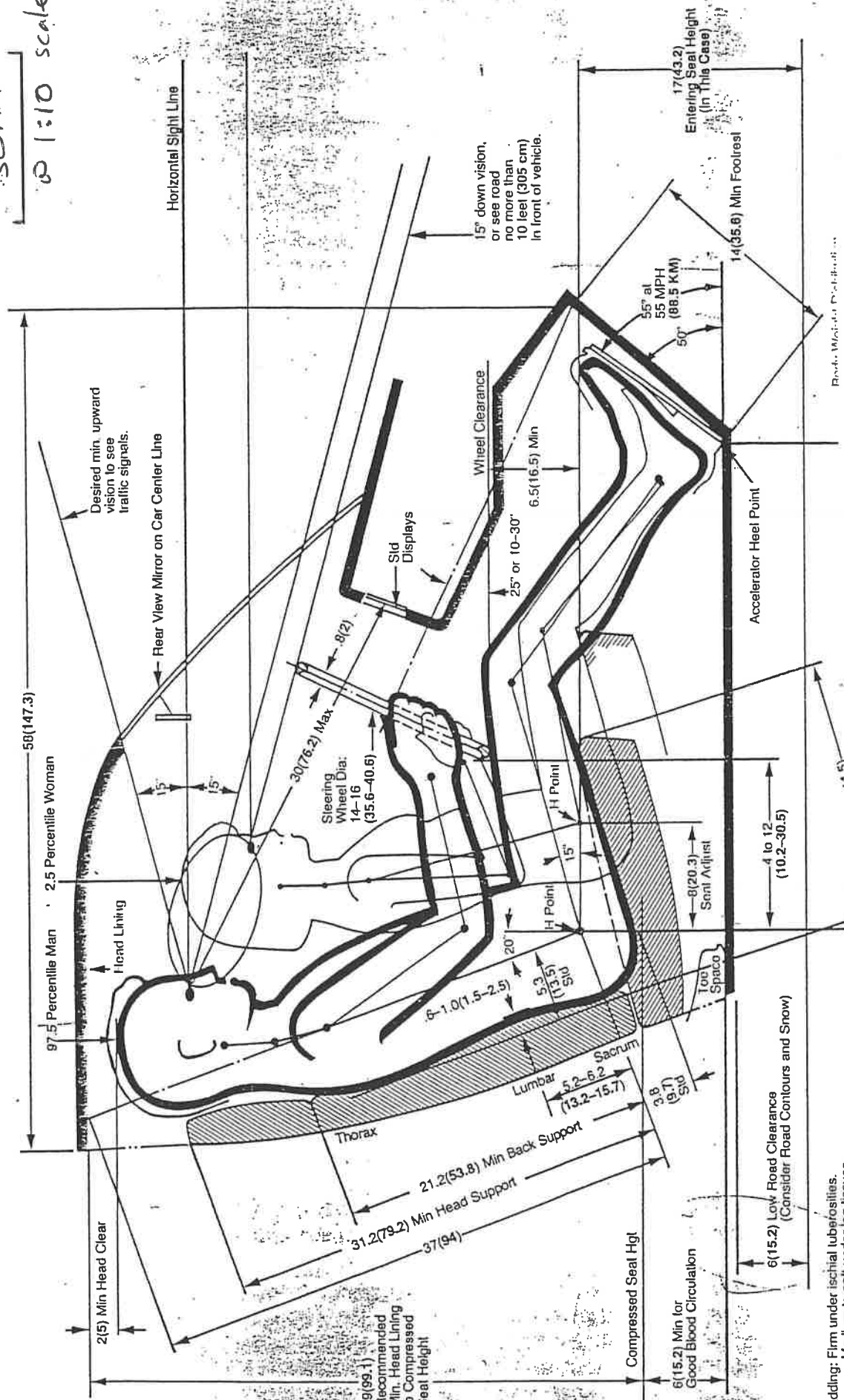


11

dash can be located. Built-in adjustments can improve comfort: use backrest angles 18° to 20° for the alert posture and 22°–28° for relaxing (passengers). The driver's seat must adjust forward and back but height adjustments and angling are also desirable. Steering wheel adjustments, in and out and tilting are helpful. New layouts are required for variations, and mock-ups should be built to confirm designs. For safety belts and visual problems see SAE handbooks.

