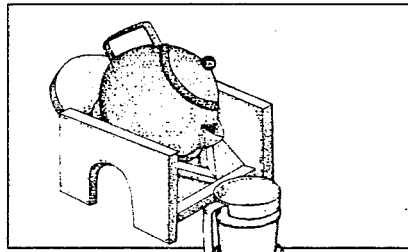
Cooking

To hold a pot or pan steady while you stir, try this wire frame held on with suction cups, available from medical supply stores for around \$12.

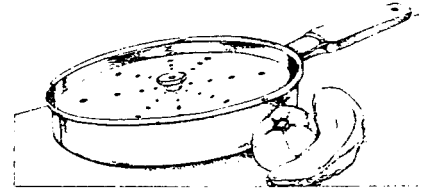


A commercial pot stabilizer. Make your own by cutting a plywood frame and attaching suction cups.

If you have trouble handling a kettle or teapot, a tipping platform can make this activity easier and safer. Make it yourself or buy it at a medical/surgical supply shop that carries homemaking aids.

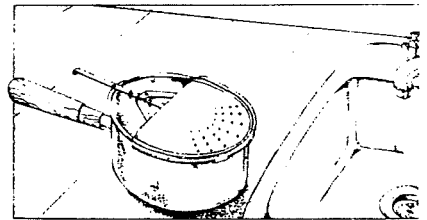


For frying bacon and other thinly sliced foods, this cast aluminum device sits on top of the food and reflects the rising heat. Foods cook through quickly and bacon crisps without turning. Available at CNIB and some housewares counters for \$4. Also from CNIB are magnifiers (handheld and on stands) and short range telescopes; meat thermometers and timers with raised markings.



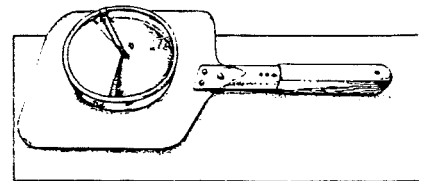
Change the handle on this bacon crisper if it's hard to grasp or lift.

To drain or strain, the device illustrated here fits over the pot with a spring loaded handle to hold it in place. Available at CNIB and some housewares counters for \$4.



This strainer fits a straight sided pot with a rim.

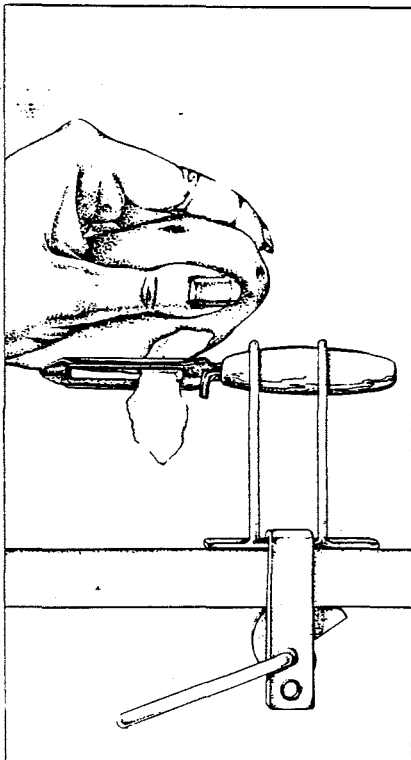
A good pair of oven mitts is essential when working with hot things; or you can use a reaching aid for some jobs. A commercial pizza 'shovel' makes a good reacher to pull hot dishes out of the oven. \$20 at a restaurant supply store.



Use this pizza shovel to handle items that are not too heavy; have a heatproof pad close by.

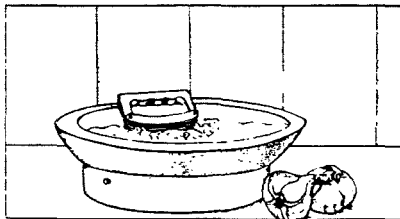
You don't have to sacrifice a healthy, varied diet because of problems in the kitchen they may be easier to solve than you think. When you share the kitchen duties with others, the food preparation tasks that give you trouble can be traded; but when you live alone, you need to be able to pare, slice, chop and cook 'solo'. Many ingenious aids have been devised for the safety and convenience of people who have problems with these activities. Many can be found at any hardware store or kitchen gadget counter. Specialty items are sold at medical/surgical supply outlets featuring aids to daily living. You might have to ask your retailer to order an item for you.

A peeler mounted on a clamp can be attached to a table top or cutting board; the apple, carrot or potato can be pushed or pulled across the blade with one hand. About \$12.



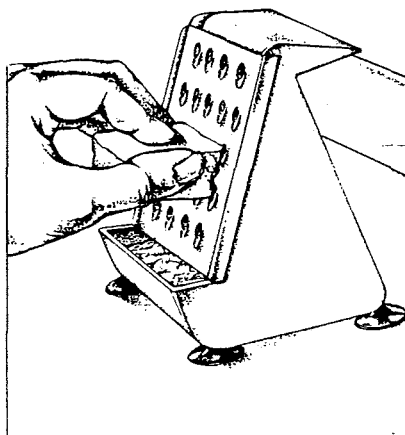
Various clamps can be used to mount tools this way.

A hardwood chopping bowl comes with a five bladed chopper and features a nontip plastic base. \$24 from some medical/surgical supply stores.



Use this bowl to chop onions, celery, peppers, hard-boiled eggs, cooked potatoes, etc.

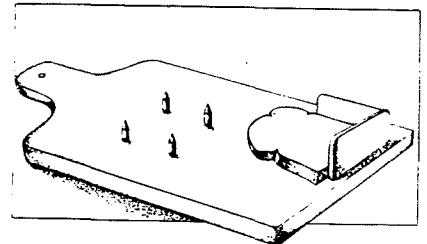
Also available is a grater with suction feet and a bin to hold the grated food. \$15.



This grater features interchangeable grating and cutting panels.

Cutting and Chopping

Cutting boards can be bought or made with stainless steel nails pointing up to impale meat, fruits and vegetables, bread, etc. for one-handed cutting or peeling. Some feature a raised angle for buttering bread. \$15-\$25.



Make sure the cutting board is stable. Wedge it in a corner or use rubber feet or suction cups.

Containers

An electric can opener can save a lot of frustration. Make sure the one you buy has nonslip rubber feet and a mechanism you can operate for any shape of can. Jar openers come in many designs and are widely available. Check the housewares counter and try them out. One is bound to suit your needs.

Boxes can be slit open with a knife and closed with a piece of masking tape or a rubber band. Plastic bags can also be resealed with an elastic band by twisting the bag shut and securing the twist under the band to keep the closure tight.



You can store almost any food or leftovers in a plastic bag using this method.

QUEEN'S CUTLERY K40/41/42/43

The set comprises a knife, fork, spoon and Splayd (combined spoon/fork with a cutting edge). The cutlery has thick plastic handles which are easily grasped and may be suitable for a person with arthritic hands, though they may be too wide for a person with small hands or limited finger movements. Some users may find them slippery. The knife has a useful serrated edge but is a little heavy (over 80g). The spoon and fork are lightweight.

Obtainable from
Homecraft Supplies
(Fleet St) Ltd

Approx. price Each £2

Export available

**SELECTAGRIP CUTLERY K50**

Developed by St Bartholomew's Research Unit for the Handicapped

The stainless steel cutlery includes a range of different sized and shaped spoons, a knife, fork and Splayd (combined knife/fork/spoon). Each item has a built-up small handle over which can be fitted either a round handle, circumference 95mm, a large grip, circumference 100mm or a small grip, circumference 75mm, to suit the user's needs. The handles, of blue translucent plastic, provide a comfortable grip, are easily cleaned and can be transferred from one item to another. A hand strap which can be adjusted to fit the size of the user's hand, is suitable for a person with weak grip who is unable to hold a spoon. The forks and spoons can be bent or angled using a special small jig. Some users may find the cutlery a little heavy and the knife handle rather long.

Obtainable from
Homecraft Supplies
(Fleet St) Ltd

Approx. price Each £2-3

Export available

**CUTLERY: POINTS TO CONSIDER**

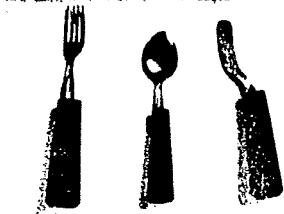
- Difficulty in gripping is one of the commonest difficulties in holding cutlery. A built-up handle may be helpful
- Sponge rubber tubing of the appropriate bore pushed over the handle provides a comfortable, resilient grip and is a cheap, simple temporary measure
- Cutlery with specially wide handles are commercially available. Trial before purchase is recommended as the diameter may be too great for small hands or those with limited finger movement
- Different sizes of plastic handles can be pushed onto handles of specially designed cutlery
- Weight of cutlery may be critical for a person with weak arms or painful wrists. The knife is usually the heaviest item
- Cutlery handles can be heated and bent to the required angle, and may require angling for a person with limited wrist movement or one who has difficulty in rotating his forearm to reach his mouth. Care should be taken to see that the cutlery does not become unbalanced when food is placed on it if the user's grip is also poor
- A combined knife/fork provides a sharp cutting edge with sharp prongs and may be suitable for use by a one-handed person
- A combined knife/fork/spoon provides an eating utensil with a less sharp cutting edge
- Safety aspects of any combination cutlery are of great importance and combination cutlery should not be used by a person who has less than good coordination or who lacks sensation
- A serrated knife may make cutting easier
- Some knives can be used with a rocking motion instead of a cutting action, and may be easier for a one-handed person or a person with painful wrists
- A spoon with a deep bowl may be the most suitable for a person with tremor or incoordination
- A spoon with a deep bowl is more suitable for use with liquids than for solid or sticky food
- Cutlery is available for left-handed as well as right-handed users

ULTRALITE CUTLERY

Developed by St Bartholomew's Research Unit for the Handicapped

The range consists of a knife, a lever knife which can be used with a normal cutting action or with a rocking action, a spoon and a fork. The spoon and fork have narrow shanks which enables them to be angled to suit an individual's requirements. Each item is available with either a large or a small grip Plastazote handle. The handles are washable but water temperature should not exceed 70°C. Both sizes of handle can be purchased separately in packs of five.

Weight of cutlery items
between 26-33g
Large handle length
120 x 40mm, weight 5g
Small handle length
105 x 30mm, weight 3g

**ULTRALITE FINGER YOKES**

Made of Plastazote, the yokes can be used to stabilise the index finger when cutting with the straight knife.

Obtainable from
Nottingham Handcraft Ltd

No retail supply

Price on application

Export available

**MANOY CUTLERY**

The lightweight but strong knife/spoon set is designed for arthritic hands. The rounded triangular Melamine handles taper towards the spoon/knife blade end. The spoons are angled for use by a person with limited movement of the wrist and elbow, but if the grip is weak the spoon may rotate. The very shallow bowl is only suitable for solid foods. Left- and right-handed spoons are available. The knife blade, which is not very sharp, can be used with a slicing or a 'rocking' cutting action.

Obtainable from
Homecraft Supplies
(Fleet St) Ltd

Approx. price Each £3

Export available

**KRISTALLON CUTLERY**

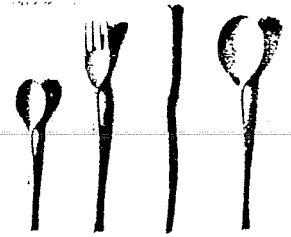
The Polycarbonate cutlery is lightweight but robust. The handles can be angled using dry heat (e.g. a gas flame) to suit individual requirements; the bend is unaffected by hot water. They can also be drilled to add an extension. A user who has difficulty in putting the spoon into his mouth in the normal way may find that the shape and depth of the spoon bowl make it easy to eat off the side of the spoon. Because of its lightness

the cutlery may be particularly useful for a person with severe muscular dystrophy or rheumatoid arthritis.

Obtainable from
A Yeates & Sons Ltd

Approx. price per set 50p

Export available

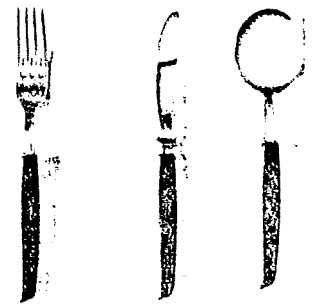
**HOMWOOD CUTLERY**

The wooden handles, which will withstand hot water and dishwasher cleaning, are slightly shaped to the hand and may be easier to grip than straight handles. They are less slippery than those made of bone or Ivorine. The cutlery is reasonably lightweight.

Obtainable from
H Housley & Sons Ltd

Price on application

Export available

**SPONG KITCHEN-TO-TABLE CUTLERY**

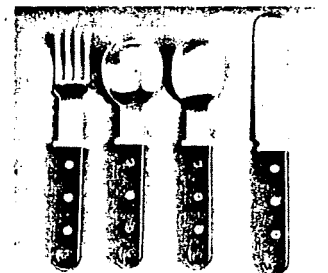
The cutlery has wide, flat, Polypropylene handles which a person with a tremor or with weak or painful hands may find easier to grasp. The range includes table and dessert forks, dessert and soup spoons, table and dessert knives with a serrated edge.

Manufactured by
Salter Housewares

Obtainable from
hardware and department
stores including Heal's Ltd
and Habitat Ltd

Approx. price Each £2

Export available

**MULTIGRIP CUTLERY**

The range consists of spoons, and forks with twisted shanks and a knife. The cutlery is supplied with detachable, lightweight, plastic handles designed to accommodate different grasps. They can be extended or angled by detachable extension or angled pegs. The handles provide a good grip for a large hand but may be unsuitable for a smaller arthritic hand. Some users may prefer the resilience of a sponge rubber tubing grip to the hard feel of plastic. For many users the handles, particularly when fitted to the knife, may be too long. They are easy to wash.

'EATING & DRINKING: CUTLERY

Diameter of handle at widest point 102mm
 Length of handle 152mm
 Overall length
 of knife 275mm
 Length of
 extension peg 38mm
 Length of angled peg 48mm



Obtainable from
 Hugh Steeper
 (Roehampton) Ltd

Approx. price from £2 each
 Set of 5 pegs £2

Export available

NELSON KNIFE K49

The stainless steel blade has a very sharp curved cutting edge and sharp pointed prongs. It is intended as a combined knife/fork for use by a one-handed person but for reasons of safety it should be used only by those with full sensation and good coordination. Some users may feel it looks too conspicuously like an aid. A Nelson knife is available on prescription, for amputees only, through local Artificial Limb & Appliance Centres.

Obtainable from
 Homecraft Supplies
 (Fleet St) Ltd

Approx. price £4

Export available

**SPLAYD**

The combined fork/spoon with cutting edge is available as a standard eating utensil for buffet party use. It may be useful as a one-handed fork/spoon for use with solid food but its edge is not sufficiently sharp for cutting.

Manufactured by
 Viners (Sheffield) Ltd

List of stockists available
 from the above

Approx. price £2

Export available

**GRANTON CHEESE SERVER 342**

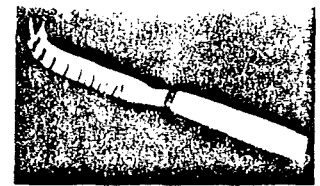
The cheese knife which has a sharp stainless steel blade with forked tip and an ivory handle looks similar to 'ordinary' cutlery. It can be used, with care, as a combined knife/fork by a one-handed person. *Note:* The knife should only be used by a person with good coordination and full sensation.

Manufactured by Grant & Cork (Sheffield) Ltd

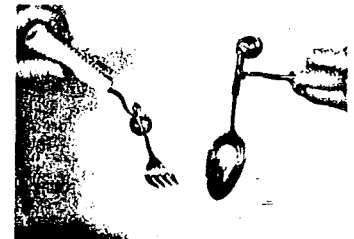
List of stockists available
 from the above

Approx. price £3

Export available

**FLOATING SPOON AND FORK, WEIGHTED, WITH PLASTIC HANDLE 118 AND 119**

The counterweight ensures that the bowl of the stainless steel spoon or fork remains level although the handle is angled. This may be useful for a person with a tremor. The plastic handles are rigid and shaped to give a comfortable grip. Right- or left-handed cutlery is available.



Obtainable from Hugh Steeper (Roehampton) Ltd

Approx. price Each £16

Export available

FLOATING SPOON AND FORK, LIGHTWEIGHT, WITH PLASTIC HANDLE 306 AND 307

The stainless steel spoon and fork can be angled to suit the individual. The bowl of the spoon remains level within one plane of movement. The plastic handles are ridged and shaped to provide a comfortable grip.



Obtainable from Hugh Steeper (Roehampton) Ltd

Approx. price Each £6

Export available

SPONGE RUBBER TUBING GRIP

A cutlery handle can be built up and a comfortable resilient grip provided by pushing the handle through a piece of sponge rubber tubing of the appropriate internal diameter and cutting it to the required length. The tubing is not particularly easy to clean but can be removed for washing if it fits loosely. It should be renewed frequently. It is not a particularly satisfactory method for permanent use but provides a convenient and cheap method for temporary use or for assessment. Sponge rubber tubing is available in 6, 10, 12, 15 and 17mm bore.

Obtainable from
 Nottingham Handcraft Ltd

POSEY SPOON HOLDER

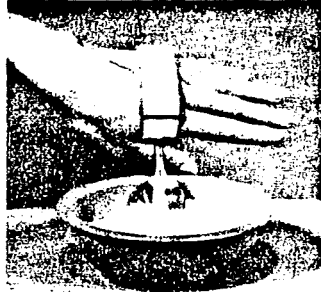
The adjustable strap, which fastens by Velcro, has a narrow elastic pocket into which the handle of the spoon or fork can be inserted. It may be suitable for a person with a very weak grip who is unable to hold a spoon or fork.

