

1-1-1993

The effect of prophylactic knee braces on running gait

Charles Lawson Liggett
University of Nevada, Las Vegas

Follow this and additional works at: <https://digitalscholarship.unlv.edu/rtds>

Repository Citation

Liggett, Charles Lawson, "The effect of prophylactic knee braces on running gait" (1993). *UNLV Retrospective Theses & Dissertations*. 356.
<http://dx.doi.org/10.25669/7a2q-6cqr>

This Thesis is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Thesis in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Thesis has been accepted for inclusion in UNLV Retrospective Theses & Dissertations by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Order Number 1358569

The effect of prophylactic knee braces on running gait

Liggett, Charles Lawson, M.S.

University of Nevada, Las Vegas, 1994

Copyright ©1994 by Liggett, Charles Lawson. All rights reserved.

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

THE EFFECT OF PROPHYLACTIC
KNEE BRACES ON
RUNNING GAIT

by

Charles Lawson Liggett

A thesis submitted in partial fulfillment
of the requirements for the degree of

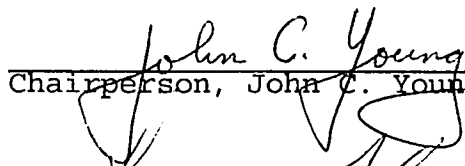
Master of Science

in


Exercise Physiology


Department of Kinesiology
College of Human Performance and Development
University of Nevada, Las Vegas
May 1994

The Thesis of Charles Lawson Liggett for the degree of
Masters of Science in Exercise Physiology is approved.

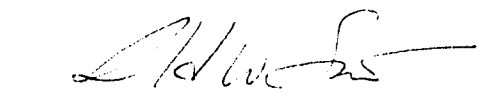

Chairperson, John C. Young Ph.D.


Examining Committee Member, Lawrence Golding Ph.D.


Examining Committee Member, Richard Tandy Ph.D.


Examining Committee Member, Danny Too Ph.D.


Graduate Faculty Representative, Louis Amundsen Ph.D.


Dean of the Graduate College, Ronald Smith Ph.D.

University of Nevada, Las Vegas
May 1994

©1994 Charles Lawson Liggett
All Rights Reserved

Abstract

The use of prophylactic knee braces to prevent knee injuries in football players might increase the risk of injuries to the players because of changes in normal function. This study focused on one of seven criteria for knee braces developed by the American Academy of Orthopedic Surgeons, namely that a brace should not interfere with normal running function in the lower extremity. Subjects with no prior history of knee injury were filmed while running on a treadmill. Digital analysis of each subject's running gait with and without the use of knee braces was performed. The knee, ankle and hip joints of both legs were studied to determine if differences existed in the ranges of motion, velocities, and duration of the gait cycle as a result of wearing a knee brace.

No differences were found between braced and nonbraced conditions for any parameter measured. Therefore, it was concluded that prophylactic knee bracing does not alter locomotor function of the lower extremities, while running on a treadmill at 5 mph.

TABLE OF CONTENTS

ABSTRACT	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
ACKNOWLEDGEMENTS	viii
CHAPTER 1 INTRODUCTION	1
Purpose	2
Operational Definitions/Variables	3
CHAPTER 2 REVIEW OF LITERATURE	4
History	4
Terminology	5
Gait Analysis	6
Laboratory Studies: Human Subjects	11
Laboratory Studies: Cadaver	15
Laboratory Studies: Surrogate Knee	18
Injury Reports	21
Reviews/Statements	24
Ethics/Liabilities	29
Summary	30
CHAPTER 3 METHODS	32
CHAPTER 4 RESULTS	38
Range of Motion	38
Velocities	43
Gait Patterns	43
Questionnaire	54
CHAPTER 5 DISCUSSION	59
CHAPTER 6 SUMMARY	66
APPENDIX I INFORMED CONSENT	67
APPENDIX II DATA COLLECTION FORM	68
APPENDIX III POST TRIAL QUESTIONNAIRE	69
APPENDIX IV DIGITAL ANALYSIS INFORMATION	71

APPENDIX V CAMERA PLACEMENT SCHEMATIC	72
APPENDIX VI INDIVIDUAL JOINT ROM FIGURES	73
APPENDIX VII INDIVIDUAL JOINT VELOCITIES FIGURES	78
APPENDIX VIII TABLE 6 KNEE RANGE OF MOTION - RAW DATA	84
APPENDIX IX TABLE 7 HIP RANGE OF MOTION - RAW DATA	100
APPENDIX X TABLE 8 ANKLE RANGE OF MOTION - RAW DATA	116
APPENDIX XI TABLE 9 KNEE VELOCITIES - RAW DATA	132
APPENDIX XII TABLE 10 HIP VELOCITIES - RAW DATA	148
APPENDIX XIII TABLE 11 ANKLE VELOCITIES - RAW DATA	164
BIBLIOGRAPHY	180

LIST OF TABLES

TABLE 1	Subjects' Information	33
TABLE 2	Subjects' Leg Measurements	34
TABLE 3	Durations for Subjects' Gait Cycles	39
TABLE 4	Post-Trial Questionnaire Results	56
TABLE 5	Questionnaire Results By Individual Subject	70
TABLE 6	Knee Range of Motion - Raw Data	84
TABLE 7	Hip Range of Motion - Raw Data	100
TABLE 8	Ankle Range of Motion - Raw Data	116
TABLE 9	Knee Velocities - Raw Data	132
TABLE 10	Hip Velocities - Raw Data	148
TABLE 11	Ankle Velocities - Raw Data	164

LIST OF FIGURES

FIGURE 1	Right and left knee range of motion	40
FIGURE 2	Right and left hip range of motion	41
FIGURE 3	Right and left ankle range of motion	42
FIGURE 4	Right and left knee velocities	44
FIGURE 5	Right and left hip velocities	45
FIGURE 6	Right and left knee range of motion composite ..	46
FIGURE 7	Right and left knee velocities composite	48
FIGURE 8	Right and left hip range of motion composite ...	50
FIGURE 9	Right and left hip velocities composite	51
FIGURE 10	Left hip range of motion	52
FIGURE 11	Right and left ankle range of motion composite .	53
FIGURE 12	Right and left ankle velocities composite	55
FIGURE 13	Right and left ankle velocities	64
FIGURE 14	Right knee range of motion	73
FIGURE 15	Left knee range of motion	74
FIGURE 16	Right hip range of motion	75
FIGURE 17	Right ankle range of motion	76
FIGURE 18	Left ankle range of motion	77
FIGURE 19	Right knee velocities	78
FIGURE 20	Left knee velocities	79
FIGURE 21	Right hip velocities	80
FIGURE 22	Left hip velocities	81
FIGURE 23	Right ankle velocities	82
FIGURE 24	Left ankle velocities	83

ACKNOWLEDGEMENTS

I wish to thank Kyle Wilson A.T.,C. and the Athletic Training Department of UNLV for the loan of the knee braces for use in this study. Also, to Maria Diener for her assistance during the actual study. To Janice Matson who helped with a smile and a laugh in between the forms and the deadlines.

To my family, who have put up with the distance and the travel while I have been pursuing this great adventure. I will never be able to express my thanks to you.

CHAPTER 1

Introduction

The use of prophylactic knee braces has become a common practice for preventing injuries in football at both collegiate and professional levels. In the sport of lacrosse, men and women are beginning to use preventive knee bracing. Prophylactic knee braces and preventive knee braces are synonymous terms and will be used interchangeably through out this thesis. The American Academy of Orthopedic Surgeons (AAOS) has set up standards for knee braces and their use (Paulos, Drawbert, France & Rosenberg, 1986). These standards are as follows: 1) a brace should supplement stiffness of the knee to injury-producing loads from both contact and noncontact stresses; 2) a brace should not interfere with normal function; 3) a brace should not increase risk factors elsewhere in the lower extremity; 4) a brace should adapt to various shapes and sizes; 5) a brace should not be harmful to other players; 6) a brace should be cost effective and durable; and 7) a brace should have documented efficacy in preventing injuries. Of these seven criteria the second was the focus of this study.

To determine if a commonly used knee brace interfered with normal function in the lower extremity, digital

analysis of running gait was performed in subjects wearing Omni Anderson Knee Stabler braces. Gait was analyzed in subjects running on a treadmill with and without braces to determine if locomotor function in the areas of range of motion (ROM) and velocity were changed by the knee brace. The duration of the gait cycle was also evaluated. Because the locomotor of function in the extremity when braced may differ from that when not braced, the lower extremity may be placed at higher risk for injury. It is important to remember that protective or preventive knee braces not functional braces are the focus of this study. Functional braces have a separate purpose for their use, namely enhancement of the stability of the knee.