010 scale



**Seat Padding:** Film under ischial tuberosities.

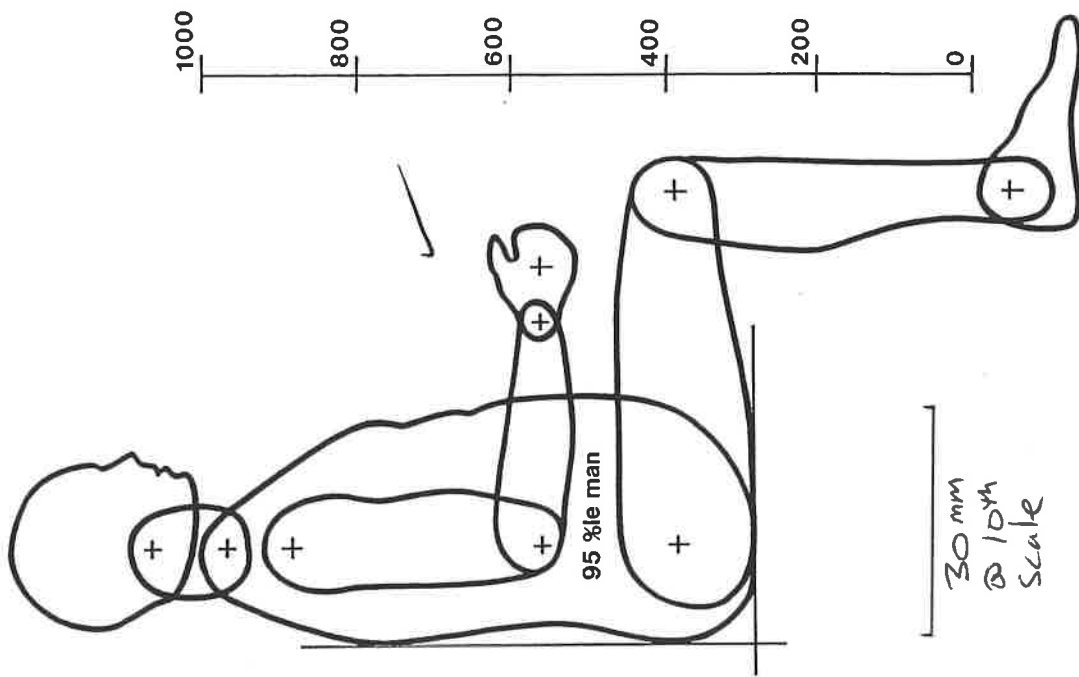


Figure 2.12. Mannikin—95th %ile man (scale 1:10).

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp \left[ -\frac{(x - \mu)^2}{2\sigma^2} \right] \quad (2.5)$$

where  $\mu$  is the mean and  $\sigma$  is the standard deviation of  $x$  for the population.  $f(x)$  is a measure of the relative probability or relative frequency of the variable having a given value of  $x$ —it will be found in books of statistical tables as the “ordinate of the normal curve”. If variable  $x$  is replaced by the standard normal deviate ( $z$ ), such that

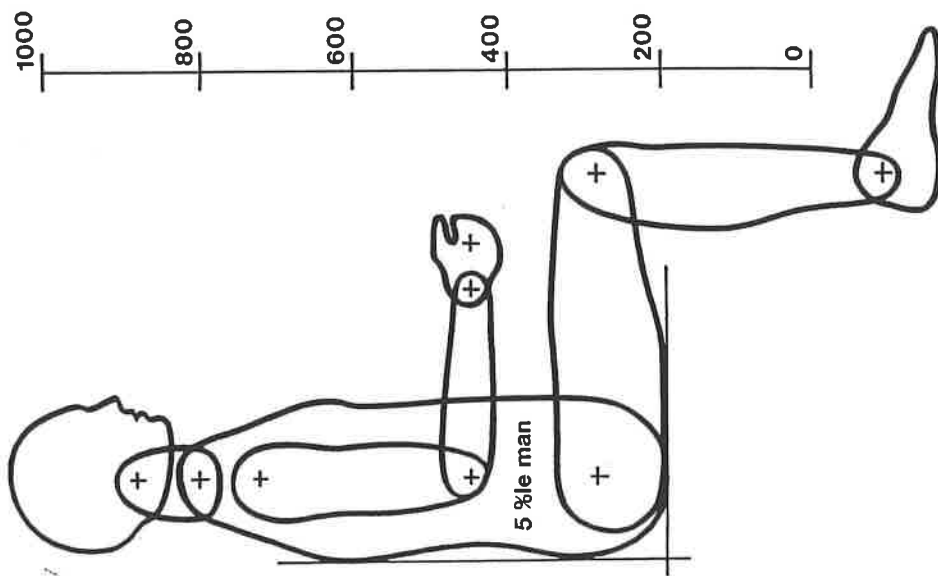


Figure 2.11. Mannikin—5th %ile man (scale 1:10).