Manufactured by
J T Posey & Co

Obtainable from
Martin Creasey
Rehabilitation

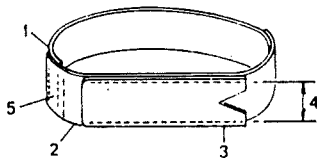
Approx. price £3

Export available

**LEATHER CUFF TO HOLD SPOON OR FORK**

Not commercially available but shown as an idea for home construction

The handle of the spoon or fork can be held in the pocket of the leather and elastic webbing cuff which is fitted round the hand of a person with a very weak grip. The cuff can be fastened by strap and buckle or by Velcro.

EATING & DRINKING: CUTLERY**Materials**

- 1 89 x 90mm elastic webbing for back of hand
- 2 1.5mm thick hide for cuff, 63 x 27mm
- 3 108 x 27mm hide for pocket
- 4 Space between stitched sides 22mm
- 5 Velcro

**GRIPKIT M29**

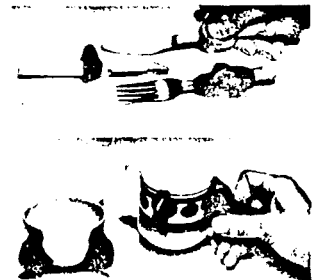
Gripkit plastic, designed for use by therapist or technician, can be used to mould cutlery handles to the individual user's grip. The weight of the item is increased by the amount of Gripkit used. The two component plastics are mixed and applied by hand and will set hard in about 30 minutes. Gripkit bonds to metal and wood and can be sawn or filed. It will not soften and is not recyclable.

Note: The manufacturer's instructions concerning the protection of the skin during the moulding process should be followed.

Obtainable from
Homecraft Supplies
(Fleet St) Ltd

Approx. price 100g pack £2

Export available

**STOKE MANDEVILLE WRIST EXTENSOR SPLINT WITH POCKET FOR SPOON OR FORK**

Not commercially available but shown as an idea for construction in a hospital department

A spoon or fork handle can be inserted in the palmar pocket of the simple splint which is made from spring steel covered with leather or closely woven webbing and fastened with Velcro.



ADAPTED FORK OR SPOON HANDLE

Not commercially available but shown as an idea for adaptation

Lightweight cutlery handles can be heated and bent to the required angle for the use of an amputee using a split-hook, or to suit other individual needs.

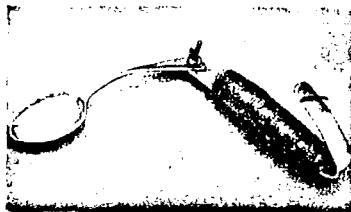
**DETACHABLE CUTLERY HANDLE**

Not commercially available but shown as an idea for construction in a hospital department

The handle, which is easily made, gives a wide range of adjustment.

Materials

- 1 16 gauge aluminium alloy width 25mm, length 150mm, or, length, with end bent over, to suit patient's hand
- 2 Aluminium alloy passed through cycle grip with end bent over
- 3 Screw and wing nut (or Allen screw) to fix to spoon handle



Keeping drink hot Use insulated plastic mug
Preventing burns to hands when holding cup of hot drink (if sensation deficient) Use insulated plastic mugs or beaker fitted into plastic container

INSULEX CUPS AND MUGS

An insulated cup keeps liquid hot and avoids the risk of a person without sensation burning his hands on the outside. It may also be helpful to a slow drinker.



Manufactured by Insulex Ltd

Obtainable from department stores including Lewis's Ltd and House of Fraser

Approx. price £2



Export available

DRINKING UTENSILS**SOLVING DRINKING PROBLEMS**

Problem	Suggestions
Difficulty in lifting cup	Use lightweight cup or mug with large well-balanced handles. Only half fill cup. Use commercially available beaker specially designed to be lifted with heels of the hands. Use child's sloped mug (requires less tipping)
Inability to reach and lift cup	In bed: provide cycle bottle carrier with long straw and attach to side of bedside locker (can be used from prone or supine position); use flexible straw to drink from feeding cup placed on bed beside patient's head. When sitting: fit straw or plastic tube into a pen clip attached to side of cup; use plastic tubing of required length to reach from cup to mouth; fix holder to wheelchair at shoulder level to hold tumbler with drinking straw clipped to it. Use child's training beaker with weighted base to prevent knocking over. A large twin-handled beaker may enable an inco-ordinate person to drink without spilling. Place beaker in suction coaster and provide straw for person with tremor to drink from

MANOY BEAKER

The lightweight Melamine beaker is designed so that it can be held in different ways by those with arthritic deformities of the hands. There is no handle but the beaker is insulated.

Height 130mm
Weight 170g

Obtainable from Homecraft Supplies (Fleet St) Ltd

Approx. price £2



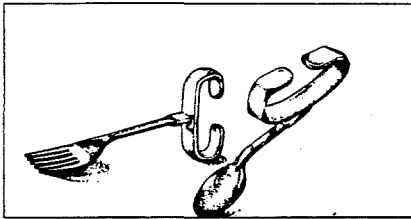
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SELECTACUP SYSTEM

Developed by St Bartholomew's Research Unit for the Handicapped

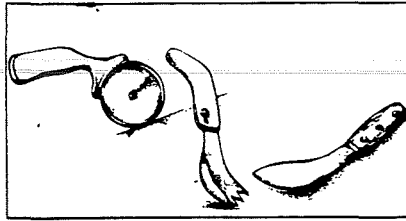
The modular system comprises small cups, lightweight and heavyweight mugs in clear Polycarbonate material, single or double white PVC girdles with slots to accommodate large or small handles. The handles can be bent additionally to suit individual requirements. A pack of handle strips which can be bent to any required shape or cut to provide a specially shaped handle is also available.

These palm utensil holders can be adapted to fit your hand and angled to make eating easier. About \$5-\$15.



Holder comes with utensil or separately.

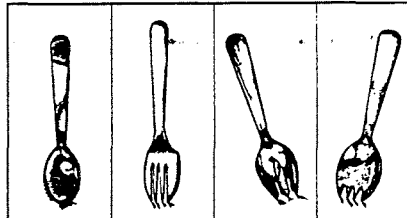
Speaking of angles, you can buy 'bent' or offset forks and spoons angled left and right in a variety of shapes. Knives come with straight or curved blades, either smooth or serrated, for easier cutting. The Nelson knife cuts easily with one hand rocking back and forth across the food. Another suggestion: an ordinary pizza cutter can be sharpened and used to cut food one-handed.



A one-handed eater can cut most foods with these knives.

Combination utensils are convenient if you don't use both hands or lack coordination. Known as 'knoons', 'knorks' and 'sporks', they come in several designs and

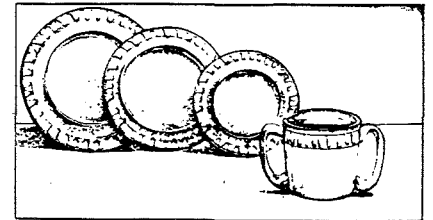
weights, some with built-up handles. A three-in-one utensil may be suited to your needs: a simple spoon with tines and a not-too-sharp cutting edge.



Combination cutlery costs \$10-\$25.

Tableware

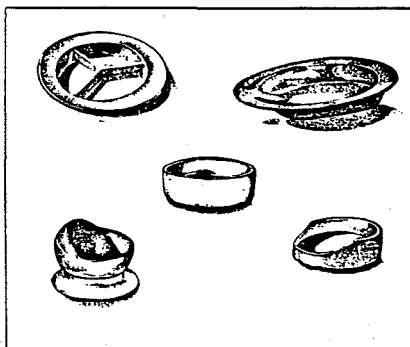
You'll find specially designed plates and dishes, cups and glasses described here. If you don't want to invest in new tableware, there are also some adaptations you can make to your own dishes to make them easier to use.



The two-handled mug in this set can be lifted with either or both hands without fear of scalding.

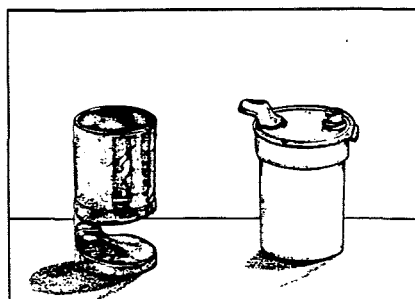
Several manufacturers have designed plates with a curved inner wall and a slightly raised rim to help guide food onto your fork. A heavier plate will prevent slipping and ensure that heat is retained longer.

Some other options: a non-slip scoop dish, which makes it even easier to push food on to your spoon; a partitioned plate; and dishes with high sides around all or part of the circumference. Available in ceramic or Melamine for \$15-\$20 each at medical supply stores.



A curved edge and high walls make scooping easier.

To make drinking easier, a cup on a pedestal has been designed for people with weak grips.



(Left) A pedestal cup is easy to grip. (Right) You can control the flow of liquid by pushing the rubber valve.

The lidded flow cup shown above reduces spills and controls the flow of liquids; particularly useful for people in bed. \$8.

Your medical supply dealer will probably have a selection of different cups, mugs and glasses for you to choose from.

Look for these features:

- easy-to-grip handle(s)
- good balance when full or empty
- insulation or large handles to prevent burns
- a wide base for good stability
- break resistance
- easily cleaned

Here are some products to adapt your own tableware:

- A plate guard in plastic or metal (\$15-\$25) will help put your food on your fork instead of on the table.

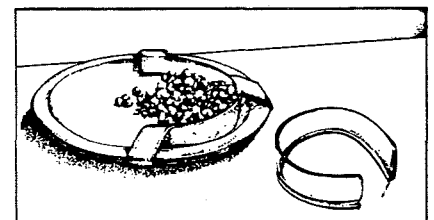
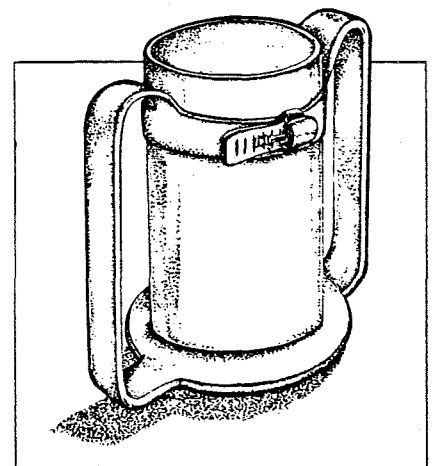


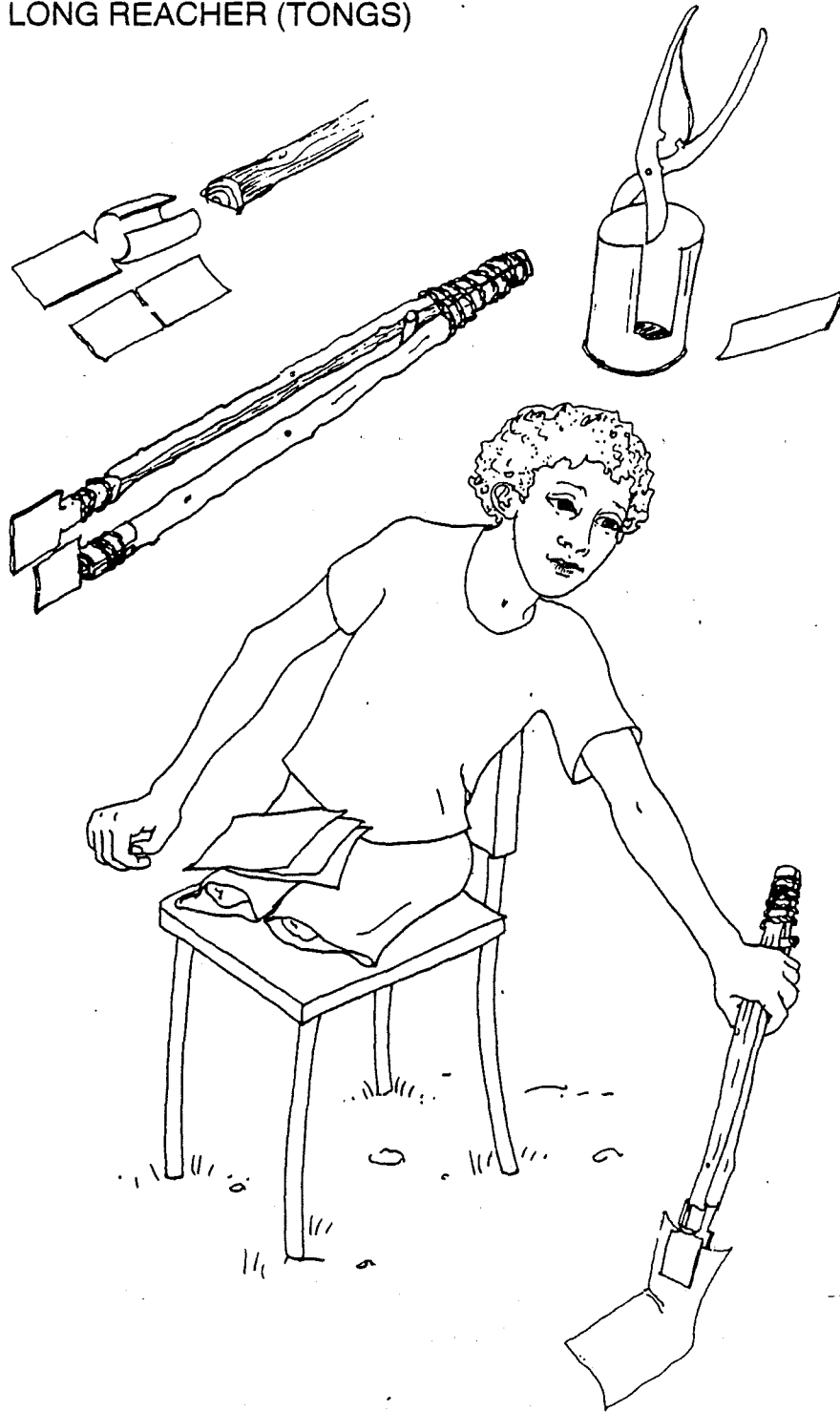
Plate guards come in different sizes for large and small plates.

- Non slip matting (Dycem, available at medical supply shops) keeps plates from sliding around. A damp cloth or suction cups can also be used.
- Handles and wide bases can be added to glasses or mugs for better stability. Buy them ready-made or improvise your own.



The plastic-coated steel glass-holder adjusts to fit most glasses. \$15.

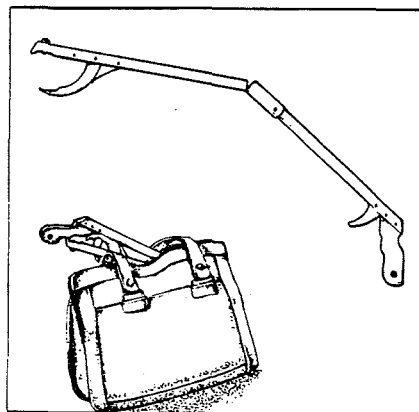
LONG REACHER (TONGS)





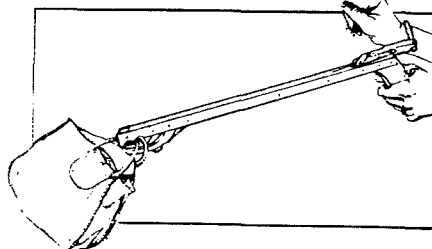
The most common reachers consist of a pair of jaws controlled by a trigger mechanism. Made of lightweight aluminum and plastic, they are available in several lengths. The desk-size model, measuring around 60 cm (24 in.), is useful for retrieving objects on your desk, kitchen counter or bedside table. The mid-range lengths, about 70 cm (28 in.), are most useful for everyday activities such as picking up objects from the floor or reaching high storage areas. An extra-long model at 80 cm (32 in.) is available if you need extended reach. Features you'll find useful include a magnet for catching metal objects and a projecting lug for pulling things towards you.

A *folding reacher* collapses to half its length to fit into pocket or bag.



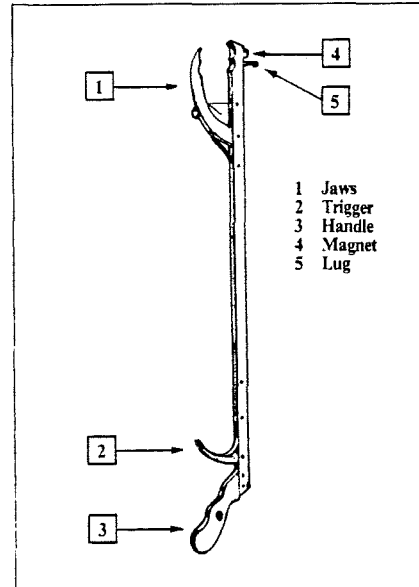
The folding reacher

A *retainer reacher* is useful if you can't operate a trigger mechanism; a toggle lever closes the jaws, which stay closed until released. Prices range from \$20-\$30.



The tip of the toggle lever on the retainer reacher can be turned to either side for right or left handed use.

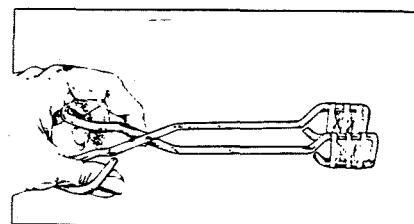
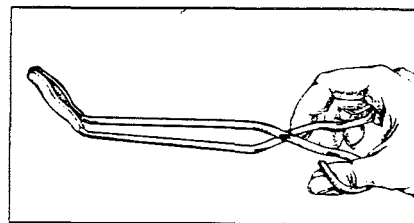
A strip of velcro or a metal clip will attach your reacher to a chair, walker, etc.



