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A Mathematical Model
of the
Inertial Properties of
a Carrier-Backpack System
Volume IV

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This is a report on the development of a mathematical model and Fortran program to examine the inertial properties of a human-backpack system. A twelve-segment model was formulated to represent a soldier carrying a backpack and other objects often carried during military operations. This computer model is used to generate values of the following variables: system mass, system center of mass location, system inertia tensor, and principal moments of inertia for the system. The model can be used to simulate both a male and a female human body. Any one of four backpack systems, each containing a 20-lb load, can be

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examined. Three of the backpacks have external frames and one has an internal frame. One or two loads, the weights of which are determined by the program user can be added to the 20-lb pack load. The positioning of these added loads is also user-determined. In this report, the development of the model is discussed and results of executions of the program are presented. In addition, the report contains a listing of the Fortran program.

PREFACE

This is the fourth of four volumes comprising the final report of research performed under Contract Number DAAK60-79-C-0131 with the Individual Protection Laboratory, US Army Natick Research and Development Laboratories, Natick, Massachusetts. The work was formulated and directed by Drs. Carolyn K. Bensel and Richard F. Johnson, Human Factors Group, Individual Protection Laboratory. Dr. Bensel was the contract monitor and Dr. Johnson was the alternate.

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