Purpose:

The purpose of this study was to determine if the wearing of knee braces for protection of apparently healthy knees changed performance by affecting duration of the gait cycle ROM or velocity of the knee, hip and ankle joints during running. If a difference in these three areas was found, the extent to which subjects could have become accustomed to the brace during use would have been determined. It was hypothesized that the wearing of prophylactic knee braces will not affect the running duration, ROM, and velocities of the joints of the lower extremity.

Operational Definitions / Variables

Running gait was defined as the duration of the gait

cycle, ROM, and velocity of the knee, hip and ankle joints. A stride was defined as the distance from one foot strike to the next touch down of the same foot. One stride was defined as a full cycle for analysis of the running gait, which was considered the gait cycle. The cycle ran from right foot strike to a second right foot strike. There was one independent variable in this study with two levels: the subject braced or not braced. There were three dependent variables in this study: the subjects range of motion, velocity and the duration of the gait cycle.

Chapter 2

Review of Literature

History

The first knee splint was reported to have been used around 2730-2625 BC (Wirth & DeLee, 1990). The search for the ideal materials has continued over the years, from the use of wheat mixed into a firm mass and egg whites stiffened with solidifying pastes, to the braces of today made with metal or high impact plastic, and fastened with neoprene and velcro straps. Braces have been classified into three categories: prophylactic, functional, and rehabilitative (Wirth & DeLee, 1990). Prophylactic braces are those designed to prevent or reduce severity of a knee injury (Wirth & DeLee, 1990). Functional braces are those designed to provide stability to unstable knees (Wirth & DeLee, 1990). Rehabilitative braces are those designed to allow protected motion to a knee that has been treated operatively or nonoperatively (Wirth & DeLee, 1990).

The histories of preventive knee braces and a review of the studies to examine their effectiveness were reported by Johnston and Paulos (1991). The information available about prophylactic braces and their effectiveness in preventing injuries was conflicting at best (Johnston & Paulos, 1991).

After braces were first manufactured, they underwent periods of use and periods of skepticism about their effectiveness leading to questions as to whether they should be used. It can be concluded that a statement about knee brace effectiveness still cannot be made after all this time of knee brace use (Johnston & Paulos, 1991).

Terminology

For purposes of clarifying this review, the following definitions are offered:

- Prophylactic braces can be defined as those that attempt to prevent or reduce the severity of knee injuries (Millet & Drez, 1987).
- Functional braces are those designed to assist or provide stability for unstable knees.
- Rehabilitative braces are those designed to allow protected motion of injured knees treated operatively or nonoperatively (Millet & Drez, 1987).
- Gait is defined by the Oxford dictionary as "the manner of walking; bearing or carriage as one walks; manner of forward progression of a runner" (Vaughan, 1984).
- Stride is the initial ground contact of one foot to the next touch down of the same foot (Vaughan, 1984).
- Gait cycle is a completed stride. Includes the duration of a stride.
- Step is half a stride or initial foot contact until opposite foot contact.
- Support phase is when the foot is in contact with the

ground.

- Non-support phase is when neither foot is in contact with the ground.
- Swing phase is when the foot is not in contact with the ground.
- Accommodation is the period of time subjects will train with the braces. It will be four weeks in duration. Subjects will run on a treadmill at a speed of 5 mph for twenty minutes three times a week.

Gait Analysis

A comparison of running and walking gaits was made by Vaughan (1984). Included in this comparison were the timing and step length differences, joint angles, electromyography and ground reaction forces to distinguish between a walking and a running gait. Differences in walking gait and running gait occur in the support and swing phases. During walking, the entire cycle (or step) lasts about one second; the support phase occurs for 60% of the cycle. During running, the duration of the cycle decreases to around 0.65 seconds. The support phase becomes an increasingly smaller percentage as the speed increases until the swing phase becomes greater than the stance phase. When shifting from jogging to running at a race pace, the joint angles increase in hip and knee joints during the swing phase. As speeds become faster, less variation occurs in the joint angles (Vaughan, 1984). When running, there is an initial peak force of

about five times the body weight that lasts for about 10 to 15 msec (Vaughan, 1984). With the duration of ground contact so short, the muscles do not seem to have sufficient time to absorb the impact forces in an interactive manner. Thus, the forces are translated up through the skeletal system of the lower extremity.

Computer simulation and modeling were applied to gait analysis. Computer modeling refers to use of mathematical equations to describe systems of interest; computer simulation refers to the use of computers to carry out testing of systems of the real world under carefully controlled conditions (Vaughan, 1984). This computer simulation and modeling method was broken down into definitions, advantages, disadvantages, different models, air resistance and track design and examined how each could affect gait. The kinetics of the running gait were also examined. These included the forces and pressures on the foot, internal forces, resultant joint moments, individual muscle forces and individual bone forces, and their effect on gait. The biomechanics of running shoes themselves were also examined. The study included the methodology of assessment and design of running shoes, effects on oxygen demand, and shoe orthotics and cushioning to see if the shoes themselves could change gait. Shoe composition may also affect oxygen consumption; light weight racing shoes were compared with heavier air-soled prototypes. It was concluded that the differences found in O_2 consumption were

more likely due to individual differences in performance than shoe weight differences (Vaughan, 1984).

Pathological gaits resulting from injuries were also addressed. These injuries included shin splints, ligamentous injuries and amputee gaits. Shin splints can be generally defined as bone damage (stress fracture), vascular insufficiency (ischemia), or soft tissue damage (myositis, fascitis) (Vaughan, 1984). It can be concluded that functional and structural differences between individuals lead to one person developing shin splints and another to not be affected. In ligamentous injuries, a similar pattern of vertical and anteroposterior forces occurs in injured and normal legs (Vaughan, 1984). An increase in maximal lateral reaction forces at the beginning of foot contact in the injured leg can be detected, as well as decreased maximum lateral force during the stance phase for the injured leg. In addition, a decrease in maximal value of rotational friction during take-off can be seen.

Vaughan (1984) determined that while linear and angular kinematics of the running gait pattern have been studied in depth, study on EMG of humans running is limited, and suggested that EMGs should be recorded simultaneously with the gathering of kinematic and/or kinetic data. There is little to be gained by examining muscle activity in isolation while these muscles are developing tensions that result in joint forces and moments that cause the movement of the joints (Vaughan, 1984). In addition, the effect

played by individual muscle and bone forces in the stance phase needs to be determined.

Dowd et al. (1992) studied the reliability of specific measurements of lower extremities and angular velocities during a gait cycle, to see if differences existed between different trials of the same subject. Using the Ariel Performance Analysis system, it was shown that no differences existed between trials in a subject's running gait. Thus, it does not appear to matter which trial is used when analyzing gait. That is, comparisons made between two trials should be able to detect any differences that might exist from an external factor.

In a study looking at functional braces (instead of protective), a comparison of running gait with and without the brace applied was performed (Devita, Hunter & Skelly, 1992). The findings of this study showed no difference between gait with and without the braces. This lack of difference was attributed to an accommodation that may have occurred during the time the braces were first used by the subjects and the time of the testing (approximately six months) (Devita, et al., 1992). To negate this accommodation, it was suggested that testing needs to be performed sooner after the brace is introduced. A potential problem with testing immediately after a functional brace is introduced however, is that if it is being applied to an injured limb, time is needed for healing to occur before actual running could be performed. Therefore, it would be

better to apply protective braces to healthy people, to see if a difference in gait occurs. Devita and colleagues (1992) suggested that in the accommodation process of wearing the brace, changes might have occurred in the overall running gait. This alteration in gait appears to persist even without the brace applied, since no difference was observed between gaits with and without the brace applied. No studies compare gait before and after accommodation to a knee brace.

A brace's hinge design and placement can affect the forces at the knee created by motion (Regalbuto, Rovick & Walker, 1989). Braces placed in a proper position had little difference in force, in comparison to the knee itself. When the brace was misplaced by 12mm, differences did exist; forces were higher when the hinge was moved forward and lower when the brace hinge was moved backward (Regalbuto, et al., 1989). It is believed that the differences in forces between the brace and knee could cause changes to the anatomical structures of the knee as well as mechanical changes (Regalbuto, et al., 1989).