A standard reaching aid

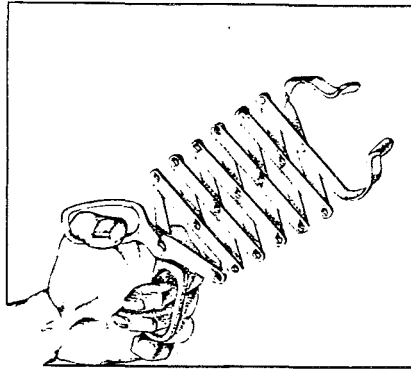
Remember that the effective weight of an object increases with the length of the reaching aid. Use it for lightweight articles.

Tongs are operated by a scissor grip which requires dexterity of thumb and fingers. Ordinary kitchen tongs will extend your reach by 15-20 cm (6-8 in.), which might be enough for you to operate a stove or washer with rear controls. Giant tongs, available at most housewares counters, will give an extra 40 cm (16 in.) and can be fitted with thick rubber bands to improve the grip.



Tongs — regular, offset, giant or barbecue — can be used as a reaching aid.

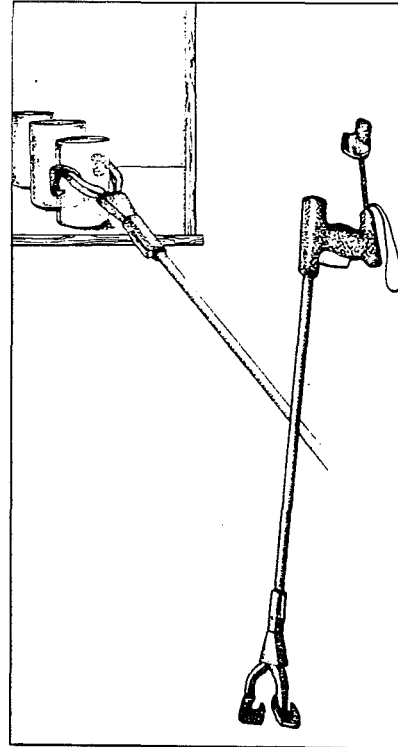
The illustrated Lazy Tongs extend to 46 cm (18 in.) to pick up light objects. Closed dimensions are 10 x 14 cm (4 x 6 in.).



Lazy Tongs are compact when closed.

For an investment of about \$40, this pistol grip reacher will increase the number of objects you can handle. The magnetized gripping claw has rubber pads and is shaped for both round and flat objects: cups and glasses, plates, bottles, pot lids, knobs and levers. The curved hook at the bottom of the tongs allows you to hook and pull large, heavy objects toward you. The wide trigger can be squeezed with all four fingers,

requiring minimal strength. Also available with swivel head and forearm extension for \$60.



The optional forearm extension provides more strength and leverage.

Using a Reaching Aid

By extending your reach, these aids can make your life a lot easier in many ways. Here are some ideas:

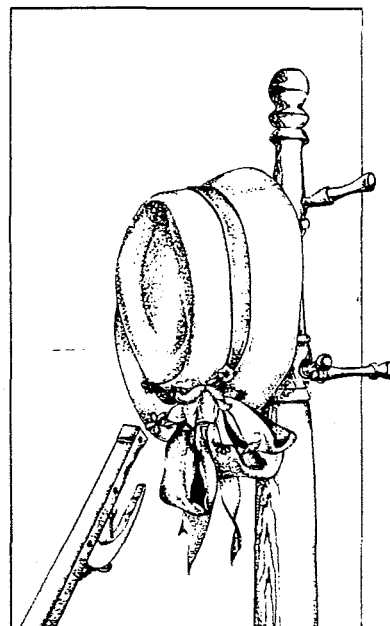
In the kitchen: Use a reacher to operate rear-mounted stove controls (you might have to change the knobs) and to move pots and pans, lids and hot dishes on the stove. Take a hot potato out of the oven or test a cake for doneness. Pull a muffin tin out of the storage drawer without bending over. Save the hard to reach shelves of the fridge for rarely used items; get at them with your reacher.

In the bathroom: Keep extra towels, soap and toilet tissue stored within reach of your aid until you need them. A foldaway grab bar or toilet rail can be pulled out with your aid.

In the laundry: Pull that elusive sock out of the washing machine and then out of the dryer.

Around the house and garden: Control of your environment can be easier when you use a reaching aid to adjust the thermostat, operate light switches, open or close high windows. Reach taps in the kitchen or bathroom that are otherwise inaccessible. Attach a cloth to your reacher and dust, wipe a steamed mirror, clean up a spill. Pick up litter, dead leaves or twigs and pull out weeds in your garden. You can cultivate the soil, use the hose and reach garden chemicals and equipment in storage.

Storage: Storage space that's too high or too low can be used for items you can handle with your reaching aid: boxes of cereal or crackers, small tins and spice jars; glasses, cups, bowls and baking tins; dishtowels, dustcloths, placemats, napkins and tablecloths. Arrange the storage of clothing, hats, footwear to suit the range of your reaching aid.



How to make the grip

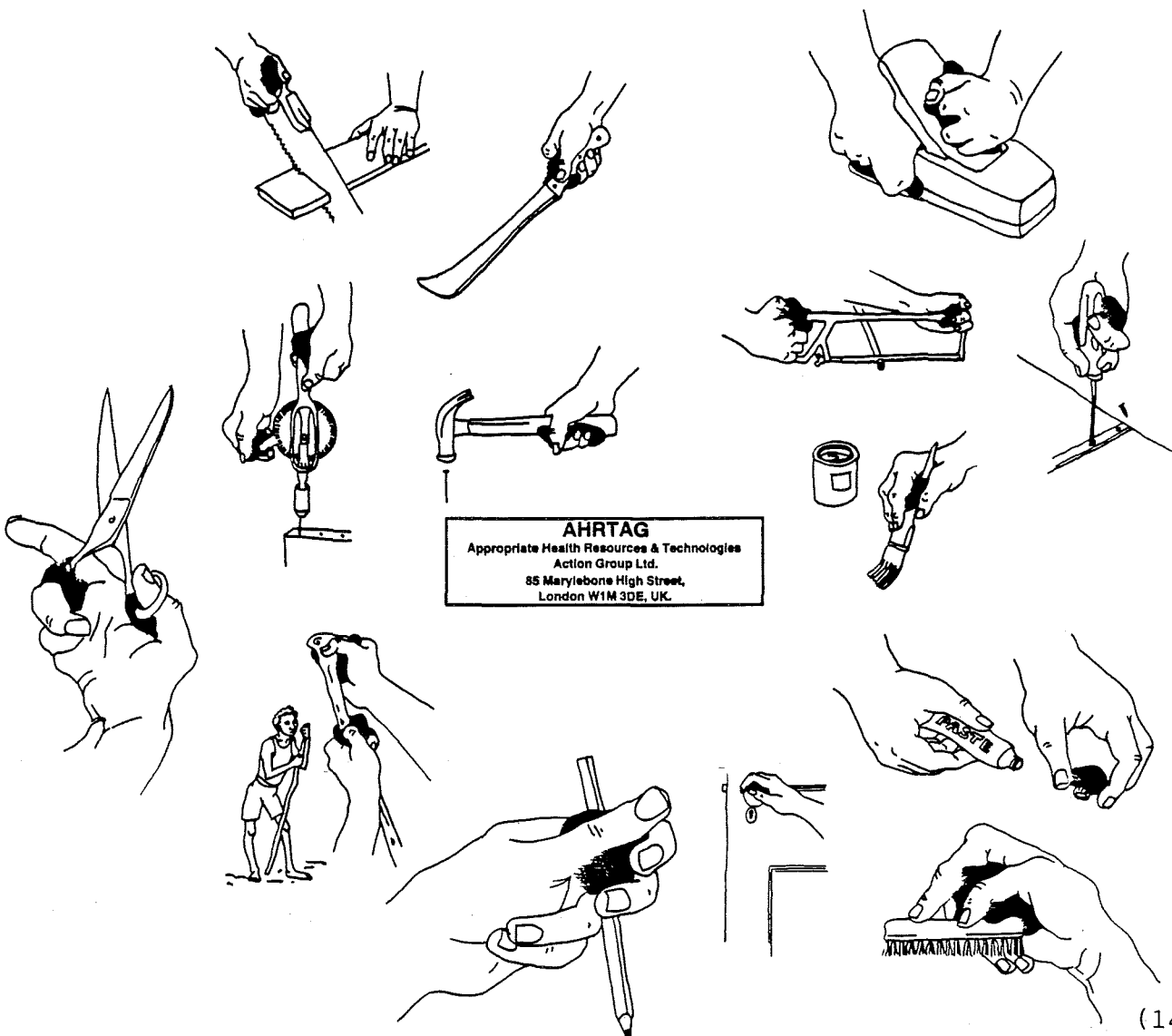
Hand grips can be made of:

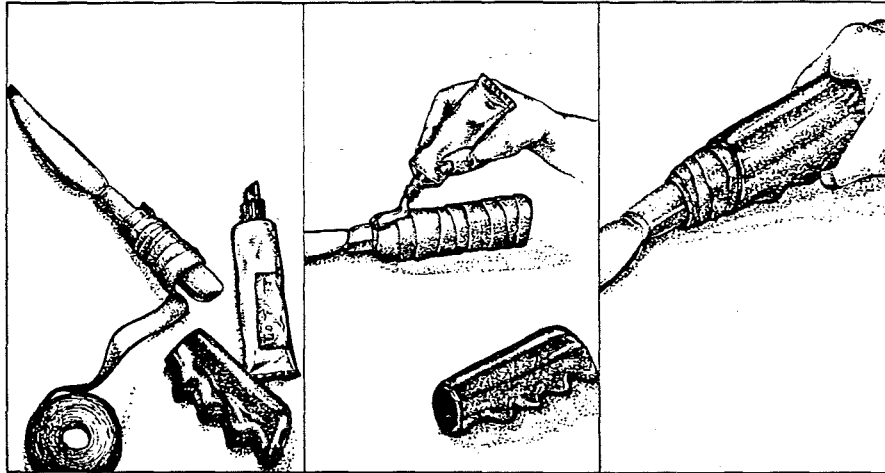
- **Clay** (modelling clay or clay from the ground).
- **Plaster** (modelling plaster or plaster used for building).
Clay and plaster can be mixed with short fibres or chopped up pieces of string to make them stronger.
- **Epoxy resin putty** (there are several brands available). This is the strongest material and can be immersed in water. Always follow the manufacturer's instructions.

2. Put it in the hand of the disabled person.
3. Put the item on which the grip is to be fixed into the material in the hand. With items such as pencils and forks push the end of the item through the material. Do not wrap it around the item.
4. Make the person hold the item in the way he would normally use it.
5. Press the person's fingers firmly in position so that a clear impression is made.
6. Leave the grip in place for a few minutes. Then take the item with the grip out of the hand and let it harden.
7. If the grip is made of clay, bake it in the sun. Cover with oil or grease to make it more resistant to water. Do not immerse the grip in water if you are washing the item.

To make the grip:

1. Take a small piece of the material and make it into a ball.

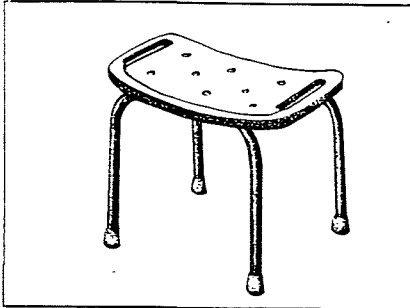




1. Build up handle with masking tape to fit snugly.
2. Spread with waterproof glue.
3. Insert handle and seal.

Bath Seats

The most common type of bath seat consists of a seat on four legs, usually with rubber or plastic feet, with optional back and arms. Let's look at these features separately to see how they might affect your choice.

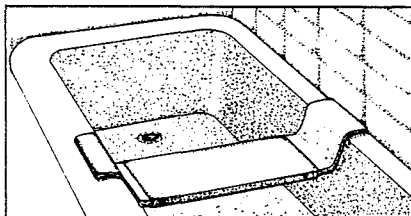


A simple bath seat; about \$50.

The seat should be made of a sturdy, water-proof, easily-cleaned material. Most seats are nylon, fiberglass, plastic—solid, perforated or mesh—or vinyl coated foam padding on wood or metal strips. The perforations and spaces between strips allow water to drip down into the tub. Plastic and vinyl coverings are easier to slide across; but if you need more friction to prevent slipping, the nylon covering might be better. Some seats are flat, while some curve up at the sides to fit your body's contours for extra stability. The dimensions of the seat are important, too: a deeper seat gives more support if you need it. Most seats range from 28-50cm (11"-19") deep by 43-66cm (17"-26") wide.

A bath seat can be removed from the tub to free it for other family members. Wipe it down after use and clean it occasionally with a mild detergent. A bleach solution can be used for disinfecting. Some models can be broken down for storage or shipping. Prices range from \$40 for a very simple seat all the way up to \$200 for deluxe models.

Other types of bath seats are available. The seat illustrated below adjusts to the width of your tub and rests on the rim. While it does not offer as much support or stability as other bath seats, it is light and portable (about \$50).

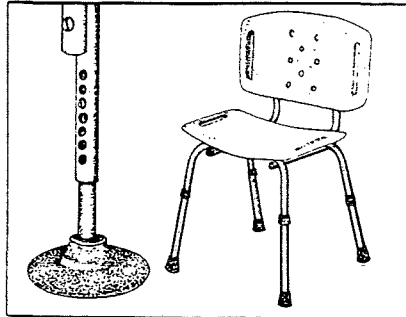


Across-tub bath seat.

Do it yourself:

You can make your own 'bath board' from a plank or piece of plywood cut to size, well-sanded and painted with a waterproof plastic coating. Suction cups or rubber strips will add stability.

The length of the legs is another factor to consider. Some seats feature adjustable legs; other models come in a range of fixed lengths. If you are certain of the height you need, fixed legs are usually less expensive. However, if you are unsure of your needs or if you have a changing condition, choose adjustable legs.



Adjustable legs.

How high should your seat be? A seat at the level of the edge of the tub (the highest option) makes transferring easy; but you will have to bend to reach the water in the tub if you are having a bath, requiring a flexible spine and good balance. A telephone shower eliminates this problem. A low seat is closer to the water and involves less bending during bathing, but you'll need enough strength in your arms and legs to climb in and out of the tub. A seat at mid-level is useful as a half-way point when getting in and out of the tub.

You should feel confident about the ability of the bath seat to support your weight. Tubular legs are the strongest. They usually come in anodized aluminum, chrome plated or plastic coated, all of which are rust resistant.

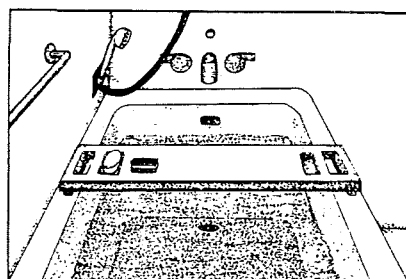
Organizing

Your bathing will be easier if everything you need is close at hand, preferably within arm's reach. If you have a reaching aid, put it beside the tub before you get in so you can use it when needed. If you bathe in a tub rather than showering, a shelf can be bought or made to sit firmly on the edges of the tub to hold soap, brushes, a magazine.

Make it yourself: bath shelf

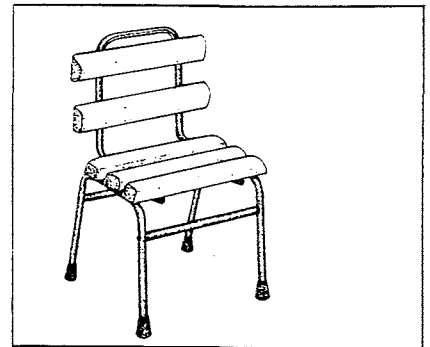
Cut a piece of 3/4" (2 cm) plywood about a foot (30 cm) wide and long enough to fit across the tub (usually 30" or 75 cm).

Paint or varnish it with waterproof paint and attach suction cups or rubber strips to the ends for stability. You could mount a small nail brush on the board, attach a plastic soap dish, or add an easel to hold reading material.



Have a look at the feet on a bath seat when you're buying. These prevent the seat from shifting or tilting while you use it. Most are rubber or plastic, with rubber providing a little more friction; suction cups are available on some models. Some bath seats are stabilized further by clamps, which secure the seat to one tub wall, or by braces pressing against the tub walls.

An optional back on a bath seat will provide support for your upper body for balance and resting. Make sure the height of the back and the angle are suitable for your needs.

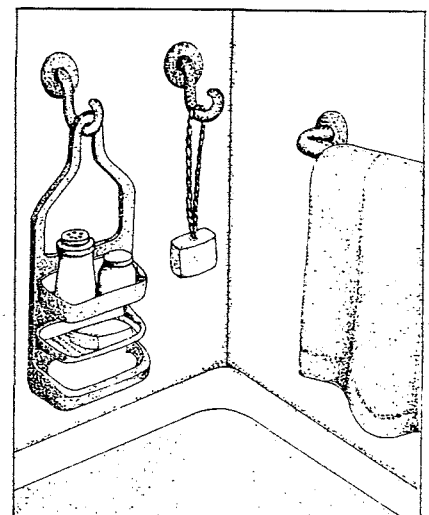


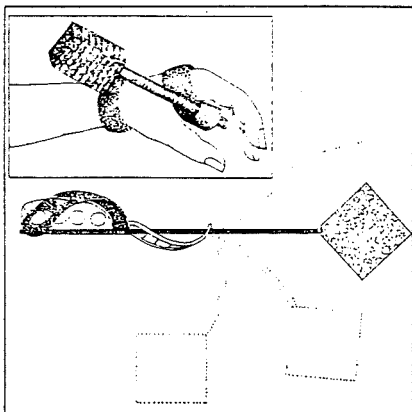
Soft padding on this chair helps to prevent skin irritation.

