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TITLE

THE SEATING OF RADAR OPERATIONS IN ARMOURED PERSONNEL CARRIERS

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WORKING PAPER ON

THE SEATING OF RADAR OPERATORS IN ARMOURED PERSONNEL CARRIERS

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THE SEATING OF RADAR OPERATORS IN ARMOURED PERSONNEL CARRIERS

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THE SEATING OF RADAR OPERATORS IN ARMOURED PERSONNEL CARRIERS

ABSTRACT

This study describes a method of seating a radar operator in an armoured personnel carrier. The stabilization and posture of the operator is obtained by the use of a modified design of the "Oxford" anatomical seat.

1. THE SEATING OF RADAR OPERATORS IN ARMOURED PERSONNEL CARRIERS

2. AUTHOR - W. D. de la Riviere

3. PURPOSE - The purpose of the study was to devise a method of seating a radar operator in Armoured Personnel Carrier No. 603 in such a manner that the operator was in stabilization when the vehicle was on the move.

A further requirement was that when operating the radar set of a stationary vehicle the operator was to be so seated that his posture induced a minimum of fatigue.

4. INTRODUCTION -

The study was carried out at the National Research Council Laboratories in Ottawa during July 1952. A full scale wooden "mock-up" of the interior of an Armoured Personnel Carrier No. 603 together with a "mock-up" of a "B" scan radar set were made available.

5. METHOD -

The method of study was to obtain the interior measurements of the A.P.C., with a view to installing a modified version of the Oxford Anatomical Seat which would allow of correctly seating at least 90% of all military personnel in the most efficient position without the operator fouling the surrounding structure, but, at the same time occupying the least possible space.

It was decided that to consider the remaining 10% composed of persons at the extremes of the range of anthropometric measurements, would lead to difficulties of design which might well outweigh any advantage gained by the increase of potentially suitable operators.

In order to accommodate persons within the 90% range, the position of the seat must be precisely related in each person to the foot rest, so that the legs are held in the correct position. For this reason an adjustable foot rest must be provided.

7. STABILIZATION OF THE BODY

A means of stabilization is essential in order to counteract the movement of the A.P.C. when the vehicle is in motion. Whatever method is adopted, the arms must be left free and the mobility of the trunk and neck should not be restricted.

Body stabilization by the use of a retaining mechanism is not thought to be desirable for it is liable to limit the movement of the arms and trunk, and also unnecessarily adds to the manipulations to be performed by the operator, when he takes up his position which he may have to leave rapidly, probably in the dark. Furthermore, the feeling of the harness, even though it may be fitted with a quick release catch, may hinder rapid escape and may have an undesirable psychological effect.

Body stabilization in the suggested design is effected by the operator himself with the minimum of muscular effort, by counter pressure between a foot rest and a back rest.

Tests have shown, that, in the optimum position, i.e., a knee angle of 165°, the stability is so great that an operator can remain in his seat when it is rolled from side to side even when less than the maximum counter pressure obtainable with the suggested design of seat is being exerted.

In normal operation, it is estimated that the maximum extrinsic force tending to displace the operator from his seat is about 200 lbs., whereas the mean pressure that can be maintained with each leg in the position shown in the appendix is about 500 lbs. (R.N.P. 34/406).

8. REDUCTION OF FATIGUE

The suggested seat provides efficient and comfortable support to the body and legs over long periods of time and allows for an alert and relaxed position. The body is accommodated in such a position that no muscles are working at a mechanical disadvantage, and no arteries or nerves are subjected to excessive pressure.

The seat thus helps to reduce fatigue to a minimum by preventing an incorrect seating position. When rest pauses can be taken, even if the pause lasts only a minute, the

operator can change his posture, thereby promoting the circulation through the fatigued muscles. This is effected by the operator sliding forward in his seat and leaning back against the back rest. This allows some of the body weight to be distributed to the back and relieves pressure on the skin over the buttocks.

9. ANTHROPOMETRIC DATA

The calculations for the dimensions of the seat, back rest and foot rest are based on the American Fort Knox Survey (Project 9), Body Measurements of British Tank Personnel (B.P.C. 45/406), and the R.N. publication (R.N.P. 44/104 C.S.18).

10. DETAILS OF DESIGN

The foot rest should be positioned, relative to the seat, as shown in the appendix and should be 15 inches in width. A heel rest must be fitted to the lower end of the foot rest from which it should project at right angles. The heel rest should be three inches deep in order to give comfortable support to the heels.

The foot rest should be adjusted between slots one inch apart in a similar manner to that employed to adjust the foot stretchers in a row boat.

The seat cusion is resilient with a range of compressibility of $\frac{1}{2}$ inch to one inch between an operator weight range of 148 lbs. to 225 lbs. with sitting weights between 125 lbs. to 172 lbs. The overall average being a

compression of 3/4 inch.

When positioning the seat, it is most important that the height of the compressed cushion be 8½ inches above the floor of the vehicle.

In addition to meeting the anthropometric, anatomical and physiological requirements, the Oxford seat in current production is capable of withstanding very severe usage under extremes of climate conditions. It is weather proof, sea and fresh water proof, oil proof, rot proof, termite proof and fire proof. The construction of the seat and back rest combine maximum strength together with minimum weight and size. The design also permits of easy and rapid access or escape from the seat.