Quadriceps femoris muscle strength plays an important part in gait patterns (Snyder-Mackler, Ladin, Schepsis & Young, 1991). Electrical stimulation after reconstructive anterior cruciate surgery was used to restore normal function to the leg. In this study, experimental subjects were given electrical stimulation to the thigh muscles after surgery and control subjects were given just voluntary

exercise to rehabilitate the knee. The results of this study showed that the subjects who received electrical stimulation had a closer to normal gait between involved limb and uninvolved limb (Snyder-Mackler, et al., 1991).

Laboratory Studies: Human Subjects

Testing of post surgical knees with the use of electrogoniometry to determine effectiveness of two braces, in comparison with the uninvolved limb, during over the ground running was performed by Knutzen, Bates and Hamill (1983). The two braces used in this study were the Lenox-Hill and the Ace elastic support brace. There was a significant difference between the two braces. The Lenox-Hill brace reduced knee flexion during the swing phase of the surgical limb (Knutzen, et al., 1983). During the swing phase with the Ace brace, an increase in knee flexion occurred. The Lenox-Hill brace reduced external rotation, while the Ace brace increased external rotation of the surgical limb. The values for knee flexion and external rotation when the Ace brace was applied to the surgical limb were approximately similar to those in the healthy contralateral limb. Highest recorded values for maximum knee flexion in swing and support phases along with maximum external rotation occurred with the healthy limb (Knutzen, et al., 1983). This study showed that the Lenox Hill brace was performing as it was intended by restricting knee, flexion and external rotation, but that the Ace brace,

though designed for support, seemed to show lack of support.

Seven functional knee braces tested by instruments for anterior tibial displacement in anterior cruciate ligament deficient knees, showed some significant differences, but not all results were significantly different (Beck, Drez, Young, Cannon & Stone, 1986). Though not all levels of testing showed significance, it is possible that the small sample size of three subjects could have played a part in this. It was concluded that all the braces had some effect in controlling anterior tibial displacement, but that some controlled displacement better than others (Beck, et al., 1986).

A biomechanical analysis of gait, with two functional knee braces was examined by Knutzen, Bates, Schot and Hamill (1987). The study examined the ground reaction force and range of motion of the knee. No significant differences were detected when all variables were analyzed together. When variables were separated and post-hoc tests were performed, the brace application altered the non braced knee during flexion on both swing and support phases. Also, the total rotation and total valgus/varus movements of the knee were changed. The injured limb had a reduction in sagittal flexion of approximately 22% during the swing phases. Although the two braced conditions were not different from each other, knee joint movement differed significantly between the healthy and the injured limb. For ground reaction forces the healthy limb again showed differences

from the injured limb. The injured limb had a longer impulse time to first maximal force and first minimal force, and a longer relative time to first maximal force and a longer relative time until first minimal force (Knutzen, et al., 1987). The reduction in times to the minimal and maximal forces indicated that the gait was being altered.

In a study comparing the healthy leg and the unhealthy leg, in braced and unbraced conditions, functional braces and effects on rotational forces were examined. No difference between conditions of internal rotation and torque at the knee were found (Knutzen, Bates & Hamill, 1984). A trend was noted in the brace reducing the internal rotation and torque patterns. For external rotation and torque, a significant difference was detected across all conditions, with the braces showing reduction of rotation. An explanation given for this difference may have been the knee position used for testing, which was not exactly the intended knee position that the braces were designed to prevent (Knutzen, et al., 1984).

The effect of knee braces on performance of male football players and female lacrosse athletes was also studied (Sforzo, Nih-mey, Gold & Frye, 1989). The braces did not have detrimental effects on the performance of the football players, but did adversely affect the female athletes (Sforzo, et al., 1989). These effects included a decrease in time to fatigue and an increase in plasma lactate levels. It was determined that a longer time to

develop peak torque caused the difference observed. More analyses were performed to determine if familiarity with the braces, testing order, or a learning effect had any effect on the results. These factors were found to have no effect. Thus, braces did not improve performance and, in some asymptomatic athletes, braces were detrimental to performance (Sforzo, et al., 1989).

The effects of lateral knee braces on speed and agility for experienced and non-experienced wearers were determined by Fujiwara, Perrin and Buxton (1990). Subjects performed four tests under four different treatment conditions; three braced and one nonbraced. The testing was divided into two sessions on different days. The first session involved a 40-yard sprint and a 10-yard shuttle run. The second session involved a 20-yard backward sprint and a 40-yard square cone drill. The order of the conditions was randomized. It was found that the experienced wearers of the braces performed significantly different only during the 40-yard sprint, with the nonbraced condition being faster than all the braced conditions (Fujiwara, et al., 1990). The non-experienced wearers were significantly different at all the levels of testing. For experienced wearers, the principal effect of knee bracing was a reduction in forward speed (Fujiwara, et al., 1990). For the non-experienced wearers, forward running, backward running and agility were reduced. No difference was found among the three braces during any treatment condition (Fujiwara, et al., 1990).

Laboratory Studies: Cadaver

American Academy of Orthopedic Surgeons (AAOS) criteria were developed in order to try to protect athletes and others around them from injury (Paulos, et al., 1986). The list of criteria used came from a biomechanical study that attempted to quantify the mechanical effects of preventive knee braces. However, none of the braces studied could meet all seven of the criteria (Paulos, et al., 1986). Of the studies that follow, most used the same or similarly constructed braces. Some studies also used functional braces whose purpose for use, is to provide support or assistance to the injured anatomical section, rather than to prevent the anatomical section from being injured. Paulos et al's. (1986) biomechanical study tested the forces and joint openings necessary to disrupt valgus restraining ligaments on unbraced knees. This was done to determine relative contributions of loading patterns for these braces when applied to the knee and their protective function under ideal conditions (Paulos, et al., 1986). The medial collateral ligament of the knee is the primary contributor to prevention of valgus force to the knee, with the cruciate ligaments acting as a secondary restraint (Paulos, et al., 1986). It can be said that current braces do not prevent injuries from valgus force. Since these braces do not prevent injuries, they then increase the chance of injuries to the knee due to the preload the brace inflicts on the wearer. This study also concluded that braces

currently in use needed modifications. Since 1986, when this study was performed, brace design and function have improved. This study was performed on cadavers, limiting the number of tests that could actually be performed. A total of 42 quasi-static tests were performed on the braced knee of the cadavers and two braced and six unbraced knees were tested to failure (Paulos, et al., 1986). Only six of the knees were tested up to levels that were nondestructive. Four braces were tested to failure without being applied to a cadaver knee. The testing of braces alone was performed to give an indication of the rigidity of the knee itself (Paulos, et al., 1986).

From a study on the biomechanics of valgus restraints to loading in unbraced knees, three characteristics that help to determine the impact response of a brace/knee component were developed (Paulos, France, Rosenberg, Jayaraman, Abbot & Jaen, 1987). They are: force distribution, energy absorption, and energy transmission. From the results of this study, a second study arose based on four potential adverse effects: the first was "ligament preload"; the second was "center axis shift"; the third was "joint line contact"; the fourth was "brace slippage." (France, Paulos, Jayaraman & Rosenberg, 1987). In addition, the possibility of knee braces increasing the proprioception response was considered. It was demonstrated that even under ideal situations, reaction time for the muscles of the knee did not occur rapidly enough to provide a significant protective

effect to the knee (France, et al., 1987).

By comparison, in another biomechanical study it was determined that prophylactic braces show minimal or no protective effect on abduction angle (Baker, VanHanswyk, Bogosian, Werner & Murphy, 1987). Also, it was shown that functional braces reduce the abduction angle when medial stability is tested. This was a study to determine if knee braces had any stabilizing effect on medial stability when the foot is in a fixed position, and the results showed that while the functional braces provided some stability, the prophylactic braces did not (Baker, et al., 1987). Of the braces tested, the most effective had a combination of double upright struts, and some type of soft tissue containment (Baker, et al., 1987).

In the second part of this biomechanical study, static abduction-external rotation forces were applied to the knees of cadavers when knee braces were utilized (Baker, VanHanswyk, Bogosian, Werner & Murphy, 1989). The braces were subcategorized based on function (prophylactic or functional), and the amount of rigid soft tissue containment present. The functional braces reduced abduction angle by as much as 53%, while prophylactic braces demonstrated at most a 25% reduction in abduction angle with a load applied (Baker, et al., 1989). When prophylactic braces were applied, the loads on the anterior cruciate ligament were increased significantly above those seen in unbraced knees or in functionally braced knees (Baker, et al., 1989). The

reasons for these differences can be found in the way the braces were made and in the purpose for which they were used.