An arm on the inner edge of the bath seat is another option for better stability. Use it as a grab bar for balance and support when transferring or bending.

You'll find a wide variety of hooks that can be attached to walls and tile for hanging towels, washcloths, brushes; place them within reach. Use a grab bar as a towel rack.

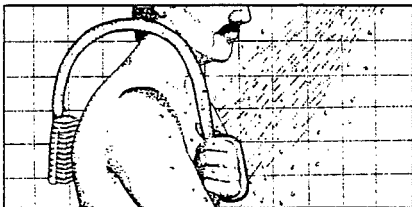
Soap-on-a-rope is always handy, and the new squeeze bottles of soap and shampoo hang on a bar or the shower fixture to be accessible. A shower caddy attaches to the wall and will hold soap and bottles.





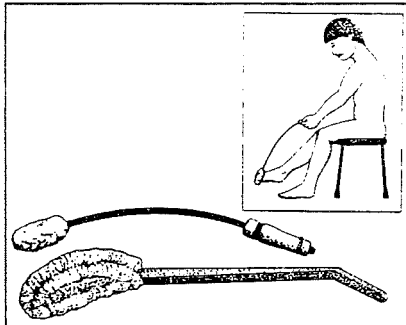
This flexible sponge brush bends to suit your needs.

- Long handles will let you reach more parts of your body without bending. You'll find special brushes with bent handles at some medical/surgical supply stores. These help you scrub your back and other hard to reach parts.

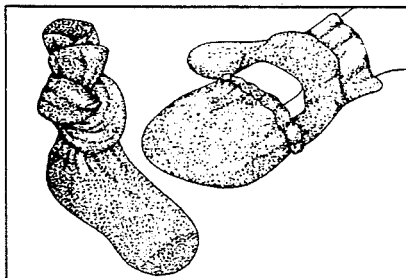


- A nail brush mounted on suction cups (you could adapt this yourself) is available for one handed scrubbing. Attach it to the side of the tub, the basin, or even the wall beside the tub—wherever you get the best angle.

- To scrub your feet and around and between your toes, an ordinary bathroom brush can be used; or make a mini-brush with a piece of sponge glued to a handle (a piece of dowel or even a bent coat hanger) to reach between your toes.



- Make yourself a scrub mitt out of terry cloth. Sew a pocket in the palm to hold a bar of soap (or soap chips) and use Velcro or elastic on the cuff. Or use a sock: tie some soap and a few odd pieces of sponge into a sock to make a fist sized scrubber. A sponge mitt is available for \$10 at some medical/surgical suppliers or the carwashing section of a hardware store.



- Another way to scrub your back (and other parts of your body) is to attach a piece of terry cloth, sponge or loofah to a strip of sturdy fabric or plastic to pull from side to side. (A loofah is a rough, spongy material frequently used for scrubbing and very good for stimulating the circulation.) These scrubbers are available for sale at medical/surgical supply stores, complete with Velcro closures, but you could probably make your own.



Design a scrubber to reach your back, thighs and calves; use the same design for drying off.

Workshops

Workshop Design

General

This chapter summarises the types of workshops which can be set up for the production of mobility and technical aids for the disabled as well as the general production of consumer goods. The type and size of workshop can range from the simplest and most basic to a large well-equipped one with many workers.

Points to consider when designing a workshop are given along with some examples of different types. The type and size of workshop will depend on the resources available, the type and quantity of product being made or repaired, and the number of people working in the area.

Basic Workshops with 1 - 6 Craftsmen

Requirements

There are several fundamental rules or basic specifications that all workshops must follow. A well designed workshop should be:

- simple in design;
- simple and easy to construct;
- large enough so that there is adequate room to work in;
- as low cost as possible and built with local materials;
- as cool as possible in hot climates;
- designed to have the potential for expansion and improvement.

(10,20)

Other points to consider when designing a small to medium sized workshop are the following:

Security

Workshop tools are expensive, liable to be stolen and easily ruined if they become rusty. Therefore, the workshop must be waterproof and secure against theft. To reduce the cost, a small workshop can be open-sided and the tools and materials kept in a secure store, perhaps a room of the craftsman's house. However, it is better if the complete workshop can be locked. Tools and small parts which might be stolen by customers or onlookers are best stored as far as possible from the door.

Openings

Windows should let in as much light as possible but should not face the afternoon sun.

The doors should also be 2 m wide so that large objects made inside the workshop can be carried out.

Blacksmithing and Welding

Blacksmithing is best done away from direct sunlight, so that the colour of hot metal may be seen easily. Blacksmithing and welding may cause a fire if they are done in a wooden building. For the same reason, the woodworking section of a general purpose workshop should be as far as possible from the blacksmithing and welding sections. Blacksmithing and welding produce quantities of unpleasant fumes and should therefore be done in a well-ventilated area.

Electric arc welding produces a dangerous light which is hazardous to any casual onlooker. It is essential therefore to design the workshop to protect other workers and visitors from the light.

Floors

Concrete or stone floors are easiest to keep clean, but tools may be easily broken if dropped onto hard floors. Rammed earth is a cheap method of flooring a small workshop.

Storage

The best way to store tools is on boards with the silhouette of each tool painted so that missing tools can be identified immediately. Materials are liable to be stolen and should be kept in a secure store. Timber must be kept dry and stored so that it can be easily inspected for termite damage. Rust on steel is bad for cold metal cutting tools; rust on steel for blacksmithing is less serious. Steel and timber are often supplied in lengths from 3 metres to 6 metres, which are best stored horizontally on racks and located so that the materials can be brought in through the door and stacked without being turned. Shorter lengths can be stored upright. Shelving with compartments is necessary for storing small items such as different sizes of screws, nails, bolts, and nuts.

Power Tools and Equipment

If there is no reliable electricity supply, it is best to use hand tools, thus eliminating problems with the supply, mechanical failure and cost. Some workshops find that there is little or no time saved with power tools. However, if gas is difficult to obtain for oxy-acetylene welding, an electric arc welder is recommended.

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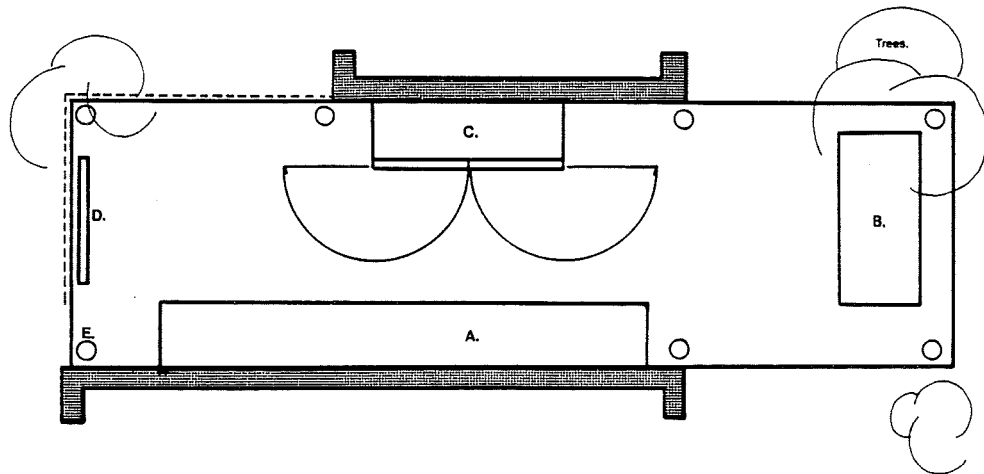
Examples of Basic Workshops

Basic Orthopaedic Workshop

A workshop was built in Khartoum to produce orthopaedic aids for the disabled. It was a wooden framed lean-to with a white painted tin roof to reflect the heat. The ends were left open to make use of any draughts and under some trees for extra cover from the sun. The whole floor was then finished off in concrete. Later a rush screen was fitted across part of one end as a shade from the afternoon sun.

In the same workshop a long wooden bench was placed against one wall which was used for general wood and leather work with room underneath for storing long lengths of wood and metal. The bench was also used for measuring and fitting the clients with their aids. A moveable metal bench for welding and metal work was positioned in the most open part of the workshop. A lock up cupboard was placed against the other wall for storing all the materials and tools. The tools were displayed on the open doors for easy access and at the end of the day everything could be stored away and locked up in the cupboard. A large blackboard used for full size designs was placed at one end of the workshop.

(20)



Key to the Workshop Plan

A WOOD BENCH

The height of the work bench is very important. This was 90cm. with a depth to the bench of 75cm and an overall length of 4 metres. To make it stable it was fixed to the wall and made of very thick pieces of wood with a strong plywood top. A 13cm jaw vice was fixed to the centre.

B METAL BENCH

2 metres by 0.8 metres with a working height of 0.85 metres, made from a 5cm square angle iron and a 4mm sheet metal top. A 15cm heavy duty metal vice was fixed at one end.

C CUPBOARD

1.5 by 0.6 metres and a height of 2.5 metres as it was built against the wall from floor to roof, with a strong wooden frame and plywood outside.

D BLACKBOARD

This was made from one large piece of hardboard 2 by 1.5 metres with a wooden framework, and painted over with two coats of blackboard paint.

E FRAME

Made from 10 by 10cm wood. The base was fixed into the concrete and the tops bolted together, this held up the corrugated tin roof but was also very useful for hanging things up.

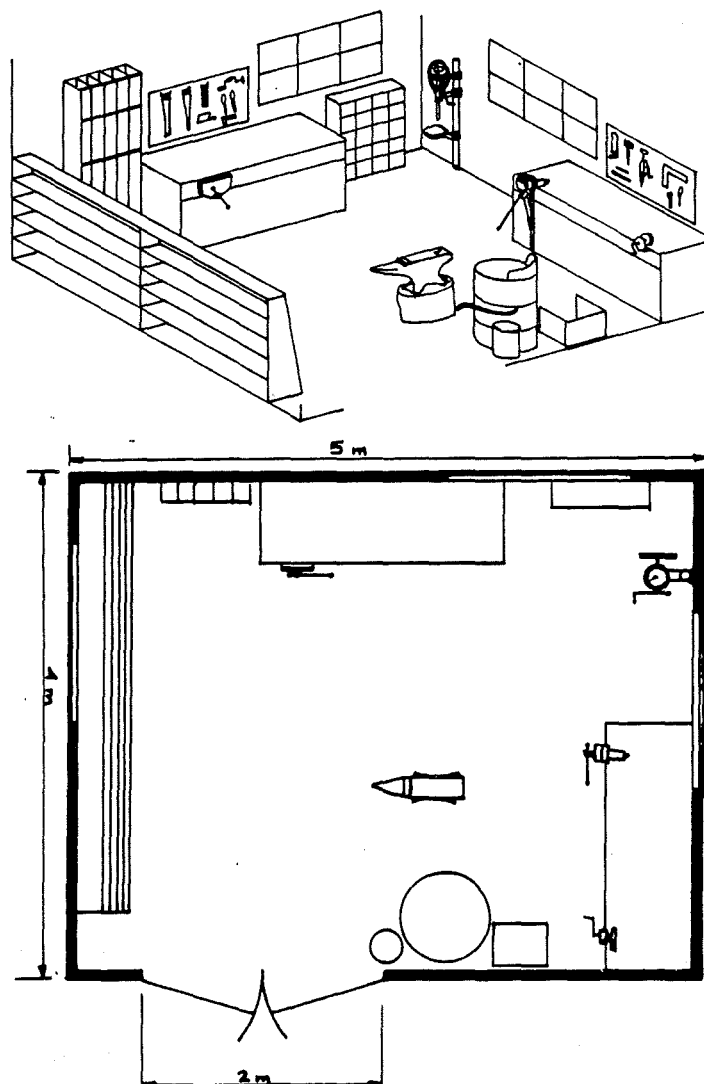
nb. For reinforcement of wooden edges such as the front edge of the bench, angle iron can be counter-sunk and screwed on.

Basic Workshop for 1 - 2 Craftsmen

Some important features of this general purpose wood and metal workshop are:

1. The doors are 2 m wide so that large objects made inside the workshop can be carried out.
2. The horizontal racks for storing long lengths of wood and metal are located so that the materials can be brought in through the door and stacked without being turned.
3. There are vertical storage racks for short lengths of material.
4. Small tools are hung on boards over the workbenches.
5. The benches receive light from the windows.
6. The blacksmithing area is near the door (for ventilation), away from direct sunlight and away from the woodwork area.
7. Tools and small parts which might be stolen by customers or onlookers are stored as far as possible from the door.
8. Equipment used for both wood and metal work (e.g. a post drill) is located between the woodwork and metalwork benches.

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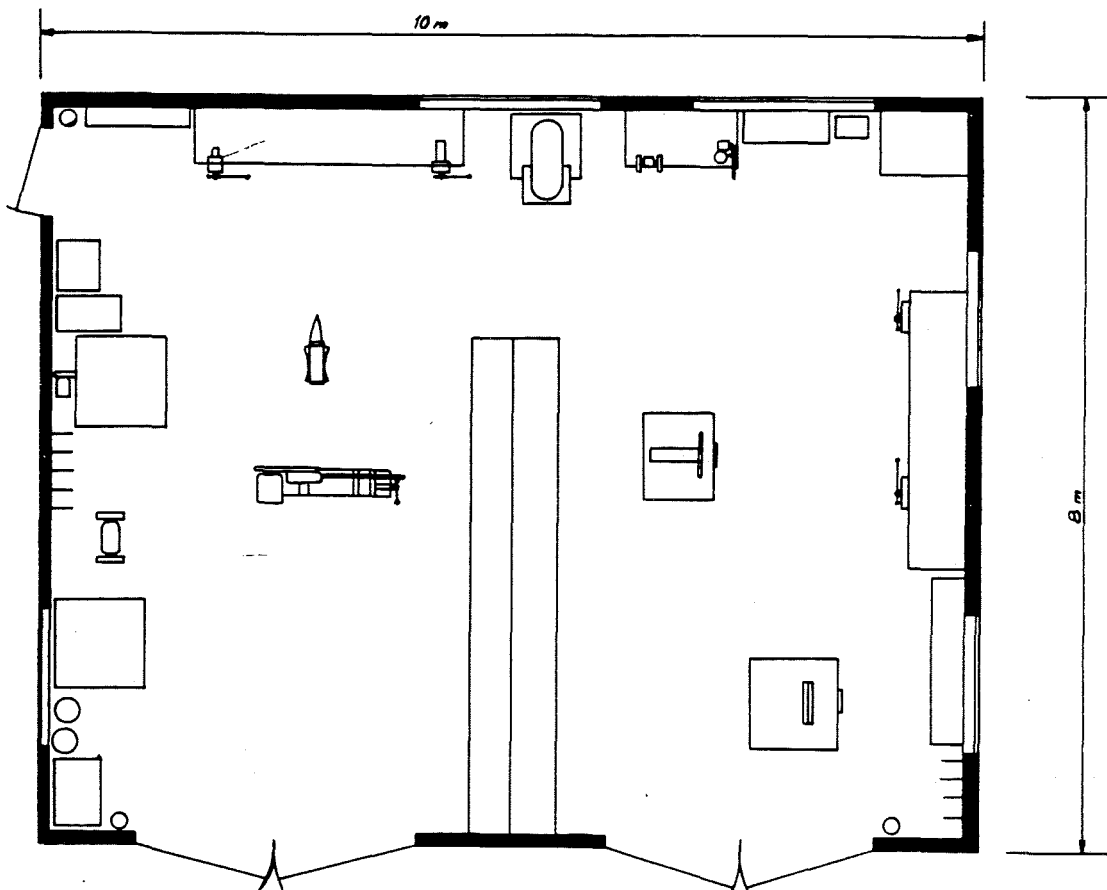


Workshop for 4 -6 Craftsmen

The principles of workshop layout are the same as those used to design the small workshop for one or two craftsmen. Features of the workshop for four to six workers are:

1. The doors are 3 metres wide so that large objects and motor vehicles can enter the workshop.
2. The welding equipment is close to the door so that it can be taken outside for work on large objects.
3. The pedestal grinder is located near the welder because it will be used to prepare the metal for welding.
4. The power hacksaw is located so that long pieces of metal can be taken from the storage racks and sawn with minimum effort.
5. The circular saw has its greatest advantage over hand tools when ripping (sawing along the length of the grain) and it is therefore located for easiest rip sawing.
6. Fire extinguishers are placed near each door.
7. A workshop of this size will need to keep proper accounts. A desk, wash basin and first aid kit are located in what is likely to be the cleanest part of the workshop.

(11)



Vocational Training Centres

Requirements

If a workshop is to be used for vocational training, a somewhat more elaborate arrangement is necessary. A separate room or space need not be assigned for each requirement since "doubling up" is possible in many areas. Training workshops are often divided into "clean" and "dirty" spaces. Normally a basic training workshop requires:

- storage space for raw materials;
- storage space for finished work;
- storage space for tools and small moveable equipment;
- a workroom for instructor;
- an area in which a group of students can watch a demonstration;
- space for fixed machinery;
- workspaces for individuals (not at machines)
- common work places to which all students may come;
- a space for students to plan projects (making drawings, estimates, etc.);
- a place for changing to work clothes and washing up;
- storage space for students' books and belongings.

(10)

Other points to consider when designing a training centre for the disabled are the following:

- machinery for a vocational training centre normally would be larger and heavier than that required for a normal small-scale workshop, particularly if woodworking and metal trades were to be taught. Workshop doors should be wide enough to allow for bringing in and manoeuvring the machines. It might also be necessary to reinforce the floors on which the machines could be installed by adding reinforcement steel and/or concrete.