## 2.7. A mathematical synopsis of anthropometrics

The purpose of this section is to treat the mathematical foundations of anthropometrics in a little more detail than hitherto. The reader who has no taste for these matters may skip this section with impunity since the sense of the remainder of the book does not depend on it to any critical extent. The equations proposed here will, however, be used extensively.

### The normal distribution

Consider a variable  $x$  which is normally distributed in a population. Its probability density function is

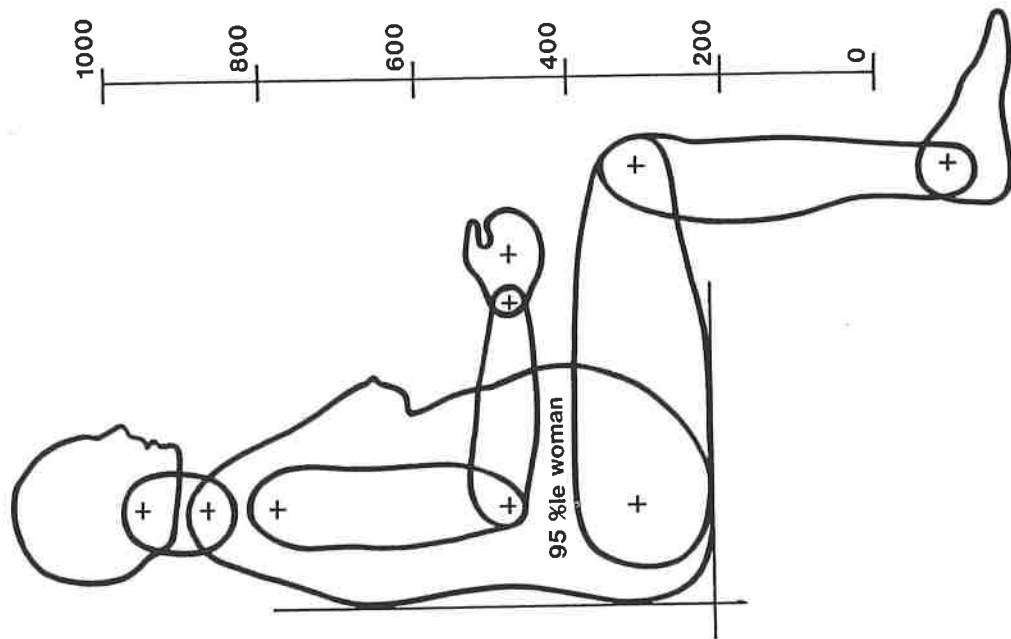


Figure 2.10. Mannikin—95th %ile woman (scale 1:10).

Evaluation), the nature and application of which was described previously.

It is difficult to predict the effects the increasing availability of such software will have on the practice of anthropometrics and design. Consider the possibility of a software package which incorporated an extensive anthropometric data library, with a fixed percentile model like SAMMIE and a percentage accommodated system like CAPE, which was fully interactive and had some of the features of an 'expert' or 'intelligent knowledge-based system', which produced presentation quality graphics and which ran on a cheap desk-top micro. Such a package would be a very powerful design tool—by the time you are reading this it may well be available.