To determine if orthotic knee braces function at the levels for which they are designed, tibia displacement on the femur was measured using six orthotic braces and an unbraced condition (Hofmann, Wyatt, Baurna & Daniels, 1984). Seven cadaver knees were used to test the six braces, with each brace being used on three of the legs (Hofman, et al., 1984). To determine stability, each knee was tested for anterior, valgus and rotational movement. The braces were applied and results were compared with an intact knee and a knee in which the ligamentous structures were severed. Of the six braces tested, only one showed less displacement than a normal intact ligamentous structure.

Laboratory Studies: Surrogate Knee

Since obtaining cadavers is problematic, a pseudo leg was developed to test the effectiveness of knee braces (Cawley, France & Paulos, 1989). This mechanical surrogate can be calibrated for different testing responses, making comparisons between different braces for the same function possible (Cawley, et al., 1989). This surrogate was used to test rehabilitative braces. It was determined that the braces tested significantly reduced the translations and rotations compared with the unbraced limb. When a force of 93 N was applied, all but one brace reduced translations,

from the unbraced mean of 11.75 mm to a range of 6.63 to 9.7 mm in braced conditions. At 155 N, translation was reduced with all but one brace from 18.55 mm to a range of 12.55 to 17.45 mm. For rotational reduction, at a force level of 14 Nm, a mean of 8.8 degrees for the unbraced and a range of 4.75 to 9.1 degrees rotation was measured for the braced knees; two of the braces did not reduce rotation. In response to the force created when 20 Nm of force was applied, all braces provided significantly greater rotational resistance. The mean rotation for unbraced knees was 21.75 degrees and for the braced knees, the range was 6.9 to 13.8 degrees. It should be noted, however, that these manipulations were performed at clinical levels of force, which are definitely below those that would occur in actual use. These manipulations would be comparable to those of nonweightbearing or partial weightbearing conditions and should be considered when outfitting a patient with one of these braces. Four factors that should be considered when applying one of these braces are suggested by the results of this study. The first is concerned with the arrangement of the straps and how they interface with the brace. The second considers the design and alignment of the hinge bars, including whether there is joint line contact by the hinge bars. The third is concerned with the presence of shells (ie. the containment area of a brace for the leg), their connection to the hinge bars, their construction design, and the fastening of the

materials to the shells. Finally, the fourth deals with the design of the hinge (Cawley, et al., 1989).

Using a surrogate leg to determine valgus loading for prophylactic knee braces, Brown, Van Hoeck and Brand (1990) found first that the results obtained with the surrogate matched those obtained on cadavers before testing of the braces. Of the seven prophylactic braces tested, all significantly reduced MCL strain, increased gross knee stiffness and had a larger valgus failure load, as compared with the surrogate leg unbraced. When comparing only the prophylactic braces, the best brace was only significantly different from the worst performing brace. MCL reduction was higher with the Anderson Knee Stabler than with the MacDavid Knee Guard (Brown, et al., 1990). Increases in gross knee stiffness were an average of 0.56 N/mm higher for the Anderson Knee Stabler than for the MacDavid Knee Guard or the DonJoy. The Iowa, averaged 0.54 N/mm higher than the MacDavid Knee Guard and the DonJoy, while the Stromgren was 0.48 N/mm higher than the MacDavid Knee Guard. For a failure load, the Iowa, with dual metal uprights, was better able to withstand higher loads before failure than the AmPro, MacDavid Knee Guard and the DonJoy braces. In comparison, a functional/rehabilitative brace, the Lenox Hill, provided approximately twice the benefit of the prophylactic braces, with a relative strain relief (percent) of 43.5 ± 8.7 compared with an average of 22.77 for the prophylactic braces, and was significantly different from

the individual prophylactic braces for all levels of testing, relative strain relief, gross knee stiffness and valgus failure loads (Brown, et al., 1990). These results suggest that even though a brace is designed for prophylactic use, there may not be a benefit to using it.

Injury Reports

Prophylactic knee braces do not appear to reduce the number of knee injuries in college football (Hewson, Mendini & Wang, 1986). Brace use, National Collegiate Athletic Association rules changes designed to reduce injuries since 1981, and improved treatment techniques have not created a reduction in knee injuries (Hewson, et al., 1986). A comparison of braced years versus nonbraced years, shows no reduction in the number or type of knee injuries or in practice time missed after bracing. Also, bracing did not change the number of season-ending injuries. The type and severity of injury in the two groups were similar (Hewson, et al., 1986).

The effectiveness of the Anderson Knee Stabilizer (from Omni Scientific Inc.) in preventing injuries in college football was determined by Hansen, Ward & Diehl (1985). The results showed that during the unbraced period, athletes had an injury incidence rate of 6.1 per 100 players, while during the braced period the injury incidence rate was 7.45 per 100 players. Furthermore, the number of surgeries almost doubled during the braced period compared with the

non-braced period (Hansen, et al., 1985). These results seem to suggest that knee braces, specifically the Anderson Knee Stabler, rather than preventing injuries can in fact be harmful.

The results of a study at the University of Southern California on the effectiveness of prophylactic knee braces favored their use for athletes (Rovere, Haupt & Yates, 1987). There was an 11% injury rate in the 329 players not wearing braces, and a 5% injury rate for the 148 who wore knee braces. Two of the 148 wearing braces did require surgery for collateral ligament repair, which is less than 2%, while 17 of the unbraced players, or 5%, needed surgery. Although braces do not prevent injury due to torsion or twisting, the players with the braces had approximately 200% fewer meniscectomies (a margin of 24 to 6) than those who did not use braces (Rovere et al., 1987).

In a study of high school football players, those wearing single hinged knee braces had a significantly higher injury rate than those not wearing any braces. No significant difference was found between subjects wearing double hinged braces, and those not wearing braces (Grace, et al, 1988). Subjects in both braced groups were matched with similar players in a nonbraced group by height, weight, and playing positions. Thirty-seven of 247 (15%) athletes with the braces received injuries, versus 11 of the 250 (4%) athletes not wearing braces. In the double hinged group, more injuries did occur in the braced group, five of eighty-

three (6%) athletes were injured, but the number was not significantly different from the nonbraced. A significantly higher number of injuries to the ankle and foot were also found in athletes wearing braces, than in nonbraced athletes. These results raise questions as to the efficacy of the braces that were studied, and suggest the potential for adverse effects of braces on other joints of the braced limb (Grace, et al, 1988).

Szczodrowski (1988) evaluated the effectiveness of knee braces from the results of a questionnaire. Based on the information received from this questionnaire, Szczodrowski (1988) concluded that players wearing braces had a significantly higher rate of injury compared with nonbraced players. Significantly more injuries occurred to running backs and defensive backs wearing braces in 1985 than to nonbraced players of the same positions. Playing surface, grass or artificial turf, had no significant effect on knee injuries. There was also no significant difference between brace types and the type of injuries that occurred. Prophylactic braces are supposed to prevent medial collateral injuries, however, significantly higher numbers of injuries occurred among the players wearing this type of knee brace compared with other types or no brace.

Prophylactic bracing was used at West Point to determine its efficacy in reducing knee injuries (Sitler, et al, . 1990). Overall, the use of these braces reduced the frequency of knee injuries based on the total number of

players injured and on the total number of medial collateral ligament injuries. The reduction of injuries was dependent on the players' position (Sitler, et al., 1990). Defensive players wearing braces had fewer injuries than did the unbraced controls (Sitler, et al., 1990). There was no significant difference in injuries between offensive players and their controls. However, there was no significant reduction in severity of medial collateral ligament and anterior cruciate ligament injury from wearing the prophylactic knee braces (Sitler, et al., 1990).

Reviews/Statements

The AAOS held a seminar on knee braces in 1984 that concluded that prophylactic braces needed improvement and could, in fact, be causing injuries to the players (Potera, 1985). This conclusion was based on a review of the three types of braces in use at this time. Since the publication of this article, more testing has occurred and more braces have become available, leading to a reevaluation by AAOS asking the same principal questions as the first statement: is the brace fulfilling its stated purpose? and, is the brace causing more harm than good?