- the layout should be carefully planned to allow adequate room for free movement around the machines. Floors should be designed to prevent the possibility of trainees slipping on them.

- if electric power is to be used, the cables connecting the supply to the machines should be placed under the floor to avoid hazards to the trainees.

- a rest room with first-aid facilities should be provided.

- the office accommodation required would depend on the size and services offered by the centre and whether or not it was being run in association with a vocational assessment and work preparation centre. If it was, for example, the conference room might serve a dual purpose.

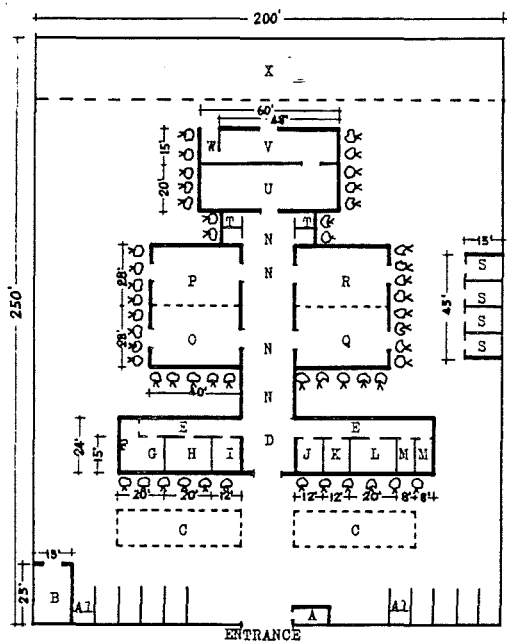
- storage accommodation might need to be bigger because spare parts and more expendable timber and metal would be required.
- if the centre planned on being all or partially self-sufficient in food production or provided training in agricultural and horticultural work, animal husbandry and poultry-keeping, a plot of ground for this purpose would be necessary.
- if there was no access road to the site, one must be made.
- the type of construction material used will depend on the availability of the materials and the climatic conditions.
- buildings preferably should be single storey with wide doors, and ramps in place of stairs or steps to facilitate wheelchair movement.
- toilet arrangements should be modified to allow for their use by wheelchair cases.
- ventilation, heating, fans or air-conditioning should be provided according to climatic needs.
- workshops should be built away from the administrative and clerical accommodation to prevent machinery noises from interfering with this type of work.
- paths between the administrative section and the workshops should be covered.
- workshops should be sufficiently large to house the equipment and to facilitate training and supervision.
- dividing walls between workshops, offices, etc, should be constructed of light materials to facilitate removal if changes in layout become necessary.
- in areas where noisy machinery is used, some sound-proofing should be attempted, particularly where concrete is used as the building material.
- if the centre is located in an area which is subject to sand or dust storms, particular attention should be paid to the means used for ventilation as sand or dust can have a serious effect on machinery.
- a kitchen and canteen or dining room would be required if meals were to be served on the premises
- a large room for use as a gymnasium should be provided or an open-air space.
- adequate office and storage accommodation should be provided.

- a plot of ground suitable for use as a kitchen or market garden or other outdoor work should be provided.

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Examples of Vocational Training Workshops

Vocational training workshops are usually larger and more complex buildings because of the large number of functions that it must fulfill.



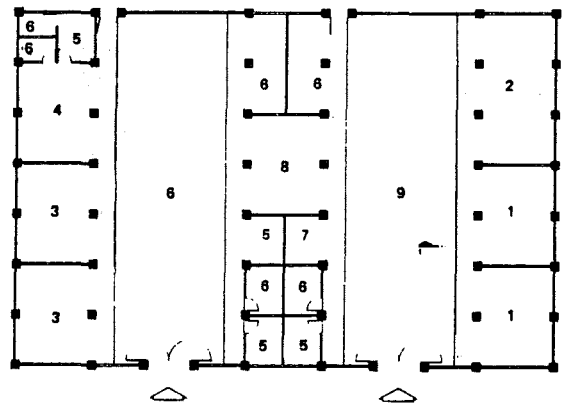
- A. Enquiry Office
- A.l. Car Parks
- B. Garage (if required)
- C. Flower and Shrub Beds
- D. Reception Area
- E. Corridor
- F. Case Conference Room
- G. Centre Manager
- H. General Office and Typist
- I. Rest Room (Staff)
- J. Social Worker
- K. Placement Officer
- L. Medical Room
- M. Staff Toilets
- N. Covered Passage
- O. Woodwork
- P. Engineering
- Q. Bench and Assembly Work
- R. Educational, Clerical
- S. Stores (incl. Cleaners)
- T. Rehabilitatees' Toilets
- U. Canteen
- V. Kitchen
- W. Food Store
- X. Gardening, Agricultural and Outdoor Work

Notes: QQQQQ - Trees (for shade) and grass where desired.
 O.P.Q.R.S. - Partitions between should be light construction to facilitate adjustments.
 T - Toilets will require adjustment if wheelchair cases are admitted.
 Doors - All doors should open outwards; emergency exits provided in O.P.Q. and R.
 N - Section between E. and O.Q. should be covered but need not have side walls.

OUTLINE SKETCH OF A VOCATIONAL ASSESSMENT AND WORK PREPARATION CENTRE FOR 40-60 DISABLED PERSONS

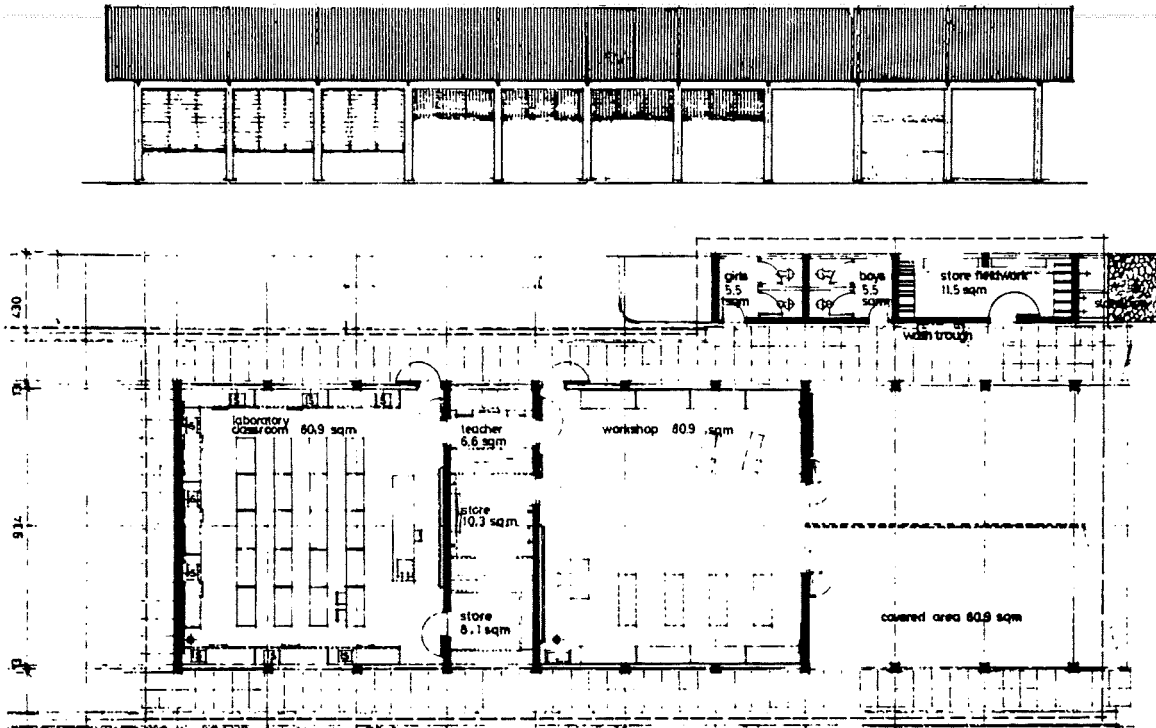
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- Key:
- 1. Metal work shop
 - 2. Masonry and concrete work
 - 3. Wood work shop
 - 4. Textile and leather work
 - 5. Office
 - 6. Store
 - 7. Forge
 - 8. Teaching assembly
 - 9. Assembly yard



Internal layout of the school at Alcada.

(10)



Plan and layout of the Kisarawe design made by Cappelen & Rodahl of Oslo, for the Ministry of National Education for an agricultural unit of a secondary school.

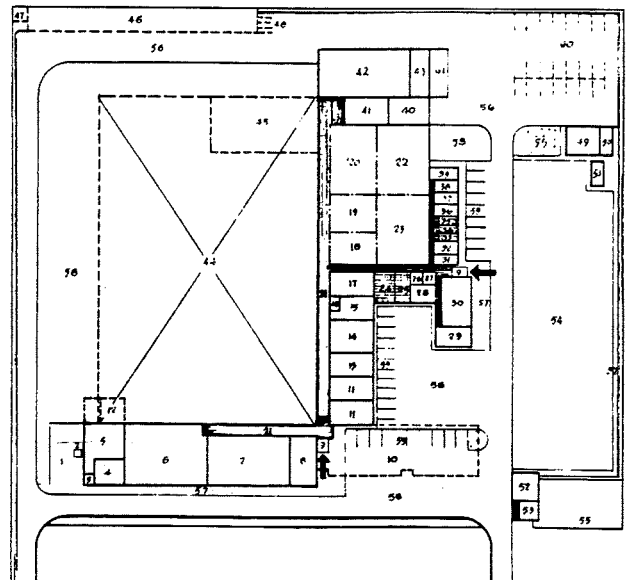
(10)

SUGGESTED PLAN OF A "100 PLACE"
INDUSTRIAL REHABILITATION UNIT
(With provision for the addition
of a Vocational Training Centre)

Key to Plan

- | | |
|--|------------------------------|
| 1. Yard | 31. Reception and Typists |
| 2. Free Standing Flue | 32. Centre Manager |
| 3. Supply Meter Room | 33. Toilets |
| 4. Oil Store | 34. Female Toilets |
| 5. Boiler Room | 35. Male Toilets |
| 6. Rehabilitees' Dining Hall | 36. Social Worker |
| 7. Kitchen | 37. Centre Placement Officer |
| 8. Staff Dining Room | 38. Psychologist |
| 9. Ramp | 39. Workshop Manager |
| 10. Future Vocational Training Centre (VTC) Administration Block | 40. Oil and Paint Store |
| 11. Lecture Room | 41. Finished Products Store |
| 12. Proposed Sub. Station and Switch Room | 42. Main Store |
| 13. Education Room (VTC) | 43. Steel Store |
| 14. Medical Room | 44. Future VTC Workshop |
| 15. Education Room (Rehabilitation) | 45. VTC Workshops Extension |
| 16. Education Office | 46. Future VTC Outdoor Store |
| 17. Allocation Section | 47. Incinerator |
| 18. Light Engineering and Miscellaneous Section | 48. Scrap Bins |
| 19. Bench Engineering Section | 49. Garage |
| 20. Machine Operating Section | 50. Garden Store |
| 21. Corridor | 51. Greenhouse |
| 22. Clerical Section | 52. Clocking Station |
| 23. Woodwork Section | 53. Timekeeper's Office |
| 24. Toilets - Male | 54. Garden |
| 25. Toilets - Female | 55. Grassed Area |
| 26. Cleaners' Store | 56. Tarmac Road |
| 27. Stationery Store | 57. Concrete Slab Paving |
| 28. Workshop Instructors Rest Room | 58. Concrete Finish |
| 29. Conference Room | 59. Car Park |
| 30. Testing Room | 60. Future Car Park |
| | 61. Cycle Shed |

(Based on plans provided by the Ministry of Public Buildings and Works, London, S.E.1.).



SCALE - 1/4" = 1' - 0" (1/100)

(45)

Mechanical Workshops

Mechanical workshops which serve agricultural vehicles and machinery, or motor vehicles and stationary power units in an average sized mechanized farm has special needs and requirements which need to be taken into consideration when they are designed.

The main purpose of this type of workshop is to provide a centre where all farm tools and machines can be stored when not in use, where repair tools and supplies can be kept and machines can be regularly serviced. Unless it is a large farm, only minor servicing and preventive day-to-day maintenance, such as lubrication and minor adjustments, will be carried out since it would not be economical to install equipment, or maintain staff to perform major overhaul work.

Requirements

Safety

Since all equipment will be stored and serviced at this centre, lubricating oils and greases should also be stored in the building. Care should be taken however to avoid the accumulation of oily rags which present a fire hazard. It will also be the place where motorized equipment is refuelled but because of the fire hazard, engine fuels should not be stored in the building, but in an underground or overhead tank located at least 20 metres from it. If fuels are supplied in barrels, these should be stored under shelter from sun and rain at the same distance from the workshop as recommended for tank storage.

Location It is desirable that the workshop and machinery storage building be located relatively close to the work centre of a farm since it can also be used effectively for vehicle storage whether animal drawn or motor-operated, thus avoiding the necessity of constructing another building for this purpose. It should be on relatively high and level ground to provide good drainage and easy manoeuvring of equipment. It should face on a main farm road or yard. Where electric power is available the proximity to power source should be considered to avoid unnecessary line construction.

Design

A satisfactory and very common design is a rectangular building approximately 8 metres wide with a total length of approximately 20 metres. One half of the workshop should be partitioned off, made weatherproof, and provided with wide entrance doors and a solid, smooth, hard-surfaced floor. This will serve as the service shop. The remainder of the building will be used only for machine storage. With this arrangement, stored machines can quickly and easily be moved into the shop section for repairs when time permits.

Depending on climatic conditions, the storage section may be completely open along the front. Only in climates where driving rain or snow is common for long

periods should doors be fitted. It need not have a hard surface floor. However, the floor level should be at least 15 cm higher than the surrounding ground level to ensure that the rain does not run in during the wet season. The shop section should have plenty of window space on the side opposite the main doors. The storage section, particularly if the front is left open, does not require windows.

If motor vehicles are to be serviced, a small covered pit is most useful and can be cheaply and easily constructed at the time the workshop is built. For agricultural tractors and machines, however, there are few occasions when a pit is required.

Construction

Materials used for construction will depend mainly on local conditions. Fireproof construction is of course, desirable. In any case the roof should be of low or non-inflammable material. A roof structure should be used which will avoid the necessity of supporting pillars in the building, as these greatly cut down the useable floor space. There should be a minimum 3 metre height clearance at the entrance doors and throughout the whole building.

In cold climates the walls of the shop section should be insulated. If a gable-type roof is used, a ceiling should also be installed so the shop can be more easily heated to permit repair work to be done during the slack winter season. Space above the ceiling provides good storage for lumber and supplies.

Tools and Equipment

This shop should be considered as a machinery headquarters for the farm rather than essentially an overhaul shop. The average farmer will not have the training to do major overhaul work and cannot afford to own the tools and equipment necessary to do such work properly. Tools and equipment recommended are only those required to perform day-to-day maintenance on machines and to carry out general repair work and small construction jobs that are required on farm buildings and equipment.

A solid work bench attached to the wall and fitted with a vice is most essential. Bins should be provided for storage of nails, screws, staples, nuts, bolts, etc. and for commonly required spare parts.

(3)

Example of Mechanical Workshops

An example of the design and layout of a mechanical workshop which follows the basic principles and requirements is given below.

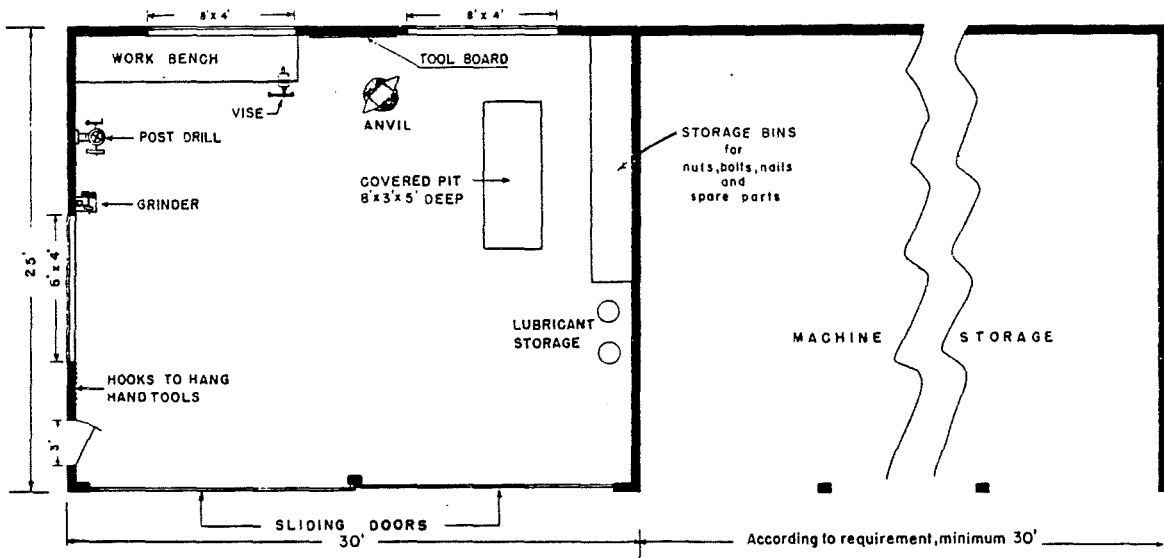
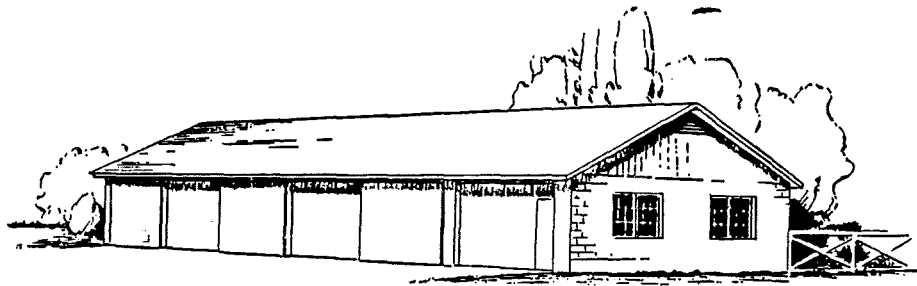


FIGURE 1. Farm workshop and machinery storage plan



(Courtesy Illinois Circular 702)

FIGURE 2. Typical combination farm workshop and machine storage building

Tools and Equipment

General

Only well-known and reliable equipment should be used. Anyone setting up a workshop in a remote part should select well-known makes of equipment whenever possible. They should not make the mistake of buying cheap equipment and make sure that any spare parts which might be needed are still produced by the manufacturer.

