Gripping the wheels is difficult, so that an alternative propelling system, perhaps by levers, is desirable.
There is difficulty in restraining involuntary movements of limbs sometimes.
Patients may tend to slide out of the chair from extensor thrust.
The problem of head support often presents difficulties. Sometimes there is head extension. More commonly the unsolved problem is of the patient with weak neck muscles.
There is difficulty in obtaining chairs with head and limb retaining devices through National Health Service channels.

THE DESIDERATA FOR THE SPASTIC'S WHEELCHAIR

The chair the spastic wants must have these properties:

Chairs should be available without delay, for spastics may be immobilised while waiting for them, and children may have grown out of the size ordered.

Stability. It must not tip when the patient moves about in the chair, nor when he is getting in or out of it.

Accessibility. He must be able to get in and out of it easily.

A Good Fit. To achieve a good fit, a good system of measuring and the possibility of trying various chairs are both necessary. The change in size of children as they grow will need frequent change or modification of his chair.

Comfort. This depends on the correct angle of the back, which should be variable, for sometimes the occupant will want to relax and sometimes to sit up more; on the length of the backrest; on suitable padding, not soft, not wooden hard, for the patient may sit in the chair for hours; on adequate support for the patient's thighs.

ERGONOMIC PRINCIPLES IN THE USE OF WHEELCHAIRS

By W. Floyd, B.Sc., Ph.D., F.Inst.P., A.M.I.E.E.

Head of the Department of Ergonomics, Loughborough College of Technology

Ergonomics deals with the capabilities and limitations of human performance in all its aspects, including the effects of age and disabilities on skill, work output, endurance and other facets of human performance.

Ergonomics also concerns itself with the proper use of human abilities and the best ways in which to use them; for example, in controlling machines so as to obtain a required degree of precision or quality of output. This involves the study of human faculties as part of a Man-Machine system. Such a study includes, for instance, the questions of the input and the output of the system looked at from the points of view of accuracy, speed, energy, fatigue and the like.

The object of such a study is to answer two questions: What action can and should be carried on by the machine? and What action can and should be done by the man? This approach demands collaboration between the human biologist,

who understands the problems of human performance, and the engineer or technologist, who understands machines, so that the best machine for the purpose can be designed and built—Fitting the Machine to the Man.

Some examples will be given.

In regard to disabled people, the physicians and surgeons who deal with these problems have always made a special study of the disabilities and various ways of overcoming them. Today Ergonomics can take this process a step further and bring engineering design and human biology together in a systematic way, with a large and growing body of knowledge of human performance behind it.

SOME PRINCIPLES IN WHEELCHAIR DESIGN

By BIRGER ROOS

Swedish Central Committee for the Care of the Disabled, Stockholm
Development Department for Technical Aids

THE very severly disabled are often very difficult to fit successfully with a standard model of wheelchair, even after alterations to the chair. Some of the work at S.V.C.K. Technical Division is devoted to the design of special wheelchairs for such cases.

One of the fundamental questions to be answered before beginning the design work is—what particular feature does the disabled require of his wheelchair? The following are some of the main features to be considered: comfortable sitting for long periods, good working position and self-lifting and easy handling of the chair into and out of a car.

To combine all these features in one chair is almost impossible. Our experience shows that the best results are accomplished by having two or more chairs for every individual. I am going to devote part of this paper to the third point: self-lifting and easy handling of the chair into and out of a car.

The need for another person's help can be greatly reduced if the wheelchair of a handicapped car driver incorporates certain aspects. In our work, we have started from the point that a standard car should be used with as few alterations as possible. We know that even with Servo-equipment and hand controls the driving of the car is almost impossible for many. The transferring of the body is in itself a big problem but it can be solved by some means or other. However, even very light collapsible chairs are too heavy and, perhaps more important, too bulky. After some tests we found that a chair which could be handled by some of our handicapped car drivers should weigh not more than approximately 10 lb., and the size of the chair should be approximately 5 inches by 20 inches by 20 inches. Starting from these premises, it seems to be impossible to make a collapsible chair in one piece, particularly if this chair has to be fitted with big wheels so that the wheelchair user can propel himself. It seemed to be necessary, therefore, to build the chair in sections. The problems was to find a suitable way of doing this and at the same time make the chair easy to handle. For two years we have been trying to develop such a system with two types of chair.

These two chairs are almost identical. It is possible to divide them into three parts—two side sections with wheels and a third consisting of seat and backrest