

Indiana University – Purdue University Fort Wayne
Opus: Research & Creativity at IPFW

Computer and Electrical Engineering Technology &
Information Systems and Technology Senior Design
Projects

School of Engineering, Technology and Computer
Science Design Projects

5-1-1980

Orthopaedic Weight Machine

Thomas Howard Nodine

Indiana University - Purdue University Fort Wayne

Denis Scot Warner

Indiana University - Purdue University Fort Wayne

Follow this and additional works at: http://opus.ipfw.edu/etcs_seniorproj



Part of the [Computer Sciences Commons](#), and the [Engineering Commons](#)

Opus Citation

Thomas Howard Nodine and Denis Scot Warner (1980). Orthopaedic Weight Machine.
http://opus.ipfw.edu/etcs_seniorproj/285

This Senior Design Project is brought to you for free and open access by the School of Engineering, Technology and Computer Science Design Projects at Opus: Research & Creativity at IPFW. It has been accepted for inclusion in Computer and Electrical Engineering Technology & Information Systems and Technology Senior Design Projects by an authorized administrator of Opus: Research & Creativity at IPFW. For more information, please contact admin@lib.ipfw.edu.

SENIOR DESIGN

TECHNICAL REPORT

for

ORTHOPAEDIC WEIGHT MACHINE

title

in partial fulfillment of the requirements
for the degree of

BACHELOR OF SCIENCE



presented to the

ELECTRICAL ENGINEERING TECHNOLOGY FACULTY

INDIANA UNIVERSITY-PURDUE UNIVERSITY AT FORT WAYNE

MAY 1, 1980

date

by

THOMAS HOWARD NODINE and DENIS SCOT WARNER

GRADE:

APPROVED:

ABSTRACT
of
ORTHOPAEDIC WEIGHT MACHINE

THOMAS HOWARD NODINE
DENIS SCOT WARNER

Specific problems concerning the method of applying traction to fractures are isolated through information from health care personnel, and then this information is considered in an effort to develop an electro - mechanical device by which all the disadvantages of the current system are eliminated while all the desirable characteristics are retained.

TABLE OF CONTENTS

FOREWORD	iii.
I. <u>INTRODUCTION</u>	1.
A. Investigation of the Problem	1.
1. Problems Related by Floor Personnel	2.
2. Problems Related by Hospital Administrators	4.
3. Other Useful Information	5.
B. Preliminary Design Considerations	7.
1. Force Production Sub-System	7.
2. Force Measurement Sub-System	10.
3. Automatic Control Sub-System	12.
4. Power Supply Sub-System	14.
C. Summary	14.
II. SYSTEMS DEVELOPMENT and THEORY OF OPERATION	15.
A. Force Production Sub-System	15.
1. Winch Development	15.
2. Motor Selection	16.
3. Gear Selection	17.
4. Operation	19.
B. Force Measurement Sub-System	21.
1. Transducer Development	21.
2. Amplifier Development	24.
3. Analog to Digital Converter Selection	25.
4. Operation	26.

C. Automatic Control Sub-System	26.
1. Operator Input Considerations	27.
2. Motor Control	27.
3. Low Voltage Monitor	28.
4. Single Step Circuit	28.
5. Operation	29.
D. Power Supply Sub-System	31.
III. <u>FUTURE DESIGN CONSIDERATIONS</u>	32.
IV. <u>MAINTENANCE</u>	36.
A. A/D Converter	36.
B. Transducer Amplifiers	36.
C. Transducer Amp to A/D Converter Adjustment	37.
D. Backplane Oscillator	37.
E. Low Voltage Indicator	37.