Hand power tools are used a great deal these days. When buying these tools, ask the manufacturer or dealer if there is a heavy duty range available. Heavy duty tools are often much stronger than the handyman range and more suitable for use in a workshop.

The type and number of tools which are provided in a workshop clearly depend on the type of product to be made, the work to be done and the number of people working in the workshop. The tools listed here are those which would be suitable for general purpose wood working and metal working enterprises which might be called on to make or repair a very wide variety of goods. Specialist workshops would require rather different equipment.

The hand tools listed in the list of basic equipment can be used to do the same work as the much more costly power tools, with the exception of welding. Power tools only speed up the work, and are not economic unless there is enough work to keep them in use for a substantial part of each day.

(11)

The following are lists of equipment suggested in "Equipment for Rural Workshops" by John Boyd (11).

Basic Woodworking Equipment (for 1-2 person workshop without power supply)

(It is assumed that the craftsman would make his own work bench, sawing horses and bench hook.)

- work bench (800 mm high, 650 mm wide and 2500 mm long)
- woodworking vice (cast iron bence vice with 200 mm wide jaws)
- sawing horses (pair)
- cross cut hand saw (with 700 mm blade)
- bow type log saw
- rip hand saw
- tenon saw
- compass saw
- coping saw
- bench hook
- mitre box

- felling axe
- hand axe
- drawknife
- wood rasp (either solid, half round, or with interchangeable flat and half round perforated blades.)
- adze
- jack plane (350 mm long)
- claw hammer (0.5 kg)
- square edged firmer chisels (5 mm and 25 mm wide blade)
- mortice chisel (5 mm wide)
- wooden mallet
- pinchers (with 150 mm long handles)
- G-clamps (two, 300 mm long)
- bradawl (2 mm wide blade)
- gimlet (3 mm diameter)
- carpenter's ratchet brace with auger bits (5, 10, 15, and 25 mm)
- expanding bit for above brace (for holes from 15 - 30 mm)
- countersink bit for above brace
- screwdrivers (150 mm long, 3 mm wide blade)
(250 mm long, 5 mm wide blade)
- set squares (200 and 500 mm)
- rule (1 metre folding)
- tape measure (2 metre metal roll-up tape)
- marking gauge
- carborundum oil stone (200 mm long and 50 mm wide with coarse and fine grits)
- triangular file (100 mm long)
- grinding wheel (either hand or treadle operated with carborundum or standstone wheel)
- goggles

Additional Useful Woodworking Equipment (for above workshop)

- two man log saw (1.5 m long)
- bow saw
- spring saw set
- block plane (150 mm long)
- spokeshave
- cross pein hammer (0.1 kg)
- bar mounted clamps (2 m long)
- square edged chisels (10 mm wide and 15 mm wide)
- mortice chisel (10 mm wide)
- hand drill (with 6 mm capacity chuck)
- set of straight-fluted bits or twist bits (from 1 mm to 6 mm diameter)
- breast drill (with 12 mm capacity chuck)
- set of flat drill bits (for 10, 15, 20, and 25 mm holes)
- hand operated post drill (with 12 mm capacity chuck)

Power Woodworking Equipment (for the above workshop)

- electric hand drill (with 12 mm capacity chuck)
- vertical drill press stand (for electric hand drill)
- horizontal bench stand and 75 mm diameter carborundum wheel (for electric hand drill)
- circular saw attachment (for electric hand drill)
- jig saw attachment (for electric hand drill)

Power Metalworking Equipment (for 1-2 person workshop)

- electric hand drill (with 12 mm capacity chuck)
- vertical drill press stand (for above electric hand drill)
- horizontal bench stand
- 75 mm diameter carborundum wheel for electric hand drill
- transformer type a.c. welder with set of accessories
- twin carbon arc torch and head shield for transformer welder

Power Woodworking Equipment: Machine Tools (for 4-6 person workshop)

- bench mounted drilling machine (with 12 mm capacity chuck and morticing attachment)
- bench grinder (with 150 mm diameter coarse and fine carborundum wheels)
- single purpose electric hand held electric circular saw
- single purpose electric hand held jig saw
- circular saw (with 250 mm diameter blade)
- radial arm saw (with 250 mm diameter blade)
- band saw
- planing machine (with capacity 300 mm wide boards)

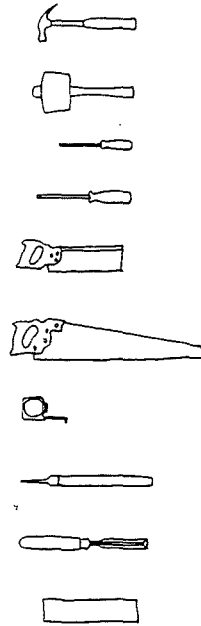
Power Metalworking Equipment: Machine Tools (for use in 4-6 person workshop)

- bench mounted drilling machine (with 12 mm capacity chuck)
- floor mounted pillar drilling machine (with morse taper fitting set of twist drills from 12 mm to 25 mm diameter)
- bench mounted grinder (with 150 mm diameter wheels)
- pedestal grinder (with 250 mm diameter wheels)
- twist drill sharpening attachment (for bench grinder)
- angle grinder (with 230 mm diameter discs)
- power hacksaw (with capacity up to 100 mm x 100 mm)
- air cooled transformer a.c. welder with output up to 110 amps.

The following are the basic tools recommended in "Simple Orthopaedic Aids" by Chris Dartnell for making callipers, clogs, shoes, prostheses, walking aids, splints, and wheelchairs in their workshop in Khartoum.

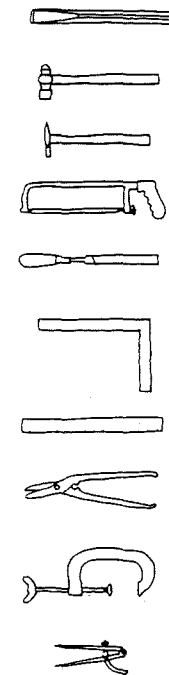
A. Woodwork

- woodwork bench
- vice
- hand drill, with 15 m chuck
- twist bits 2 mm to 15 mm
- screw-drivers, flat, small
medium
large
- wood chisel, 20 mm
- G. clamp
- mallet
- ball pein hammer
- claw hammer
- wood rasp
- hand saw
- junior hack saw
- set square
- steel tape rule



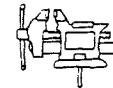
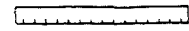
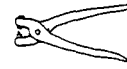
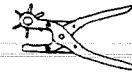
B. Metalwork

- metal work bench
- vice
- centre punch
- hack saw
- universal tin snips
- hand files, flat
half round
triangular
- steel rule
- dividers
- rod bender (to be made)
- hammers, lump
ball pein
- pliers, flat
round
self grip
- cold chisel
- adjustable spanner
- carborundum stone

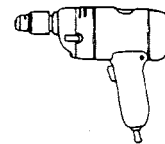


C. Leatherwork

- revolving punch, 1 mm to 5 mm
- hollow punch, 10 mm
- eyelet setter
- utility knife
- scissors
- steel straight edge
- ball peen hammer
- cutting board

**D. Other Extras**

- marking pens
- paint brushes
- glue spreader
- apron
- electric fan

**E. Electrical Tools**

- power drill: twin speed with 15 mm chuck
 - chuck key
 - set of twist bits
 - grind stone attachment
 - sanding pad
- other useful but non-essential power tools:
 - disc sander
 - grinder
 - band saw
 - drill press stand and clamp

F. Welding

- transformer type a.c. welder: air cooled with and output of up to 150 amps.

with accessories:

- cables
- electrode holder
- earth clamp
- slag chipping hammer
- wire brush
- face shield
- welding electrodes 2 mm to 4 mm
- or
- oxy-acetylene welding equipment

Materials

The specific type and quantity of materials used in a workshop will depend completely on the products being made. The materials that are used most often in a workshop producing orthopaedic aids are wood, metal, leather and foam. The following is a brief description of some suggestion on how to choose, cut, join and finish these materials.

Wood

Choice

Wood that is available locally may be of very poor quality. Therefore care should be taken in choosing a good piece. Faults found in wood that should be avoided are: knots and dark rings in the wood; splitting and cupping due to poor seasoning; and rotten wood caused by wet or dry rot.

Cutting

For cutting lengths of wood, an ordinary wood saw can be used, but for cutting out curved objects from a plank, a coping or compass saw is best because it can quickly and easily round curves.

Finishing

All surfaces to come in contact with the skin should be sanded smooth and then varnished to protect it from water and dirt.

Metal

Choice

Metal rod is commonly used because it is very easy to work with and is generally available in most countries due to its extensive use in building construction. Whatever metal is available should be free from rust and without bends. The metal chosen can be either very soft and easy to bend or very hard and brittle (due to a high carbon content) which will make it very difficult to cut.

Cutting

The metal is fixed in a vice close to the jaws and sawn through with a hack saw. Often the piece can be broken off with a pair of pliers after having cut just half way through.

Bending

When bending metal rod, it is not necessary to heat it. Just fix it securely in a vice and either hit it with a hammer or use a homemade bender. (instructions on how to make a steel rod bender is available from ITDG.)

Finishing

Any oil and dirt should be cleaned off and any sharp burs that may cause injury filed down. Then the most pleasant part of the job is to paint the item (e.g. walking frame). This has a three fold purpose; the paint protects the metal from rust, it

makes it more hygienic because dirt can be wiped off, and probably most important, it makes the item look good.

After cleaning the metal, a primer coat should be applied. If there is no primer available, just use a thin coat of white emulsion paint. Then cover with a single coat of enamel paint. Do not forget to clean the brushes out with thinners.

Leather

Choice

The quality and thickness of the leather will depend on how the leather is used in the aid. Basically the skin should have a uniform shape with uniform elasticity and no holes. A common problem with leather is that one part may be hard while the other is very soft and stretchy, making it useless for straps.

Cutting

For this you need a very sharp knife either made from an old hacksaw blade or a sharp utility knife. Cut on a smooth flat surface with the rough side of the leather up. For cutting straps, use a heavy metal straight edge, holding it with one hand and cutting with the other by pulling the knife carefully towards you.

Joining

Joining can be done by glueing and riveting because it is far quicker and easier than stitching and just as good.

For glueing two surfaces together, cover both faces with a thin layer of contact glue (such as 'Evo stik'), wait for it to dry and then firmly press together.

To riveting such things as buckles to straps, etc., use a leather punch to put a hole in both pieces of leather. Then position the two pieces of rivet together in the holes, press together and hit with a flat hammer.

Finishing

Finishing is done for preservation and comfort and a good appearance. Try to match the colours of the leather. Treat the leather by brushing in vegetable oil on the rough side. The oil can also be used for softening. To protect the leather on the clogs from mud and water, brush in shoe polish mixed with paraffin.

Foam

Choice

Many things can be used for padding from old rag to cotton but by far the easiest to use is foam.

Cutting

The foam can be cut with a roughly sharpened piece of metal with the blade about 20 cm long and then is cut as you would leather.

Glueing

Glueing foam is again done by using contact glue on both surfaces.

(20)

Ordering Materials

The following are the materials recommended in "Simple Orthopaedic Aids" by Chris Dartnell (20) for making callipers, clogs, shoes, prosthesis, walking aids, splints, and wheelchairs in their workshop in Khartoum.

Metal

mild steel rod, 5 mm
8 mm
12 mm
flat, 20 mm x 3 mm
angle, 25 mm
sheet, 1 mm

Wood

plank 25 mm to 30 mm pine or any other available wood

Leather

- cow skin, insole 6 mm thick
3 mm thick
goat or sheep skin (soft)

Miscellaneous

contact glue
buckles
leather rivets
eyelets
thinners
varnish
paint
sand paper
wire wool
nails, 20 mm up to 50 mm
tacks
selection of: bolts
nuts
washers
wood screws

Other Economic Activities

Production Workshops for the Disabled

General

Other than organizing workshops to produce mobility or other aids, there is enormous potential in setting up workshops run by the disabled that produce needed consumer goods. In countries where there is little economic activity, setting up a production workshop not only creates employment for the disabled, but it also makes an important contribution to the economy in general.

Production work and services in sheltered workshops and cooperatives for the disabled should be selected according to marketing conditions prevailing and natural resources available in a particular country with special emphasis given to indigenous handicrafts in rural areas. (19)

The following is a list of economic activities that have been undertaken by the disabled in various countries. It is not intended to imply that all these can work or would be appropriate in Angola, but it does help to suggest the wide scope of activities that could take place under the correct circumstances.

Woodwork

- school furniture (desk, chair, chalkboard, etc.)
- first-aid box making (for homes and factories)
- marketing boxes (vegetable, fish, etc.)
- household furniture (for kitchen, bedroom, living room, etc.)
- hospital ward furniture (bed, chair, table, etc.)
- nail box- tool box
- trays - cutting board for cooking
- toys - educational toys and others
- wall and ceiling light bases
- stirring stick
- fruit and nut bowls
- walking sticks and crutches
- tool handles (chisel, knife, axe, etc.)
- table lamps
- candle sticks
- rural crafts (various)
- rural carts and wheelbarrows
- bookends and shelves
- traditional musical instruments

Metalwork and Welding

- verandah furniture
- shoe racks
- barbeque stands - charcoal burner
- swinging cot, cradle
- lamps
- aquarium
- clothes hanger stands, towel racks, coat hangers
- industrial tools
- agricultural tools and equipment
- repair work (furniture, etc.)
- shelves
- candle holder
- waste paper basket
- buckets
- steel bars for windows and doors
- calipers and braces (orthotics)
- name plate, car licence plate
- ash tray or dish
- fishing hook
- kitchen utensils
- cooking stove
- wheelchair
- tricycles

Textiles

- apron-making (hospital and workshops)
- school satchels (canvas)
- tools bags
- padded toys
- garment making (shirts, overalls, pyjamas, trousers, dresses)
- sheets, pillow cases, bedcover, etc. (hospital, hotels)
- table cloths
- gloves (home, industries)
- lamp shades
- rug making
- pillow and cushions
- embroidery (clothes)
- knitted wear (machine knitting)
- school uniforms
- doctor's surgical wear (hospitals)
- needlework

Leatherwork

- tanning of hides and skins
- shopping bag (leather, plastic, wood handle)
- harnesses
- school satchels
- purses - various
- key holder
- belts
- wallets
- shoes - all types and repairing
- sandals
- surgical and orthopaedic foot wear and appliances
- brief cases
- jewellery case

Handicrafts

- batik, dyeing
- jewellery making
- bamboo, rattan work (furniture, etc.)
- picture frames
- wood carving (animals and wall plaques)
- embroidery
- weaving (looms, needle, hand, rug, etc.)
- knitting (machine, hand, etc.)
- beads and bracelets
- cork table mats
- book-binding
- hand printing and greeting cards
- pottery
- brushes and brooms
- lacquer and silverwear
- cane and bamboo work
- ceramics

Repair Work

- circuit wiring and soldering (radio, TV, and electronics)
- repairing of electrical appliances (irons, toasters, vacuum, etc.)
- watch and clock repairs
- bicycle, motorcycle repairs
- furniture repairs
- repair of orthopaedic appliances

Food Processing

- dried fruit processing
- dried fish processing
- fruit juice processing
- canning
- dried vegetable processing

Agricultural Items

- hoes, rakes, spades, shovels
- seed and fruit boxes
- netting
- pumps (manual)
- irrigation accessories
- wheelbarrows
- chicken feeder

Small-Scale Industries

- polyethylene bag-making plant
- fruit juice making plant
- building materials production
- baking
- match making
- rice milling
- soap making
- candle making
- wire and wire products
- umbrella making plant
- farm implement making
- printing plant
- bicycle assembly plant
- chalk making plant
- work glove making
- furniture manufacture

Other Activities

- laundry work (repairs, pressing)
- typewriting
- hair cutting, hair dressing
- washing and greasing cars
- concrete block making
- envelope making
- brick making

- charcoal producing
- grocery store
- poultry and small animal farming
- orchard management
- plastic work
- sign manufacturing
- horticulture
- simple house building
- packing and cartoning

Cooperatives and Small Businesses

A special note must be made of cooperatives and small businesses as a method of organizing work for the disabled since it is flexible and has many advantages. The following is a summary of the objectives of cooperatives for the disabled and some important points to consider when setting up either a cooperative or sheltered production workshop.

The main objectives of cooperatives for the disabled are to:

- maintain and increase the physical fitness and resourcefulness of the disabled and to ensure their social reintegration;
- create economic conditions whereby the disabled can be employed on gainful work which is consistent with their qualifications and disabilities under cooperative forms of self-management;
- meet the social needs of the disabled, improve their material and cultural living standard as well as their social consciousness.

To compensate for the high cost of employing large numbers of severely disabled persons with lower than average productivity and of providing them with rehabilitation services, the State can give certain privileges and concessions to disabled cooperatives which can include reduction of taxes, particularly income tax, partial reimbursement paid by a cooperative for the social insurance of its employees; exclusivity or priority for certain products and services (sole production and access rights for some products) and preferential allocation for supply of tools, machinery, equipment and premises.