In its new position statement, the AAOS (1987) expressed doubts that the use of prophylactic knee braces, as they are currently available, is effective in preventing knee injuries by either number or severity. Furthermore it was concluded that, in some cases, the brace may have been one

of the factors leading to the injury. Conversely, based on the data, the AAOS states that functional and rehabilitative braces can be effective.

A round table discussion on the use of knee braces and their injury preventing abilities was moderated by Allan J. Ryan, MD, in 1986 (Ryan, Grant, Rosenfeld, Rovere & Schottenfeld, 1986). The panel consisted of team physicians from college and professional football teams. The continued use of knee braces was favored by the panel. However, they felt that reduction of injuries was a coincidence and not a product of the braces themselves. Based on the information that was available to them at the time showing that the braces were increasing injuries, they recommended that more research be done in both the clinical and biomechanical areas on the use of prophylactic knee braces.

A number of studies have used injury reports and the wearing of braces to determine the effect of braces on injuries (Garrick & Requa, 1987). In a compilation of results by the Center for Sportsmedicine (Saint Francis Memorial Hospital, San Francisco, California), six studies looking at injury rates and knee braces were brought together (Garrick & Requa, 1987; Requa & Garrick, 1990). A study of Michigan high schools and a study at the University of North Carolina, showed a significant reduction of injuries for the players wearing braces, while no difference in injury rates for brace wearers were found in studies done at the University of Arizona and Wake Forest.

An increase in injuries was found for brace wearers in a study of Division-1 schools (Garrick & Requa, 1987; Paulos, et al., 1986; Requa & Garrick, 1990). In this Division-1 study, (Garrick & Requa, 1987) the years of 1984 and 1985 were studied to compare braced versus non-braced athletes. A total of 11,594 football players were compared. Of these athletes, 7,010 were not braced while 4,584 were braced. In 1984, 11% of the braced players suffered knee injuries compared with 6% of the unbraced athletes. In 1985, 9.4% of the braced players had injuries compared with 6.4% for the unbraced players. Braced players had a significantly higher number of the specific injuries braces are supposed to help prevent: medial collateral ligament (MCL) injuries. MCL injuries occurred in 7.6% of braced players and 3.5% of unbraced players in 1984, and in 5.4% of brace players and 3.6 % of unbraced players in 1985. The conclusions reached in the study were that knee braces did not prevent injuries and may have caused the athlete to become prone to injuries. In Michigan (Garrick & Requa, 1987), knee injuries were reduced in one hundred ninety-seven players from 12 high schools who wore braces, however criteria for bracing and exposure were not reported. Exposure is the chance an athlete has to be injured, including practice and game time. At the University of North Carolina (Garrick & Requa, 1987), injuries in unbraced and braced years were compared to determine effectiveness of braces. In the years 1980 through 1982 braces were not worn, and during 1983 through

1985 all players were required to wear braces.

Significantly fewer injuries were reported for the period 1983-1985. At Wake Forest (Garrick & Requa, 1987), the same comparison between seasons of unbraced and seasons requiring braces for all players was made. The years studied for Wake Forest were 1981-82, unbraced, and 1983-84 braced.

Similarly at the University of Arizona, the years 1977 through 1981 without braces and 1981 through 1984 with braces were studied. In these two studies, no differences in injury rates were found between unbraced and braced seasons.

Adams and Peota (1989) in reviewing an article by Sitler et al. (1990), found that, at West Point, injuries in intramural tackle football players, were decreased in those who wore prophylactic braces. It was also concluded that due to the size of the players on these teams, it is probably best to generalize the results only to high school players (Adams & Peota, 1989).

Based on a review of other studies, it was concluded that there is no evidence supporting an effective use of prophylactic knee braces in football (Requa & Garrick, 1990). Therefore, caution should be used in requiring use of knee braces in collegiate settings. A brace with a single hinge appears to be more hazardous than one that uses double hinges. Nine separate studies on knee brace use at high school and college level were reviewed. The type of brace, single hinge or double hinge, and the positions of

football players who wore the braces was varied. Duration of the studies were from two years to four years. The subject pool sizes varied from 50 to over 7,000 subjects. In addition to the studies already reviewed (Garrick & Requa, 1987; Grace, et al., 1988; Hansen, et al., 1985; Hewson, et al., 1986; Paulos, et al., 1986; Sitler, et al., 1990) a study on high school football players in Florida found a significantly lower incidence of MCL injuries. Also, a reduction of injuries occurred with random distribution of the braces to 50 of the 244 individuals who played.

In the final 6 years of a 18-year investigation of a Division III college football team, an injury rate for prophylactic brace wearers of 1.48 per 1000 athlete exposures was reported (Scriber & Matheny, 1990), while nonbraced athletes had an injury rate of 1.09 per 1000 athlete exposures. Athlete exposure was defined as each time a player fully participated in a practice or game (Scriber & Matheny, 1990). The results were based on these levels of knee injury: one, missing practice for an entire week; two, missing a minimum of one game; and/or three, having surgery no matter the time lost. The overall injury rate was 1.38 per 1000 athlete exposures. The injury rate in games was greater than practices (5.72 per 1000 athlete exposures vs. 0.645 per 1000 athlete exposures). It was concluded that lateral knee bracing would not be encouraged for the players (Scriber & Matheny, 1990).

The question of whether or not braces work as intended was raised in a review by McCarthy (1988). A clear picture on the effectiveness of braces still does not exist. Although new braces keep appearing in the marketplace, there have been no new design innovations (McCarthy, 1988). A comparison of results between different studies also does not shed light on the subject, since some studies show that braces are effective for preventing injury, while others show that braces are not effective. With no standard system in place for testing knee braces, and because of the problems inherent in clinical and real life application of results, it is difficult to determine whether braces are effective (McCarthy, 1988). Until a test can be designed that eliminates the problem of applying clinical tests to real life situations, the question of whether braces prevent injury will not be answered (McCarthy, 1988).

Ethics/Liabilities

Prescribing a knee brace could present ethical and liability problems based on the decision of which type of brace to use (Zachazewski & Geissler, 1992), since not all braces are guaranteed to be effective for protection. Beliefs by the coaches, trainers and medical staffs of schools and teams affect the decision on the use of braces rather than the data available (Zachazewski & Geissler, 1992). On the other hand, previous studies had inconsistent methods of reporting how the braces were used, which braces

were worn, how injuries occurred, the number and the severity of the injuries, and how the injuries were classified (Zachazewski, Geissler, 1992). Duplicating the forces exerted on the knee during sporting events is difficult in a laboratory, as is trying to measure the forces generated during an actual contest. Results from a clinical situation may be impossible to apply accurately in the actual game setting (Zachazewski, & Geissler, 1992). Zachazewski and Geissler (1992) determined that prophylactic braces should be applied based on each individual's needs. They recommended that prophylactic brace use should not be abandoned as long as well researched braces are being used, and design and technology continue to improve.

Functional bracing was also analyzed by Zachazewski and Geissler (1992). Similar issues involving the decision to use braces were brought forth including selecting the right device, durability of the brace, the fit and comfort of the brace, and making the use of the brace complete by including it as part of a treatment. It was stated that functional braces do work for specific purposes.

The selection of a functional brace should be carefully evaluated before it is used (France, Cawley & Paulos, 1990). In selecting a brace, the ultimate decision should be based on solid mechanical criteria and should be individualized for each patient (France, Cawley & Paulos, 1990). The brace must do the job for which it is designed and be one the patient will use with confidence.

Summary

The results of studies reviewed were conflicting. Some studies concluded that braces were effective, while others concluded that there was no difference between wearing or not wearing a brace. Furthermore, some showed that there was a problem with brace use that can actually lead to injuries.

Based on the seven criteria for effectiveness of knee braces put forth by the AAOS, it seems as though most of these studies contained braces that could not meet all of these criteria. Thus, more research should be planned to examine braces with these criteria in mind. Improvement of braces and testing technologies should be maintained. A way to examine forces, motion and restraint in actual contest or realistic simulation may finally solve the problem. Finally if injury reports are to be used uniform criteria for all reporting would help decreases conflicting results.

All this information leads to the goal of this study that was to determine whether a prophylactic knee brace interferes with normal function. All athletes have a running gait to which their body has become accustomed. If a change should occur in the gait as a result of wearing a brace, the force being absorbed by the lower extremity may be increased. Therefore, the specific purpose of this study was to determine if the wearing of knee braces for the protection of apparently healthy knees changes functional performance by altering running gait.

