ADA 119129

TECHNICAL REPORT NATICK/TR-82/016

# Effects of Gender, Load, and Backpack on Easy Standing and Vertical Jump Performance Volume II

BY RICHARD C. NELSON
AND
PHILIP E. MARTIN

BIOMECHANICS LABORATORY
THE PENNSYLVANIA STATE UNIVERSITY
UNIVERSITY PARK, PENNSYLVANIA

**MARCH 1982** 

UNITED STATES ARMY NATICK RESEARCH & DEVELOPMENT LABORATORIES NATICK, MASSACHUSETTS 01760



APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED



Approved for public release; distribution unlimited.

Citation of trade names in this report does not constitute an official indorsement or approval of the use of such items.

Destroy this report when no longer needed. Do not return it to the originator.



UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Oate Entered)

5. TYPE OF REPORT & PERIOD COVERED Final Report for Period Oct-ober 1, 1979 to August 31, 1981
Final Report for Period Oct-
Final Report for Period Oct-
6. PERPORMING ORG. REPORT HUNDER IPL-240
B. CONTRACT OR ORANT NUNBER(+)
DAAK60~79~C~0131
10. PROGRAN ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
6.2,
1L162723AH98AJ005
12. REPORT OATE
es March 1982
15. NUNBER OF PAGES
74
15. SECURITY CLASS. (of this report)
UNCLASSIFIED
15. DECLASSIFICATION/DOWNGRACING SCHEDULE

is. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. OIST RIBUTION STATEMENT (of the abetract entered in Block 20, If different from Report)

IS. SUPPLEMENTARY NOTES

18. KEY WOROS (Continue on reverse side if necessary and identify by block number)

loads

load carrying military personnel

males

anthropometry

exercise

females

combative movement

field tests

frame-pack systems performance

field operations

28. ABSTRACT (Continue on reverse stde if reseasory and identity by block number)

This study was conducted to determine the effects of loada worn or carried and the type of backpack used on parameters of the easy standing and vertical jumping performance of men and women. Fourteen men and eleven women participated in the easy standing test and eleven men and ten women participated in the vertical jump under each of the following load conditions: Load 1 - baseline (shorts, t-ahirt, sneakers); Load 2 - fighting gear (utility shirt and trousers, boots, ALICE fighting gear); Load 3 - combat gear (Load 2 plus PASGT helmet, PASGT armor vest, aimulated M16 rifle); Load 4 - combat gear and 20-1b backpack

DD 1707M 1473

EDITION OF ! NOV \$\$ IS OBSOLETE

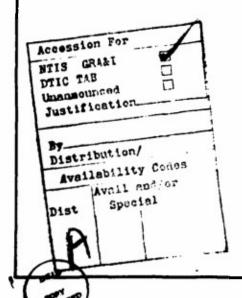
UNCLASSIFIED



#### UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE(When Date Entered)

load (Load 3 plus backpack with 20-1b load); Load 5 - combat gear and 35-1b back-pack load (Load 4 plus an additional 15 lb in pack). The men were also tested under a sixth load condition: Load 6 - combat gear and 50-lb backpack load (Load 4 plus an additional 30 lb in pack). The subjects carried Loads 4 through 6 using four different backpack systems. Two of these consisted of Army framea equipped with the standard Army pack. The third was an experimental item, a packboard made of rigid aluminum, used with the Army pack. The fourth backpack was a commercially-available, internal frame system. Analyaes of the easy standing data indicated that both men and women demonstrated greater stability with the medium than with the lighter or heavier loada. The internal frame backpack resulted in greater postural stability relative to the three, externalframe systems. Increasing loads produced a aystematic, linear decrease in vertical jumping performance. Analyses of the effects of backpacks on the parameters of jumping performance revealed few differences among the packa. However, it was found that height of jump was somewhat better with the internal frame system than with the external-frame backpacks. Additional analysea were carried out on the trial-to-trial reliability of easy standing and on ground reaction force parameters of vertical jumping adjusted for body weight and system weight.



INCI ACCIPIEN



#### PREFACE

This is the second of four volumea 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 Laboratoriea, Natick, Massachusetta. The work was formulated and directed by Drs. Carolyn K. Benael and Richard F. Johnson, Human Factora Group, Individual Protection Laboratory. Dr. Bensel was the contract monitor and Dr. Johnson was the alternate.



# DOCKET

# Explore Litigation Insights



Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

# **Real-Time Litigation Alerts**



Keep your litigation team up-to-date with **real-time** alerts and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## **Advanced Docket Research**



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

# **Analytics At Your Fingertips**



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

### API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

#### **LAW FIRMS**

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

#### **FINANCIAL INSTITUTIONS**

Litigation and bankruptcy checks for companies and debtors.

## **E-DISCOVERY AND LEGAL VENDORS**

Sync your system to PACER to automate legal marketing.