As agriculture is the main basis of the economies of many countries, priority should be given to basing the main activities of cooperatives for the rural disabled in agro-based and cottage industries. Urban based cooperatives for the disabled should also be developed with production activity based on the working capacities of the disabled members.

In countries where sheltered workshops for the disabled are operating, consideration should be given to transforming them into cooperative units. This would not only help them achieve viability but also give added incentive to the handicapped workers through the profit sharing and self-management aspects of cooperative enterprise.

Government assistance to cooperatives for the disabled in the form of grants and loans is essential, particularly during the early developmental stages. Such financial support is required for the purchase of capital equipment, acquisition of land and raw materials.

The system of providing social and vocational rehabilitation services for the disabled in conjunction with the economic activities of disabled cooperatives is unrealistic for most developing countries because of the acute shortage of qualified social and vocational rehabilitation personnel. The cost of providing such services

would be too burdensome in the early developmental stage, but nevertheless, the system of comprehensive rehabilitation services and employment within a cooperative setting should be regarded as a long-term objective.

In planning and developing vocational training for the disabled in underdeveloped countries both within and outside a cooperative setting, the following factors should be taken into account:

- the limited extent of special training facilities for the disabled;
- the literacy rate in the area or region concerned;
- the need to make the fullest possible use of existing training facilities for the general population.

There is a need for sheltered workshops and homework schemes. Such workshops which do exist often require substantial financial support; nevertheless their viability could be improved through:

- transforming them into a cooperative enterprise;
- better quality control of production;
- integration of all disability groups in the workshops with some able-bodied labour to undertake tasks beyond the capacity of disabled workers;
- close cooperation and coordination of efforts between government and voluntary associations;
- need for marketing personnel to ensure good market outlets;
- granting of exclusive or priority production rights.

Prior to establishing a sheltered workshop for the disabled it is essential for marketing feasibility studies to be made to help determine the type and nature of economic activity to be undertaken. At the same time the number of disabled persons in the area requiring such services should first be determined. Good management and supporting technical staff services should be secured well in advance.

Summary and Recommendations

Since the objective of this report was to give a general overview of the range of aids available to the disabled and to discuss workshop design and organization, the following summary and recommendation must be general in nature.

During the research of this project, it has become increasingly clear that there are very few successes in establishing and then efficiently and effectively operating workshops for producing basic simple orthopaedic aids for the disabled in developing countries. Successes are in fact all too rare and the failures are primarily due to:

- insufficient planning of the project;
- unclear definition of the objectives and expected results;
- overly ambitious expectations;
- a lack of funding to undertake what is usually a rather expensive programme;
- a lack of qualified local personnel to manage and implement the project;
- underestimation of the difficulties and problems that could occur and an unpreparedness to deal with them;
- an overestimation on the part of foreign donors of what resources are available locally and their accessibility;
- a lack of support on the part of the government; and
- underestimating the amount of time necessary to implement this type of project.

These are lessons that have been learned and should be heeded, and every effort must be made to not repeat them. Success will not come easily or quickly, but in the case of Angola, it can and must happen.

Setting up a production workshop for prostheses, orthopaedic, mobility and other aids in Angola is even more difficult than in most other developing countries for several reasons. The large number of war disabled results in an urgency to do as much as possible, as quickly as possible and there is a danger of starting a large ambitious programme or project before being properly prepared. The on-going war makes travel to where the target group lives in the rural areas, extremely difficult, if not dangerous. The war has also inevitably distorted and altered the economy as well, and while some resources may in theory be available in Angola, the most important and strategic ones must be directed towards the defense of the country and are in reality normally unavailable.

Probably the greatest asset that Angola and the Secretary of State for Social Affairs has for establishing any workshop or vocational programme is their staff. Though none were trained in the area of vocational rehabilitation, orthopaedics, etc., we were constantly impressed during our trip with their motivation and high commitment to their work.

The best possibility of a disabled person leading an active and productive life occurs when they are given the basic means of personal mobility, education, vocational education and employment and all three aspects must be addressed satisfactorily.

General Recommendations

The following are some general recommendations and priority projects and programmes which should be undertaken.

1. To begin, the first priority would be to set up workshops which can produce basic simple orthopaedic aids such as pylons ("peg-legs"), crutches and other simple mobility aids. This would at least give the disabled person mobility which in turn would enhance and enlarge their employment opportunities. These aids are not sophisticated and are not as satisfactory or desirable as a high quality artificial limb, but given the extremely limited resources of the country and the overwhelming numbers that need treatment, it seems more reasonable at this point to help as many as possible. The International Red Cross has already started a project in Huambo to produce a fairly high quality artificial limb and any new project would be wise to take advantage of their experience and expertise in this field.

Though the end product may be basic, it will still be relatively complicated and expensive to set up a workshop to accomplish this. The largest problem will be obtaining the necessary raw materials such as wood, steel, leather, foam, bolts, glue, etc. in Angola. As was already mentioned, it cannot be assumed that even though the materials may exist in the country, a workshop will have access to it. We would strongly suggest therefore that any donor who is willing to assist S.E.A.S. in setting up this type of workshop supply all the tools, equipment and materials (containerized) for a minimum period of at least five years with experienced workshop technicians.

Many donors are not open to this type of suggestion because they feel that the recipient country should supply either all or at least a good part of these materials. This is so under "normal" development conditions but we would argue that Angola's situation is not normal. The conditions are so critical and desperate that any assistance should be regarded as emergency aid.

2. It is also essential to train Angolan technicians both in the production and fitting of orthopaedic aids and the design of various types of aids as well as managing and operating workshops. This will likely include training outside the country (see appendix II for available courses) as well as taking advantage of any relevant training which might be available in the country.

3. The next step would be to establish programmes to help train the disabled in meaningful employment skills by establishing production workshops that would produce badly needed consumer goods. These workshops would be places run by

and for the disabled. The choice of product is almost limitless and can range from the production of buckets to building materials. The choice of products would have to depend on the materials that are available locally and a detailed feasibility study would first have to be done to assess the situation. Here too, it would be essential to ensure that the workshop is supplied with all the necessary tools and materials.

4. Training would also be essential for the Angolans responsible for organizing, managing and running these workshops.

5. It is recommended that both the orthopaedic and production workshops be limited in number and location. Luanda and Benguela would be good choices, being able to serve both the north and the south and should be considered as locations for pilot projects. Though perhaps overly modest in comparison to the need, limiting the size and number of workshops would allow all participants to concentrate on these areas which would greatly increase the chances of success. When they are functioning satisfactorily, with the experience gained, it will be far easier to expand the programme to other cities, towns and provinces. The pilot workshops in these two places would then be able to also act as training centres to others districts and provinces starting their own workshops.

6. At the national level there are also a number of measures that must be taken. The government and S.E.A.S. must make the vocational rehabilitation of the disabled a priority. This means substantially increasing the staff responsible for this area and allocating more resources and the staff must be encouraged to be creative and bold in finding solutions to the problem. Adequate management and technical training of this staff is also urgently needed and is key to a successful programme.

7. S.E.A.S. should set up a department responsible for finding and creating employment opportunities for the disabled. This means investigating the existing employment opportunities open to them, negotiating with companies to accept disabled employees and supervising the implementation of the new law stating that 2% of a company's workforce should be disabled. This would also entail investigating the vocational training facilities which already exist in Angola and encouraging the disabled to enroll in the courses which would greatly increase their employment opportunities.

8. The rehabilitation of the disabled must be seen in a wider perspective and must deal with a general and nation-wide problem of extremely low educational levels. Therefore in conjunction with the Ministry of Education, S.E.A.S. must start to organize a system of basic education for the disabled since the vast majority are illiterate and the issue is not one of 'rehabilitation' as much as 'habilitation'. Basic literacy would greatly enhance their employment opportunities.

Specific Assistance by Foreign Donors

More specifically, there is a variety of measures and projects that could be undertaken by foreign donors that would assist Angola enormously in dealing and overcoming the problem in both the short and long term. These include:

- supplying as a short term (1-2 years) emergency measure, basic mobility aids such as crutches, tricycles, wheelchairs, etc. (with the spare parts and the means to maintain them) to those who are already participating and registered in S.E.A.S. centres;

- training 50 Angolan technicians and managers, in or outside of Angolan in a variety of skills as listed above, over a 5 year programme;

- establishing a warehouse receiving and distribution system in Lobito, Benguela Province, to serve the south and Luanda to serve the north, to handle all incoming supplies and equipment. This would include transport to ensure distribution to the workshops and centres.

- establishing in Benguela and Luanda, a fully equipped and supplied workshop for assembling, maintaining and repairing all imported orthopaedic and mobility aids.

- establishing in Benguela and Luanda, a fully equipped and supplied workshop to begin manufacturing simple basic orthopaedic and mobility aids such as pylons, crutches, wheelchairs, tricycles, etc. using a combination of imported and when possible, local materials.

- establishing in Benguela and Luanda a vocational training centre for the disabled with 6 month to 2 year courses in practical vocational skills with the intent that these trainees graduate with the skills to work in or run small businesses such as production cooperatives and workshops. Additional assistance would be needed to assist in establishing these small businesses or workshops with credit for materials and tools, as well as business advice.

In summary, it would be difficult to overestimate or overemphasize the urgency and overwhelming need that exists in Angola to set up a comprehensive strategy and implementation plan to deal with the war disabled in the country. There is an urgent need to establish workshops and a vocational programme for the war disabled. To accomplish this means that there is a need for a great deal of assistance in both the short and long term; funds, materials, research, training and technical expertise. The case of disabled persons in Angola is a tragically unique case which clearly requires an equally "abnormal" extraordinary effort by the Government and the international community to overcome.

Organizations

African Rehabilitation Institute (ARI)

The Permanent Secretary
Ministry of Labour Manpower Planning and Social Welfare
Mr. Z. Makoni
P. Bag 7707
Causeway, Harare
Zimbabwe

Action on Disability and Development (ADD)

P.O. Box 31
Frome, Somerset BA11 3AJ, UK

The Amar Jyoti Trust

N-192, Greater Kailash-1
New Delhi, 110048, India

- a trust that produces and provides calipers, crutches and artificial limbs free. Also holds camps in rural areas.

Appropriate Health Resources and Technologies

Action Group (AHRTAG)

85 Marylebone High Street
London W1M 3DE, UK

- independent charity set up to promote primary health care through an information and inquiry service, publications and training materials, and design and development of low cost equipment.

- publishes Aids for Living newsletter, Low Cost Aids, Personal Transport for Disabled People, Low Cost Walking Aids, and How to Make Hand Grips.

Appropriate Technology International (ATI)

1131 H Street NW
Washington DC 20005, USA

- publishes Independence through Mobility and the Wheelchair Manual.

ApT Design and Development

28-30 Northwick Park
Blockley, Moreton-in-Marsh
Glos. GL56 9RF UK
Tel: 0386.700130
Telex: 337497 Fistex G

- a group of engineers which carries out equipment design and vocational training assignments worldwide.
- provides training based on the skills required in a rural workshop.
- aim of ApT training programmes is to assist in the development of small-scale, income-generating enterprises, and to increase the availability of locally-made equipment and products.
- offers training for metalwork instructors, small-scale metalworkers and agency field workers

Australian Council for Rehabilitation of the Disabled (ACROD)

ACROD-ICTA Sub-Commission
18 Argyle Street
Sydney NSW 2000, Australia

- publishes Asia-Pacific Disability Aids and Appliances Handbook, Part 1 Mobility.

Canadian Rehabilitation Council for the Disabled

1 Young Street, Suite 2110
Toronto M5E 1E8, Canada

- the CRCD is a non-profit association whose objectives and activities support the provision of comprehensive rehabilitation services for physically disabled adults and children.
- publishes bibliographies on Technical Aids for Disabled Persons, Vocational Rehabilitation of Physically Disabled Persons, Foreign and International Rehabilitation Literature, and Developing Countries, and fact sheets on

Computerized Information Resources for Physically Disabled Persons, Canadian Manufacturers and Distributors of Aids for Disabled Persons, International Organizations Involved in Technical Aids for Disabled Persons, and CRCDC Information Service and Resources Centre.

Commonwealth Foundation

Administration Officer
Marlborough House
Pall Mall
London SW1Y 5HU U.K.

- publishes The Disabled in Developing Countries, Occasional Paper Number XLI.

Disabilities Study Unit

Wildhanger
Amberley, Arundel
West Sussex, BN18 9NR, UK

- publications

Disabled Living Foundation

Information Service for the Disabled
300-384 Harrow Road
London W9 2HU, UK

- information and publications on transport, walking aids and aids in general.

Disabled Peoples International

Headquarters: Sweden

Regional: P.O.Box 2247
Bulawayo, Zimbabwe

ECHO - Equipment to Charity Hospitals Overseas

Ullswater Crescent

Coulston, Surrey CR3 2HR, U. K.,

- UK charity provides new or good secondhand equipment of all sorts to overseas charity hospitals or medical relief units. It also supplies a wide range of low-cost pharmaceuticals and basic equipment for rural health centres and village clinics. Recently opened medical engineering division to increase spares available to maintain equipment in the field, provide technical advice and enlarge and improve the range of high quality, reconditioned equipment.

Equipment for the Disabled

Marlborough Lodge

Nuffield Orthopaedic Centre

Headington, Oxford OX3 7LD, UK

- publishes reference books on various equipment and self-help devices including Wheelchairs, Hoists, Walking Aids, Outdoor Transport, Communication, Housing and Furniture, Home Management, and Leisure and Gardening.

GATE

Postfach 5180

D-6236 Eschborn 1

Federal Republic of Germany

-GATE stands for German Appropriate Technology Exchange and is a division of GTZ, the German Agency for Technical Cooperation. GATE is a centre for the dissemination and promotion of appropriate technologies for developing countries.

- publishes Prosthetics and Orthotics Supply and Care Centre and Training College for Orthopaedic Technicians in Lomé, Togo and On Stump Socket Lamination.

**Handicapped Education and Aids Research Unit
(HEARU)**

City of London Polytechnic
Walburgh House
Bigland Street
London E1 2NG, UK

- trains in the design and production of low cost aids.

The Health Education Council

78 New Oxford Street
London WC1 1AH, UK

- publishes Health Education Journal and a subscription service for information on disability.

Hesperian Foundation

P.O. Box 1692
Palo Alto
California 94302, USA

- publishes Project PROJIMO and Rehabilitation of Disabled Children in Rural Areas.

Human Resources Center

Attn. Publications
I.U. Willets Road
Albertson, NY 11507, USA

- publishes Economics and Equity in Employment of people with Disabilities, Work, Disability and Rehabilitation, and Leisure and Lifestyle: A Cross-National Report on Issues and Models for People with Disabilities.

ILRU-TIRR

Institute of Rehabilitation Research
P.O. Box 20095
Houston, TX 77225, USA

- publishes Independent Living: An Overview of Efforts in Five Countries, A Voice of Our Own, Participation of People with Disabilities: An International Perspective, International Perspectives about Independent Living, and Quota Systems and the Employment of the Handicapped: Experiences in Three Countries.

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

Box 303

S-161, 26 Bromma, Sweden

- research and development, testing and information within the field of rehabilitation technology.
- some publications and quarterly newsletter.
- publishes Appropriate Technology Aids for Disabled People - ways and means for their production the 3rd world.

**International Federation of Disabled Workmen and
Civilian Cripples**

Froburgstrasse 4

4600 Olten, Switzerland

International Labour Organization (ILO)

Vocational Rehabilitation Section

Vocational Training and Guidance Branch

Training Department

4 route des Morrillons

CH-1211, Geneva 22, Switzerland

- publishes Cooperatives for the Disabled: Organization and Development, Social and Vocational Rehabilitation Resources Vol 1 Africa, Adaptation of Jobs and Employment for the Disabled, and Training the Disabled in the Community, Vocational Assessment and Work Preparation Centres for the Disabled, and Organization of a Production Workshop for the Disabled: The United Abilities Company, Ethiopia.

Pierre and Raymond Jaccard

Centre National de Prosthesis Jamot
Yaounde, Cameroon

- experience in producing artificial limbs using local materials.

Jairos Jiri Association

P.O. Box 1529
401 Southhampton House
Main Street-9th Avenue
Bulawayo, Zimbabwe

- orthopaedic workshop, vocational training centres sheltered employment for disabled and encouragement of ex-trainees to engage in small businesses either individually or in cooperatives.

Leonard Cheshire Foundation International

Leonard Cheshire House
26-29 Maunsell Street
London SW1P 2QN, UK

- newsletter quarterly "International News"
- publishes Simple Orthopaedic Aids: Appropriate Designs for a Developing Country.

NASCO (Zimbabwe National Association of Societies for the Care of the Handicapped)

P.O. Box UA 504
Union Avenue
Harare, Zimbabwe

- publishes The African Rehabilitation Journal.
- "NASCOH is an umbrella and representative body for all organizations working with and for disabled persons in Zimbabwe. They have 33 members in all. NASCOH headquarters provide services to member organizations, government ministries, disabled persons and to international agencies in the area of research, coordination, promotional work and advisory/informational services. NASCOH operates

community-action groups aimed at securing improvements in such areas as accessibility, public attitudes to disabled people, the acquiring of wheelchairs and other appliances, and employment of people with disabilities."