Chapter 3

Methods

Ten subjects, four male and six female, were selected from the University of Nevada, Las Vegas student population (Table 1: age range of 23-32) after giving informed consent (appendix I). The selection criteria were that subjects had no previously known knee injuries or prior experience wearing functional or prophylactic knee braces. Subjects were measured for height with shoes using an anthropometer (Siber Hegner and Company Inc., Carlstadt, New Jersey) (see appendix II for data collection form). Trochanter and tibial height were measured bilaterally with the anthropometer to determine leg length (Table 2). Trochanter height was measured from the top of the greater tuberosity to the floor and tibial height was taken on top of the tibial plateau. Thigh length was calculated as the difference of the overall leg length and the lower leg length. Subjects were weighed, with shoes on, using a Toledo Scale, model 2184, and body composition was estimated by skinfold measurements using the Jackson and Pollock sum of 4 formula (Golding, Myers & Sinning, 1989). Harpenden calipers were used and the four sites measured were abdomen, ilium, triceps and thigh.

After all measurements were taken, markers were applied to enhance the digitizing procedure. Markers consisted of white athletic tape with a black dot in the center. This

TABLE 1 SUBJECTS' INFORMATION

SUBJECTS' INFORMATION				
SUBJECT	AGE	WEIGHT	HEIGHT	FAT %
1	25	77.56	174.9	16.2
2	24	67.12	178.5	10.3
3	23	87.60	176.0	21.4
4	23	67.91	172.5	22.0
5	24	67.90	166.0	18.4
6	32	58.12	155.7	23.3
7	23	67.97	173.8	20.8
8	27	83.00	182.3	21.4
9	24	70.90	172.0	20.8
10	25	59.00	172.1	18.4
MEAN \pm S.E.	25 \pm 1	70.71 \pm 3.0	172.4 \pm 2.3	19.3 \pm 1.2

TABLE 2 SUBJECTS' LEG MEASUREMENTS

SUBJECTS' LEG MEASUREMENTS						
	LEG LENGTH		THIGH LENGTH		LOWER LEG LTH.	
SUBJ.	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
1	93.8	94.2	33.0	35.0	60.8	59.2
2	95.0	95.5	45.1	45.3	49.9	50.2
3	96.8	95.9	44.9	45.4	51.9	50.5
4	89.7	88.9	43.4	41.4	46.3	47.5
5	89.6	86.9	41.7	41.1	47.9	45.8
6	80.1	82.4	37.1	38.2	43.0	44.2
7	94.0	93.6	42.2	42.3	51.8	51.3
8	97.1	100.1	44.3	47.9	52.8	52.2
9	95.0	94.7	45.5	44.3	49.5	50.4
10	103.1	103.0	54.5	54.1	48.6	48.9
MEAN	93.42	93.52	43.17	43.50	50.25	50.02
±S.E.	±1.91	±1.92	±1.78	±1.67	±1.49	±1.29

dot was placed in the center of the joint being marked. The sites marked included the right and left balls of the feet, ankles, knees, hips, shoulders, elbows, and hands. The markers were placed on the front and back of the subjects. Sixteen sites were digitized. Of these 16 sites, 14 were marked. The two sites not marked were the temporal mandibular joint and crown of the head.

Before a subject arrived for testing, two cameras were positioned eleven feet from the treadmill at 45 degree angles to the center of the belt of the treadmill (see appendix V camera placement schematic). One of these cameras had an anterior view of the subject and the other camera had a posterior view, thus giving a front and back view for digitizing. Cameras were set to manual focus and shutter speed was set at 1/1000. Before filming, the cameras were calibrated. The cameras were zoomed in on a subject in the center of the treadmill and focused. The cameras were zoomed out to a distance such that there was approximately a foot clearance on all sides of the subject. Cameras were then ready for use. This procedure was necessary because the digital image was to be three dimensional and filming takes place from both the front and back at the same time. A control points cube was used for reference by the computer system. Videotaping of this control-points cube was done first; the cube was set on the treadmill, and then removed before the subjects were placed on the treadmill. The cube's dimensions were x-axis 74", y-

axis 76", and z-axis 37.25". Two conditions were used with each subject, braced and nonbraced, in a randomized order. Braces were applied according to manufactures specifications for application. Subjects were then placed on the treadmill and given a brief warm-up/familiarization period. Treadmill speed was gradually increased to a speed of 5mph at which time video cameras were started. Three continuous trials of running were filmed. Cameras were synchronized by visual hand clap prior to each trial. This hand clap helped to ensure video taped images were timed together for selecting the correct gait cycle on each tape. After subjects had run for approximately 30 seconds on the third trial, the treadmill was slowed and then stopped. Cameras were stopped, the subject was taken off the treadmill and the control points cube was placed back on the treadmill and filmed again. Subjects then performed the second condition. When both conditions were finished, markers were removed and the subjects completed a questionnaire about the braces (appendix III). Each subject was told that if a difference in gait was seen between the braced and unbraced conditions, they would be asked to undergo an accommodation period of four weeks. This would involve running on the treadmill at 5 mph, for 20 minutes per day, three times a week.

Video tapes were digitized using an Ariel system (Ariel Life Systems Inc., San Diego, California). A set number of frames from the same trial of each view, front and back, along with a frame of the control points from the video tape

were digitized (see appendix IV). Videotape images were converted into digital images using frame-by-frame manual digitizing of the subject. Both the back and front views were used. After frame-by-frame digitizing, the computer software transformed the image into a stick figure. The transformations were then smoothed and graphed. Smoothing was accomplished using the cubic spline smoothing algorithm of the Ariel system. This method is based on the traditional spline theory, and has been modified to allow for best fit instead of recalculation of the data points and exact fitting. After minimal smoothing, to prevent changes of the raw data as much as possible, graphs of the curves created by the knees, hips and ankles for range of motion and velocity over time were produced.

Data for ROM and velocity for a single gait cycle were analyzed separately using a factorial ANOVA with repeated measures on time. The designs were 3(joints: knee, hip and ankle) X 2(side: right and left) X 2 (brace: with or without) X 8 (time: from 0.0 to 0.7 every tenth of a second). Differences in gait cycle duration between braced and nonbraced conditions were determined by paired t-test, with an alpha level set at 0.05.

Chapter 4

Results

Range of Motion

There was no significant difference between conditions for the duration of the gait cycle (0.79 ± 0.01 vs. 0.77 ± 0.01 seconds for non-braced and braced conditions respectively) ($t = 2.14$, $P = 0.06121$; Table 3). Range of motion (ROM) of the knee, hip and ankle joints were compared for braced and nonbraced conditions in both the right and left leg. No significant differences were detected between conditions for ROM of all joints ($F = 0.14$, $P = 0.71$). Also, no significant differences were detected between conditions for the time points, and the joints between conditions for the time points ($F = 0.22$, $P = 0.98$ and $F = 0.12$, $P = 1.0$ respectively). When plotted together and synchronized for time, ROM during the support phase showed very little variation between legs and conditions (Figure 1). More variation showed up in the latter parts of the swing phase between knees (Figure 1). At the start of the support phase, end of the support phase, beginning of the swing phase and end of the swing phase variations occurred between hips for ROM (Figure 2). ROM in the left ankle appeared smaller for the left ankle, during the support phase and the start of the swing phase (Figure 3). Still the ROM for the knee, hip and ankle joints was similar for both conditions.