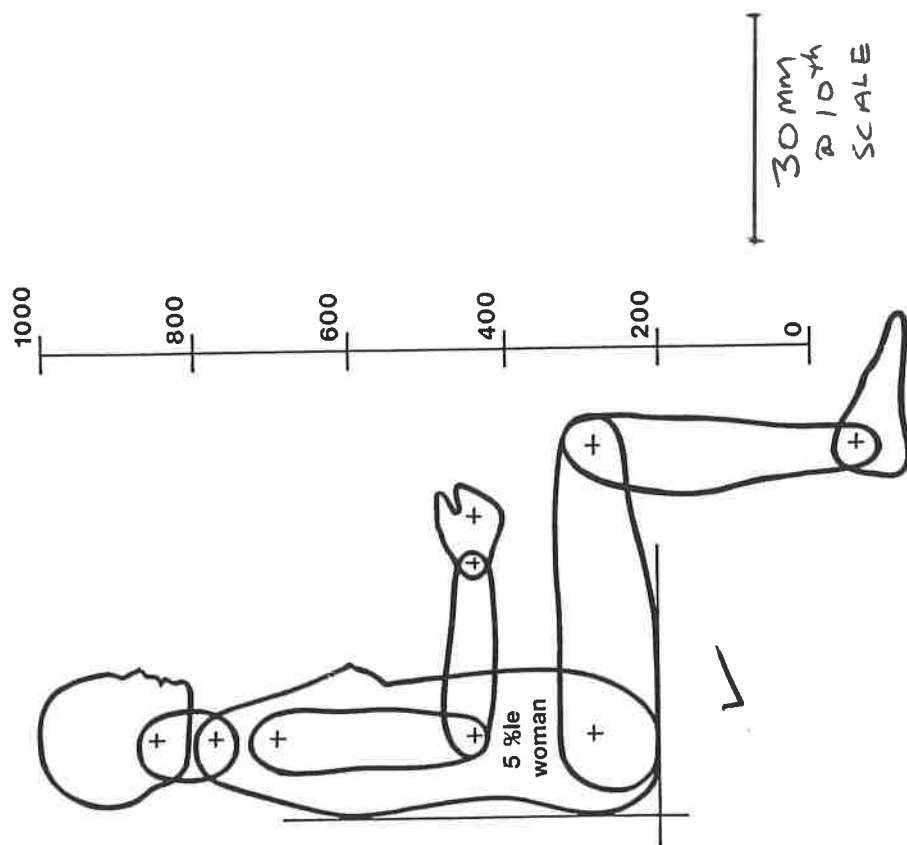
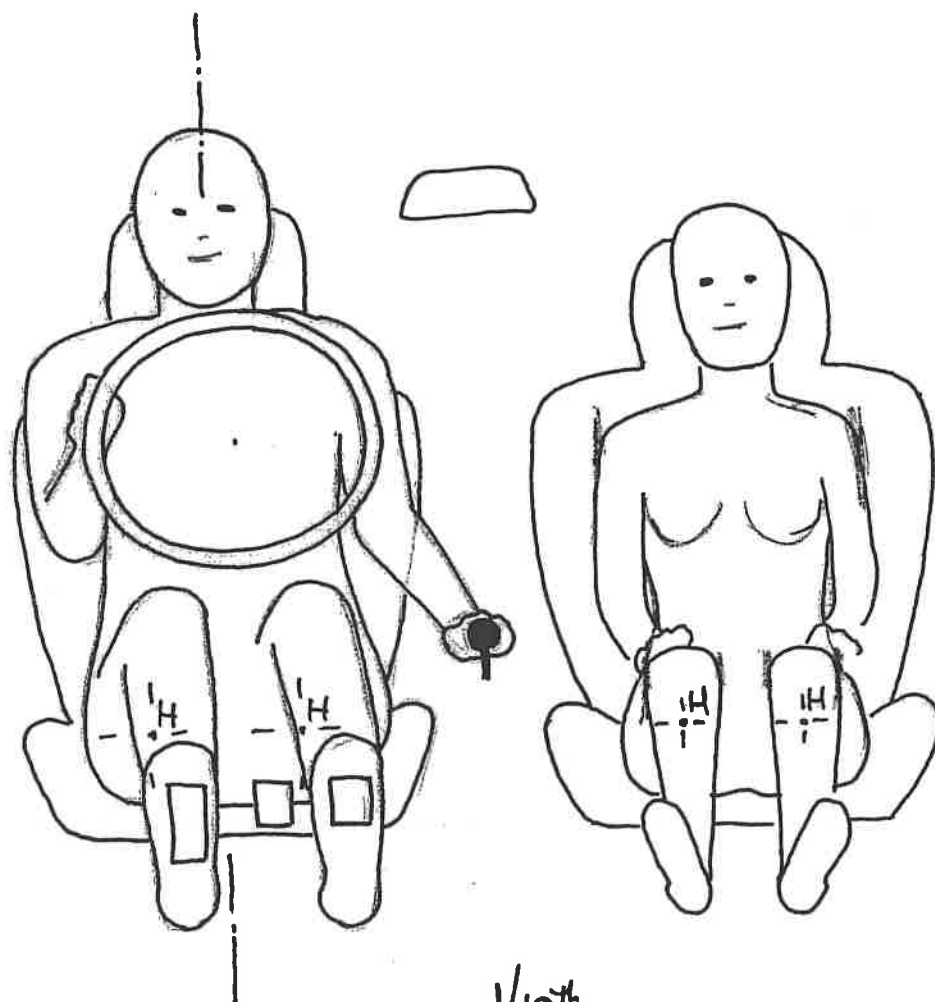


Figure 2.9. Mannikin—5th %ile woman (scale 1:10).