National Council of Disabled Persons of Zimbabwe (NCDPZ)

P.O. Box 1952
Bulawayo, Zimbabwe

- "the NCDPZ is constituted to be a mass membership movement of disabled people. Through it, disabled people must find a vehicle for self-expression and self-determination. The organization exists to facilitate the means for self-reliance of its members, and to advocate for the removal of barriers to the full integration of disabled people in the society and its economy. The majority of the population of disabled persons live in rural areas where they have been and still suffer untold deprivation of basic services of health, mobility aids, education and rehabilitation. The NCDPZ runs a development programme in the rural areas with disabled people. The programme involves a team of 2 development workers travelling to rural areas to identify disabled people, listen to their problems, animate them to think in terms of helping themselves and generally sensitizing them and their communities to the basic human rights of disabled people."

National Rehabilitation Information Center (NARIC)

Attn: Ms. Jan Galvin, Information Specialist
The Catholic University of America
4407 Eighth Street, NE
Washington DC 20017, USA

- supplies general information concerning significant research, programs, policies, etc. in many foreign countries.

Operation Handicap International (OHI)

Siège National, 1, Impasse de L'Aigas
69160 Tassin La Demi Lune, France

- project in Thailand for producing artificial limbs using local materials.
- publishes Below Knee Prosthesis and Gait Training for Amputees.

Pan-American Health Organization

525 Twenty Third Street NW
Washington DC 20037, USA

- regional office of the World Health Organization
- for WHO Publications Centre, contact 49 Sheridan Ave. Albany, NY 12210.

Rehabilitation International

25 East 21st Street
New York, NY 10010, USA

- assists in improving the organizational and administrative structures of rehabilitation services and facilities for disability prevention and rehabilitation throughout the world and support and promote all efforts that contribute to a better coordination between the various sectors of rehabilitation services.
- main fields of work include structure of programmes or services (provides for an exchange of information and experience in order to facilitate the improvement of organization and administrative structures of existing programmes as well as the building-up of new services), programme evaluation, financing of rehabilitation services, management, public information and public relations, and participation of disabled persons.

TOOL (Technical Development with Developing Countries)

68a-69a Entrepôtdok
1018 AD Amsterdam, Netherlands

- publishes More with Less - Aids for Disabled People in Daily Living.

World Health Organization (WHO)

Division of Strengthening of Health Services

20 avenue Appia

CH-1211, Geneva 27, Switzerland

- publishes Training Disabled People in the Community:
A manual on community-based rehabilitation for
developing countries.

Courses

Rehabilitation Trainers Course

- a 9 month diploma course for suitably qualified doctors and therapists who are responsible for setting up training schools or programmes for Community Rehabilitation Workers in developing countries. Run at the Institute of Child Health, London, England, in conjunction with the Appropriate Health Resources and Technologies Action Group (AHRTAG). Applications to be sent to AHRTAG. (see Appendix I - Organizations for address).

Design and Production of Low-Cost Aids

- short training courses are held in the design and production of low cost aids for the disabled at the Handicapped Education and Aids Research Unit (HEARU), London, England. (see Appendix I - Organizations for address).

Orthopaedic Technicians

- a 3 to 6 month practical course for training orthopaedic technicians.

Contact address is:

Sr. Ivan Ferraretto, Medical Director, A.A.C.D.
Av. Pro. Ascendino Reis, 724
C.P. 8334
CEP 04027 - São Paulo
Brasil

Orthopaedic Assistants

- a new course which will begin this year offered by the Zimbabwean Ministry of Health. Contact address is:

Ministry of Health
P.O.Box 8204
Causeway

Bibliography

- (1.) Adaptation of Jobs and the Employment of the Disabled. by the International Labour Office (ILO). Geneva, Switzerland; International Labour Office (ILO), 1984.

- "This completely revised edition reflects up-to-date developments in the application of ergonomic principles aimed at creating and safeguarding jobs for disabled workers. At a time when placement opportunities in many countries are extremely limited, this publication will be particularly helpful to selective placement officers, employers, production engineers and industrial medical officers who have the employment interest of the disabled at heart."

- (2.) The African Rehabilitation Journal. July 1985. Volume 2, Number 6. Harare, Zimbabwe; Zimbabwe National Association of Societies for the Care of the Handicapped (NASCOH).

- (3.) Agricultural Machinery Workshops: Design, Equipment and Management. By the Food and Agriculture Organization of the United Nations (FAO). Rome, Italy: FAO, 1960.

- "deals with some of the essential principles of machinery workshop location, design and management, including storekeeping and replacement parts control, and lists the essential tools and machines required to maintain in full production the field equipment used on projects."

- (4.) Aids For Living. Summer 1983 No. 1., April 1984 No. 2., October 1984 No. 3., April 1985 No. 4, November 1985 No. 5, and April 1986 No. 6. London, U.K.; Appropriate Health Resources and Technologies Action Group (AHRTAG).

- "a 4 monthly newsletter on all aspects of low cost technologies for disability prevention and rehabilitation."

- (5.) Appropriate Technology Aids for Disabled People - ways and means for their production in the third world. By the International Commission on Technical Aids, Housing and Transportation. Bromma, Sweden; International Commission on Technical Aids, Housing and Transportation (ICTA), 1987.

- (6.) Asia-Pacific Disability Aids and Appliances Handbook, Part 1 Mobility. By the Australian Council for Rehabilitation of the Disabled. Sydney, Australia; Australian Council for Rehabilitation of the Disabled (ACROD).

- (7.) Ayre, Michael and Ann Darnbrough. Personal Transport for Disabled People: Design and Manufacture. London, U.K.; Appropriate Health Resources and Technologies Action Group Ltd. (AHRTAG), 1984.

- "This manual provides technical information and advice on the design and manufacture of trolleys, wheelchairs, and tricycles for disabled people, and describes methods for manufacturing and marketing these aids. The technical information in the manual is presented as a range of options, enabling the reader to choose a suitable design for manufacture, or to adapt existing products. The information can also be used to produce new designs which are low-cost. The manual aims to encourage the manufacture of aids on a small scale and the use of simple but efficient batch production methods to aid this process. It is essential that disabled people should be consulted at all stages in the production of wheelchairs and tricycles. They should be involved at policy making, planning and production levels. Only by this process can it be ensured that disabled people receive the most appropriate equipment they need in a manner suitable to their requirements."

- (8.) "A Zimfoot? What's That?" International Committee of the Red Cross Bulletin. May 1986, Number 124, pp. 3.

- (9.) Below Knee Prosthesis and Gait Training for Amputees. by Operation Handicap International. Tassin La Demi Lune, France; Operation Handicap International (OHI).

- (10.) Berg, Liv, Krisno Nimpuno, Roger van Zwanenberg, et al. Towards Village Industry. A Strategy for Development. London, U.K.: Intermediate Technology Publications, 1978.

- this book is concerned with village industry though it does discuss small scale production in urban areas. The primary concern is with cottage type production - with crafts which are an integral part of agriculture and the lives of the people of the countryside. This book provides a brief analysis of what is happening in terms of small scale production, and a practical guide to ways of improving village production.

- (11.) Boyd, John. Equipment for Rural Workshops. London, U.K.: Intermediate Technology Publications, 1978.

- this is an equipment guide to "assist the man in the field who is required to set up a training workshop, a workshop of his own use, or attempting to assist local people in the purchase of equipment. The tools recommended are those which would be suitable for general purpose wood working and metal working enterprises, which might be called on to make or repair a very wide variety of goods."

- (12.) Cain, Allan. Vocational Workshops Program for the War Disabled and Physically Handicapped, Angola. Luanda, Angola: Development Workshop, 1986.

- (13.) Carpentry and Joinery. By the International Labour Office. Geneva, Switzerland: ILO, 1982.

- is a equipment and planning guide for vocational and technical training and education programmes.

- (14.) Caston, Don and Joan Thompson. How to Make Hand Grips. London, U.K.; Appropriate Health Resources and Technologies Action Group Ltd. (AHRTAG), 1981.

- "a poster and booklet showing ways in which clay, plaster and epoxy resin putty can be used to make hand grips to allow disabled people to hold tools, spoons and brushes, etc.."

- (15.) Caston, Don and Joan Thompson. Low Cost Aids. London, U.K.; Appropriate Health Resources and Technologies Action Group Ltd. (AHRTAG), 1982.

- "shows a wide range of aids for disabled children."

- (16.) Caston, Don and Joan Thompson. Low Cost Walking Aids. London, U.K.; Appropriate Health Resources and Technologies Action Group Ltd. (AHRTAG), 1983.

- (17.) Communication. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1980.

- like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

- (18.) Community-Based Rehabilitation Services for the Disabled: A pilot experience in Indonesia. By the International Labour Office. Geneva, Switzerland; International Labour Office (ILO), 1982.

- "The second edition of this report has been printed in response to increasing demand. One of the main challenges in rehabilitation work today is the development of models of low-cost and high-output delivery systems that can reach out to the large numbers of disabled persons who live in rural communities. First published in 1982, the report deals with the Government of Indonesia's successful launching of an innovative community-based rehabilitation and training programme, with technical cooperation provided by the ILO and funding by the United Nations Development Programme."

- (19.) Cooperatives for the Disabled: Organization and Development. By the International Labour Office. Geneva, Switzerland; International Labour Office (ILO), 1978.

"This report provides a detailed account of the Invalids' Co-operative movement in Poland which is providing comprehensive rehabilitation and employment for some 200,000 physically and mentally disabled persons. The nation-wide network of State-supported industrial co-operatives includes sheltered workshop and homemaker's facilities. The origins, development and organisation of this highly successful 'employment creation' scheme for reintegrating severely disabled persons into active economic and social life are fully explored. The generous state aid for the movement, self-management aspects of the co-operatives and the provision of rehabilitation services within the context of productive employment, are also described. This approach may well have meaningful applications in countries seeking to develop and expand employment opportunities for their disabled citizens."

- (20.) Dartnell, Chris. Simple Orthopaedic Aids: Appropriate Designs for a Developing Country. London, U.K.; Leonard Cheshire Foundation International.

- "The book aims to set out in simple detail how to set up a workshop and produce these orthopaedic aids in a country where resources are scarce but the need is very great. The Khartoum Cheshire Home is taken as the model but the principle involved is applicable, with slight modifications, to meet most other situations. The information is intended for physiotherapists, nurses, health workers, heads of Projects; local workers; in fact anyone wanting to produce aids for the rehabilitation of handicapped people."

- (21.) The Disabled in Developing Countries. Occasional Paper Number XLI. By the Commonwealth Foundation. London, U.K.; Commonwealth Foundation, 1977.

- Proceedings of a symposium on appropriate technology and delivery of health and welfare services for the disabled in developing countries held at Oriel College, Oxford, September 26-30, 1976.

- (22.) England, Roger, S.W. Eaves, et al. How to Make Basic Hospital Equipment. London, U.K.; Intermediate Technology Publications Ltd., 1979.

- (23.) Heim, Sepp. Prosthetics and Orthotics Supply and Care Centre and Training College for Orthopaedic Technicians in Lomé, Togo. Eschborn, Federal Republic of Germany; Deutsch Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH (German Agency for Technical Cooperation), 1979.

(24.) Helander, Einar, et al. Training Disabled People in the Community: A manual on community-based rehabilitation for developing countries. Geneva, Switzerland: World Health Organization, 1983.

(25.) Home Management. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1981.

- like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

(26.) Hotchkiss, Ralf. Independence through Mobility. Washington DC, U.S.A.; Appropriate Technology International.

(27.) Hotchkiss, Ralf. The Wheelchair Manual. Washington DC, U.S.A.; Appropriate Technology International.

(28.) Housing and Furniture. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1986.

- like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

(29.) Hytten, Eyvind. Report on a Mission to the People's Republic of Angola, 8 to 22 December 1984 on behalf of the Disabled Person's Unit, Centre for Social Development and Humanitarian Affairs. Vienna, Austria; United Nations.

(30.) Independent Living. By Health and Welfare Canada. Ottawa, Canada; Health and Welfare Canada, 1985.

- pamphlets on Cooking Utensils, Food Preparation Aids, Tableware and Cutlery, Domestic Appliances, Storage, Dishwashing Aids, Plumbing Fixtures, Grab Bars, Showers, Toilets and Toilet Seats, Bath Lifts, Bath Shower and Transfer Seats, Bathing Aids, and Reaching Aids.

- (31.) Kaphingst, Wieland and Sepp Heim. On Stump Socket Lamination. Eschborn, Federal Republic of Germany; Deutsches Zentrum fur Entwicklungstechnologien (GATE) of Deutsche Gesellschaft fur Technische Zusammenarbeit (GTZ) GmbH, 1986.

- "The procedure of the Direct Socket Lamination Technique (D.S.L.T.) serves for the manufacture of PTB-sockets for BK-protheses in an alternative way of production for those countries where there is no plaster-of-Paris powder (gypsum) available. The soft liner as well as the hard prosthetic socket for BK-protheses are manufactured directly on the stump of the patient without cast taking and without use of thermo ovens or any other electric tools. This manual explains the working procedure by 57 drawings of each single step of the new manufacturing process. The procedure explained is not easier than the normal way of production. But it is under the restricted circumstances in Developing Countries - a recommendable alternative for realization of proper results."

- (32.) Leisure and Gardening. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1983.

- like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

- (33.) Machining and Fitting Occupations. By International Labour Office. Geneva, Switzerland: ILO, 1978.

- "this is an equipment planning guide for vocational and technical training and education programmes and facilitates planning equipment requirements with accuracy and speed and produce precisely defined technical specifications for equipment requests and workshop layouts."

- (34.) More with Less - Aids for Disabled People in Daily Living. by TOOL. Amsterdam, Netherlands; 1986.

- (35.) Organization of a Production Workshop for the Disabled. The United Abilities Company, Ethiopia. by the International Labour Office (ILO). Geneva, Switzerland; International Labour Office, 1979.

- "ILO continues to assist developing countries in their efforts to create training and employment opportunities for their disabled citizens. Experience has shown that a very effective approach to this end is the establishing of production workshops based on small-scale industry and in the form of cooperatives. One of the most successful enterprises of this kind is the United Abilities Company in Addis Ababa, Ethiopia, which provides well-paid employment and social services. Some 400 disabled persons are now employed there, and they in turn support some 2,000 dependents. Initially launched as an umbrella assembly workshop, the company has since branched out into umbrella frame and handle manufacture and a new product, dry-cell batteries. This highly profitable enterprise which was planned and established under ILO technical cooperation arrangements, and subsequently developed and expanded successfully under Ethiopian management, has attracted world-wide attention."

- (36.) Outdoor Transport. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1982.

- like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

- (37.) Project PROJIMO. By the Hesperian Foundation. Palo Alto, U.S.A.; Hesperian Foundation.

- a book on a villager-run rehabilitation programme for disabled children in western Mexico.

- (38.) Rehabilitación profesional y empleo de personas minusválidas; Documento de Proyecto. República Popular de Angola/Programa de Las Naciones Unidas para el Desarrollo, 1985.

- (39.) Rehabilitation of Disabled Children in Rural Areas. By the Hesperian Foundation. Palo Alto, U.S.A.: Hesperian Foundation.

- (40.) Report on the Tandi Workshop on Rehabilitation and Making of Low Cost Aids for Rural Disabled Persons. Zimbabwe National Association of Societies for the Care of the Handicapped (NASCOH). Harare, Zimbabwe: NASCOH, 1986.

- (41.) Social and Vocational Rehabilitation Resources. Vol. 1 Africa. by the International Labour Office. Geneva, Switzerland; International Labour Office (ILO), 1984.

- "As one of its contributions to the United Nations Decade of Disabled Persons (1983-92), the International Labour Office intends to publish, in four volumes, an international directory of social and vocational rehabilitation resources. The objective of the directory is to make available important information on the extent of rehabilitation programmes and activities, by country, in the major developing regions of the world. Each volume will cover a separate continent or region, namely Africa; Asia and the Pacific; Latin America and the Caribbean; and the Middle East. It is hoped that the directory will serve as a reference and information source for governments, for national and local voluntary agencies and for international and non-governmental organisations, and that it will encourage communication and collaboration between those working in this important field."

- (42.) Sanders, Dr. David. The Philosophy of Rehabilitation. Proceedings of the Seminar on the Disabled Child in Zimbabwe. 9 - 12 April, 1985. Harare, Zimbabwe: National Association of Societies for the Care of the Handicapped (NASCOH).
- (43.) Special Edition: Angola 85 - 86. International Committee of the Red Cross Bulletin. January 1986.
- (44.) Training the Disabled in the Community. by the International Labour Office. Geneva, Switzerland; International Labour Office (ILO), 1983.
- "This Manual describes a new approach: community -based rehabilitation. Here the process of rehabilitation has been demystified by breaking it up into component parts. Each of the parts is described in such a way that rehabilitation can safely and effectively be carried out by lay persons, such as a family member or a friend of the disabled person, or by disabled people themselves. Components with evaluation sheets form training packages. There are training packages for all the major forms of disability seen in developing countries. The Manual also includes guides, describing the entire programme at community level."
- (45.) Vocational Assessment and Work Preparation Centres for the Disabled. by the International Labour Office. Geneva, Switzerland; International Labour Office (ILO), 1974.
- "This manual is intended to provide basic guidance for government departments and other entities that want to set up vocational assessment and work preparation centres and/or develop vocational training facilities for disabled persons. It describes the administration, organization and work of such centres, in which short assessment, evaluation and reconditioning courses are provided for the disabled; and it offers suggestions for the subsequent vocational training of the disabled for specific occupation."
- (46.) Walking Aids. By Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1985.
- "like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."
- (47.) Wheelchairs. by Equipment for the Disabled. Headington, Oxford, U.K.; Equipment for the Disabled, 1982.
- "like the other books in the Equipment for the Disabled series, this book "aims to present information on aids and equipment to those professionally concerned with the care of physically handicapped people of all ages. It provides 'guide-lines' to help in the selection of equipment and suggests ways of overcoming different problems."