Table 3 Durations for Subjects' Gait Cycles

Durations for Subjects' Gait Cycles		
Subject	Nonbraced	Braced
1	0.78sec.	0.73sec.
2	0.88sec.	0.88sec.
3	0.76sec.	0.76sec.
4	0.76sec.	0.73sec.
5	0.74sec.	0.74sec.
6	0.79sec.	0.81sec.
7	0.76sec.	0.74sec.
8	0.78sec.	0.78sec.
9	0.81sec.	0.76sec.
10	0.79sec.	0.76sec.
Mean \pm S.E.	0.79 \pm 0.01	0.77 \pm 0.01

Duration t Test

MEAN OF THE DIFFERENCE : 0.016 SECONDS
 S.E. OF THE DIFFERENCE : 0.00748 SECONDS
 OBSERVATIONS : 8
 DEGREES OF FREEDOM : 7
 t - OBSERVED : 2.14
 t - CRITICAL : 2.26
 ALPHA LEVEL : 0.05
 P VALUE (TWO TAILED TEST) : 0.06121

Figure 1 Right and Left Knee Range of Motion

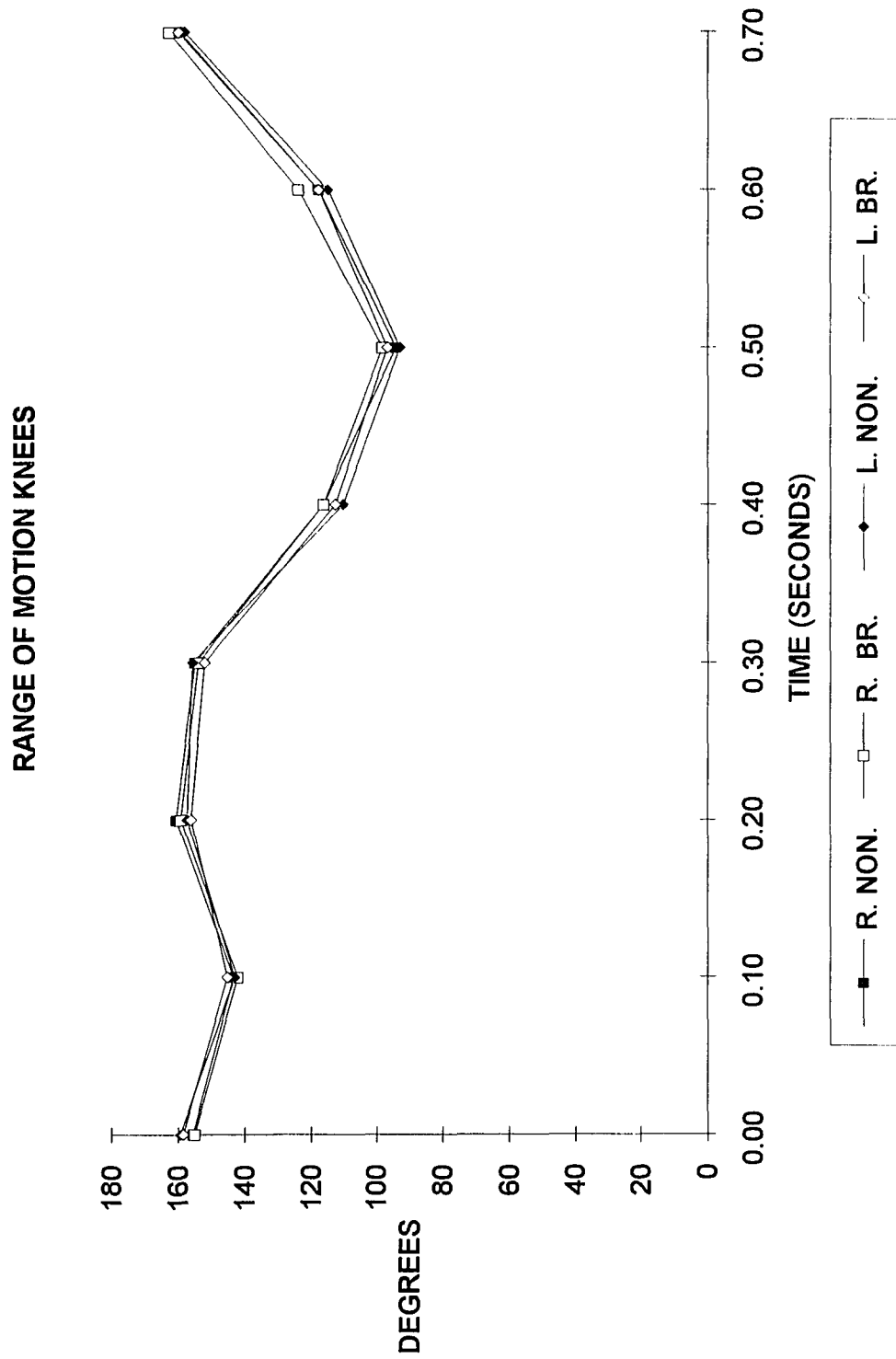


Figure 2 Right and Left Hip Range of Motion

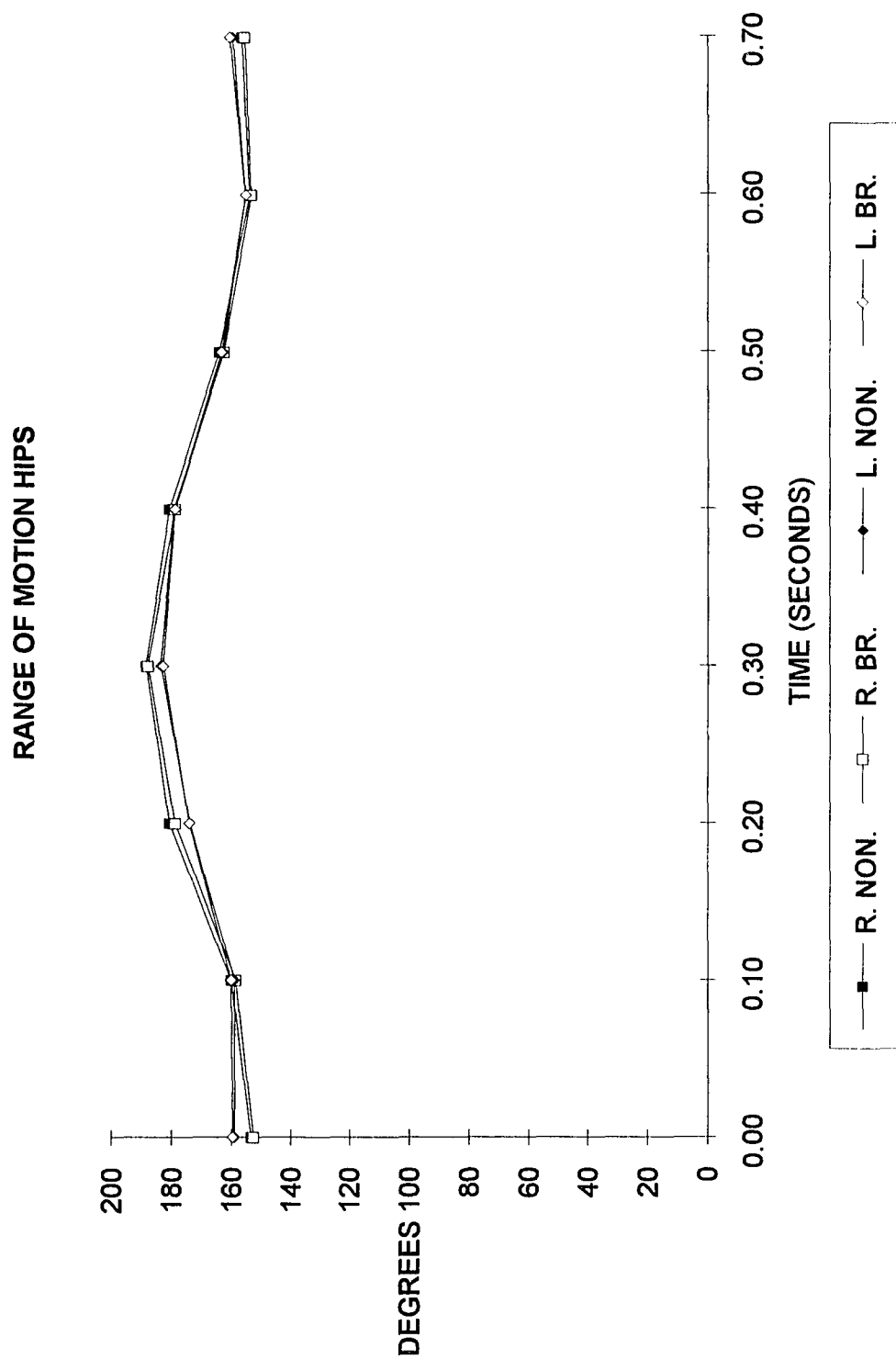
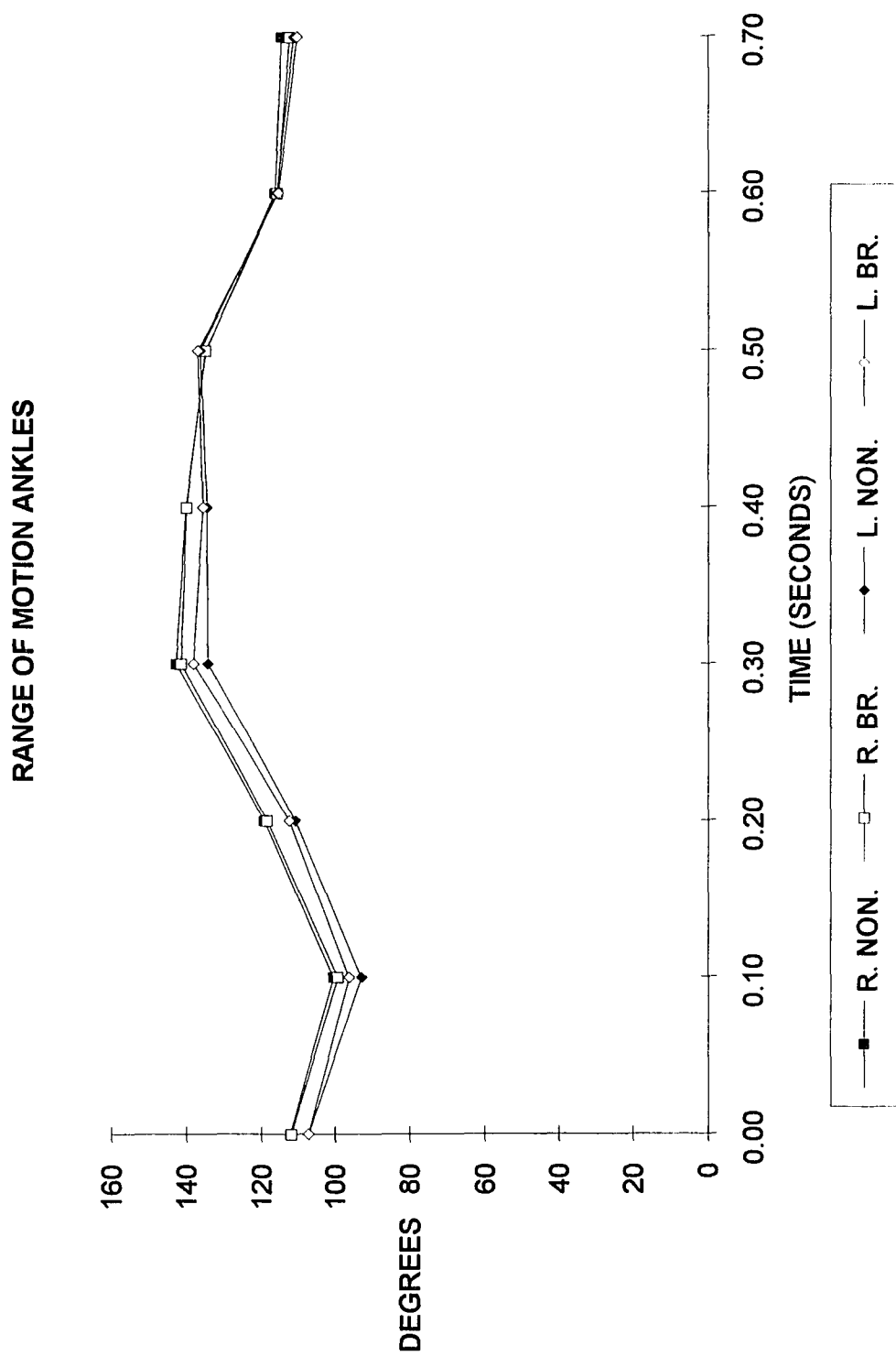