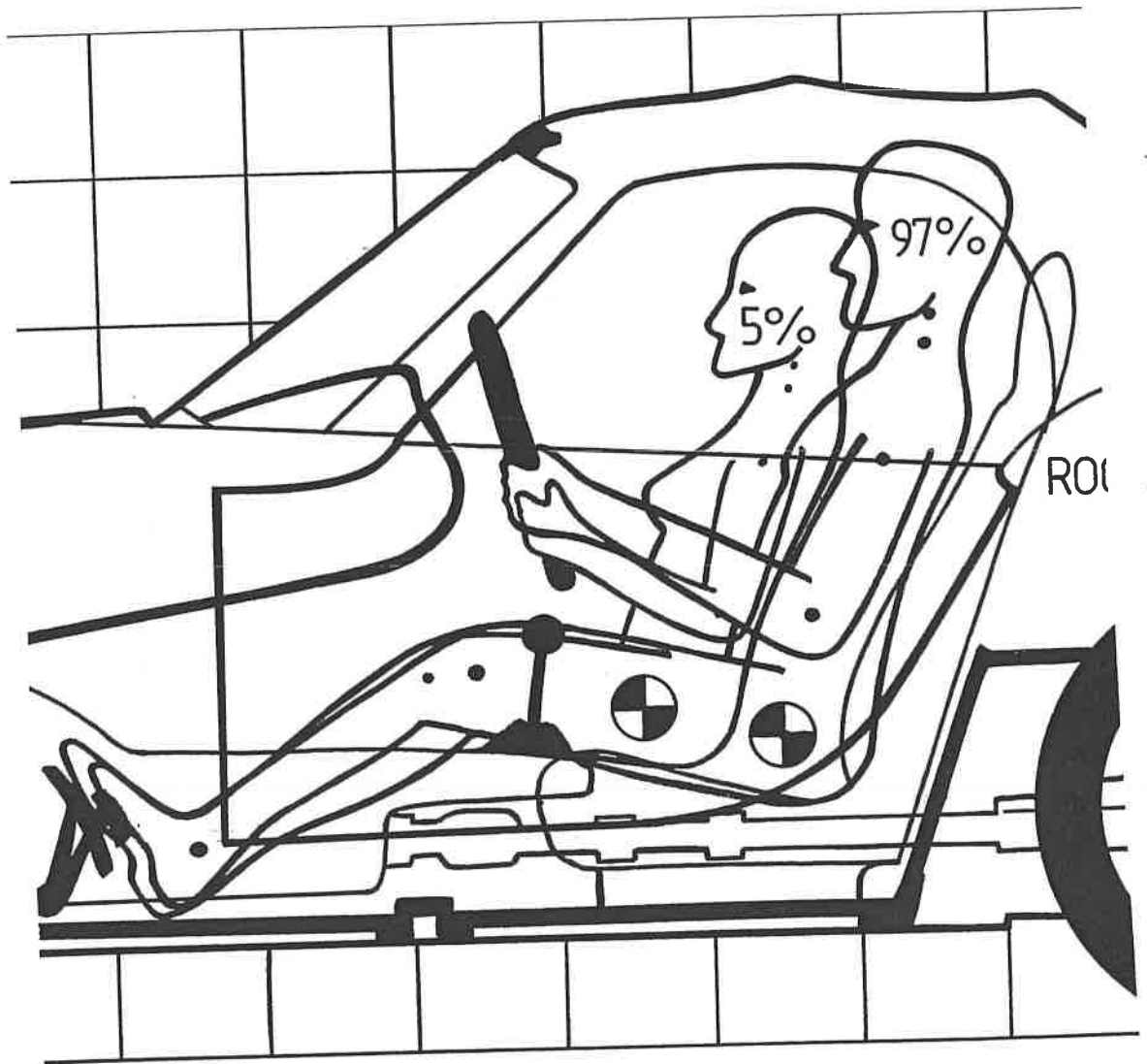
projected layouts with respect to reach, fit, clearance and field of view. The system can be used both as a design and an evaluation tool and has been used for design problems associated with vehicles (trucks, cars, tractors, ships, aircraft and trains) and other diverse tasks and equipment such as the design of cash payment areas in shops, the design of computer-aided equipment and the layout of control rooms. Figure 2.13 illustrates a rather unusual application. It shows a tall female manikin (a nurse) reaching into a specially designed cot for infant care. Various dimensions of the cot were examined in terms of comfort and ease-of-use criteria. Recommendations based on these SAMMIE evaluations were then fed back to the designer prior to user trials. (This particular project was performed by Stuart Gibson and Ian Pemberton).