11. CONCLUSION

It would appear desirable that the A.P.C. 603 be equipped with a modified "Oxford" anatomical seat comprising, seat, back rest and folding arm rests. The foot rests to be of local manufacture.

This patten seat is manufactured by the Fairey Aviation Company as the "Seat Universal R.N.", and could be obtained from the U.K. Ministry of Supply. Should it be decided not to obtain these seats from the British manufacturers, a complete specification and working drawing can be obtained from DRML, Toronto.

This method of seating complies with all the requirements of stabilizing the operator when the vehicle is in motion and eliminates as much fatigue as possible when he is operating the radar equipment.

ACKNOWLEDGEMENT

The writer wishes to thank Dr. H. Darcus of the Department of Human Anatomy, Oxford University, for the use made of his principles of seating and some of his terminology in the text of this study.

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2. Body Measurements of British Tank Personnel - B.P.C. 45/406

3. Seating in Relation to Anatomical and Psychological Principles - R.N.P. 46/326 48

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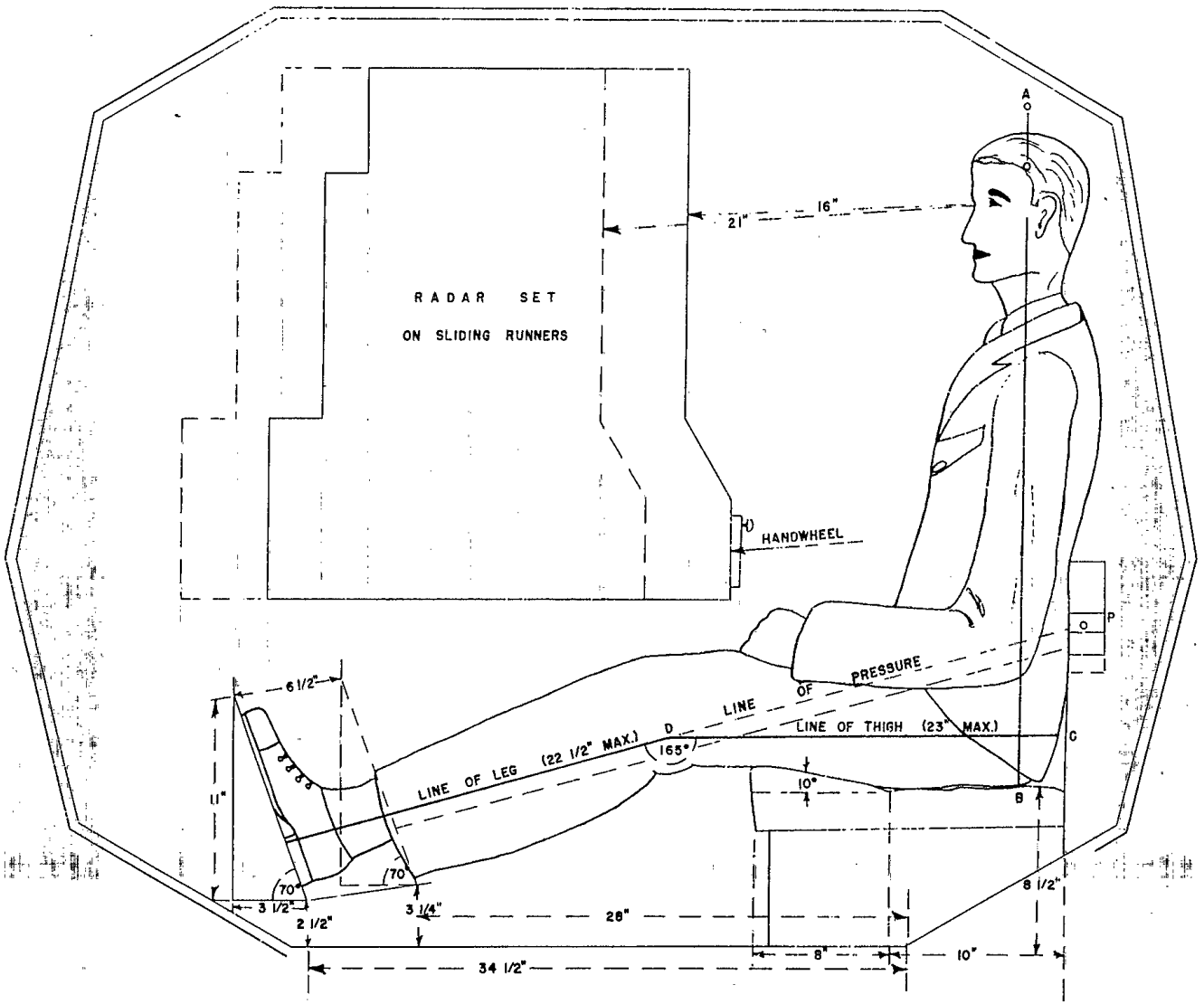
OPERATOR SEATED TO OBTAIN OPTIMUM POSITION
FOR BODY STABILIZATION BETWEEN
A BACK REST AND A FOOT REST



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