An alternative type of program is one like the Monte Carlo model of Bittner *et al.* (1975) known as CAPE (Computerized Accommodated Percentage



1/10th

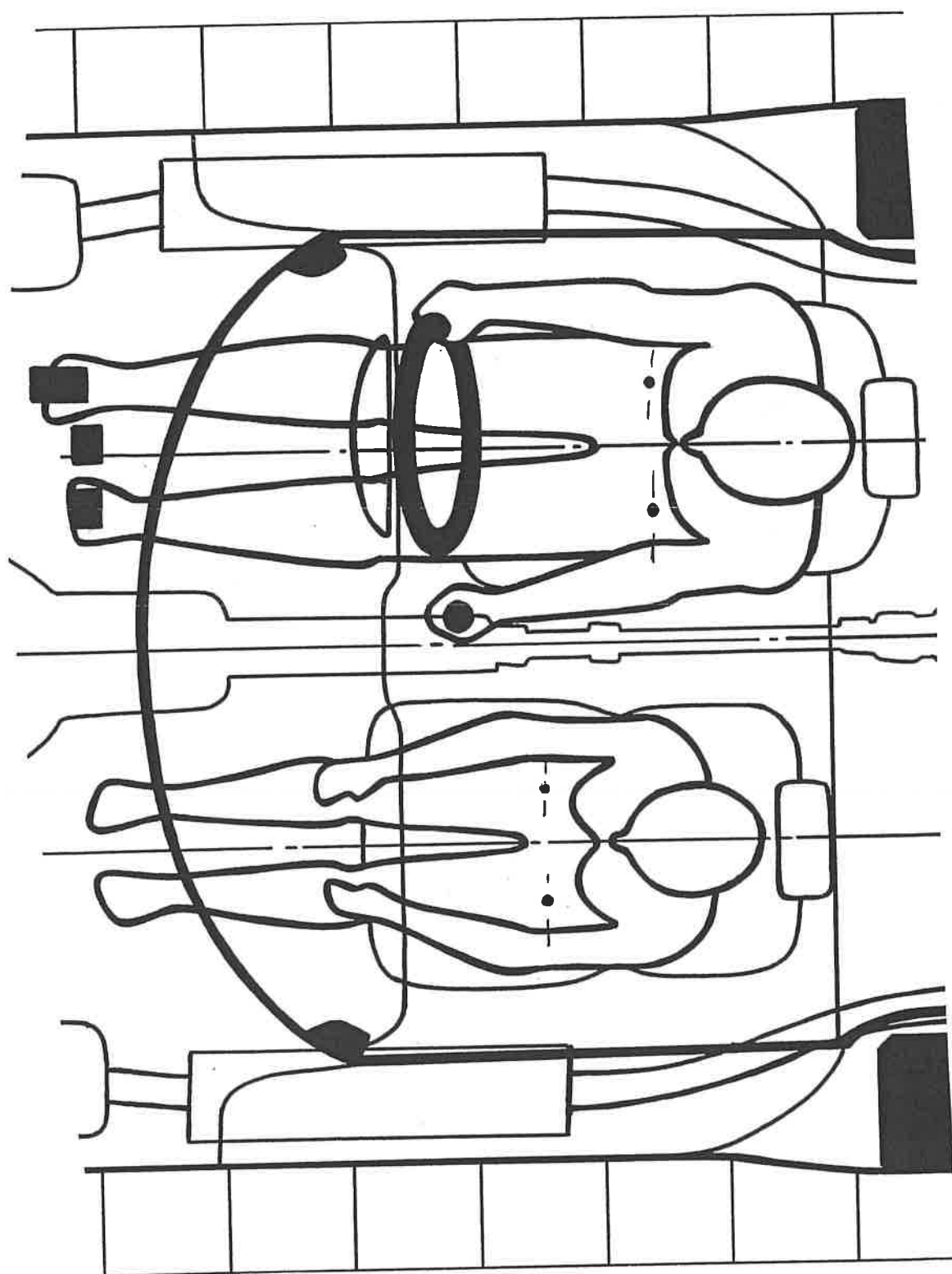
30mm  
@ 1:10 scale



1:10 SCALE

MORLAN SPORTS CAR

30mm



30mm

@ 1:10

1:10 SCALE

MORLAN SPORTS CAR