Figure 3 Right and Left Ankle Range of Motion



Velocities

Velocities of movement around the knee, hip, and ankle joints were compared for braced and nonbraced conditions in both right and left legs. No differences in velocities between braced and nonbraced conditions were found at any joint in either limb ($F = 0.42$, $P = 0.52$). There was no significant difference between conditions over the time points, and between the joints between conditions over the time points ($F = .58$, $P = 0.77$ and $F = 0.33$, $P = 0.99$ respectively). When plotted together and synchronized for time, velocity during the swing phase was slightly less for the left knee compared with the right (Figure 4). Initial velocities for the right hip were faster than for the left hip, but no further variations were observed between conditions throughout the gait cycle (Figure 5). Velocities were slower in the right ankle initially and during the swing phase of the cycle than for the left ankle. Overall, the velocity of movement around each joint was similar for braced and nonbraced conditions.

Gait Patterns

When gait was analyzed, the range of motion that occurred in the knee, hip and ankle joints during the support and swing phases was determined for discrete time points. Using the right knee as an example (Figure 6), at 0.00 seconds the support phase started. The knee was not in full extension, as it might be assumed, but was in slight flexion with an angle of approximately 158 degrees, instead

Figure 4 Right and Left Knee Velocities

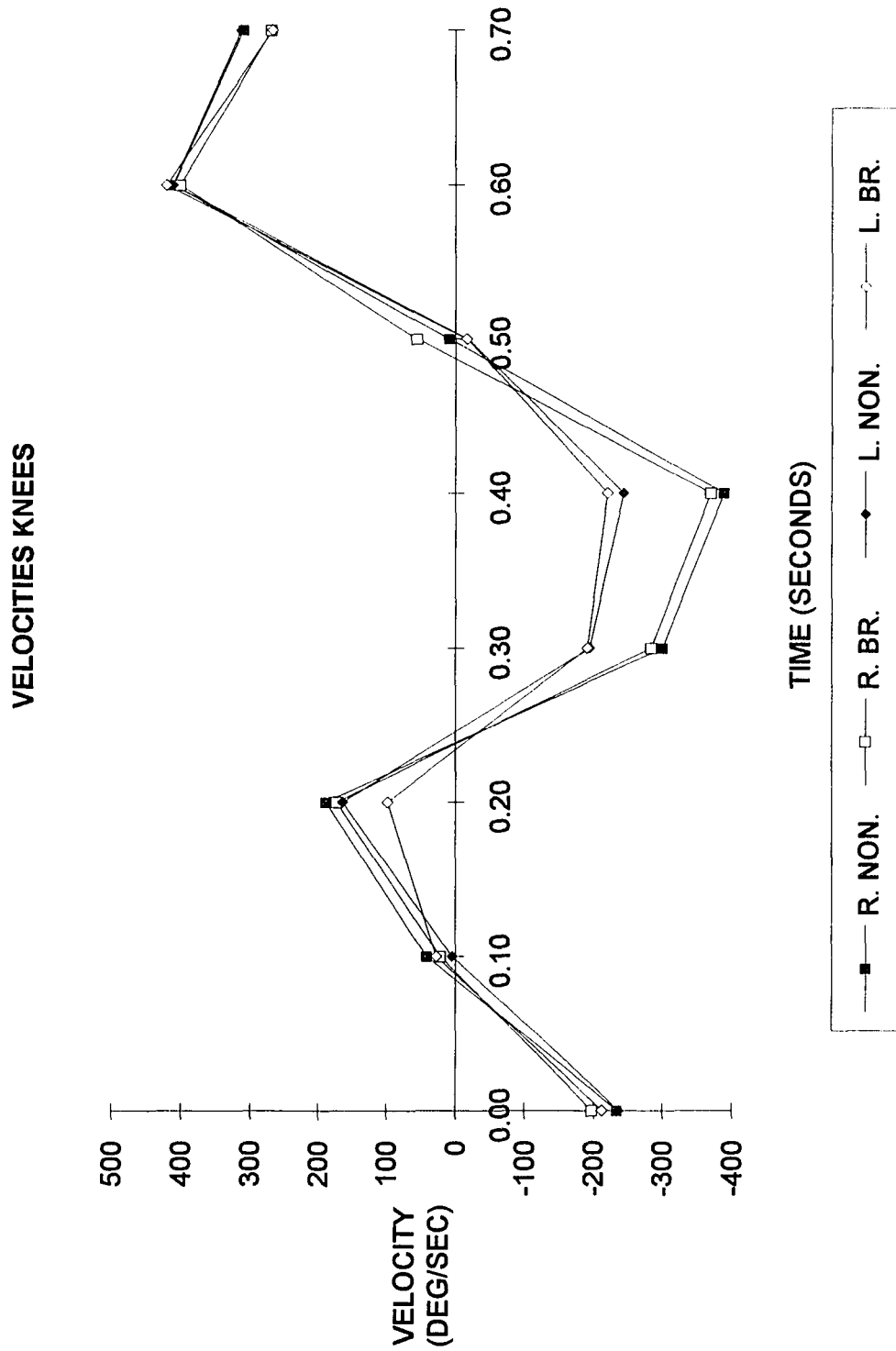


Figure 5 Right and Left Hip Velocities

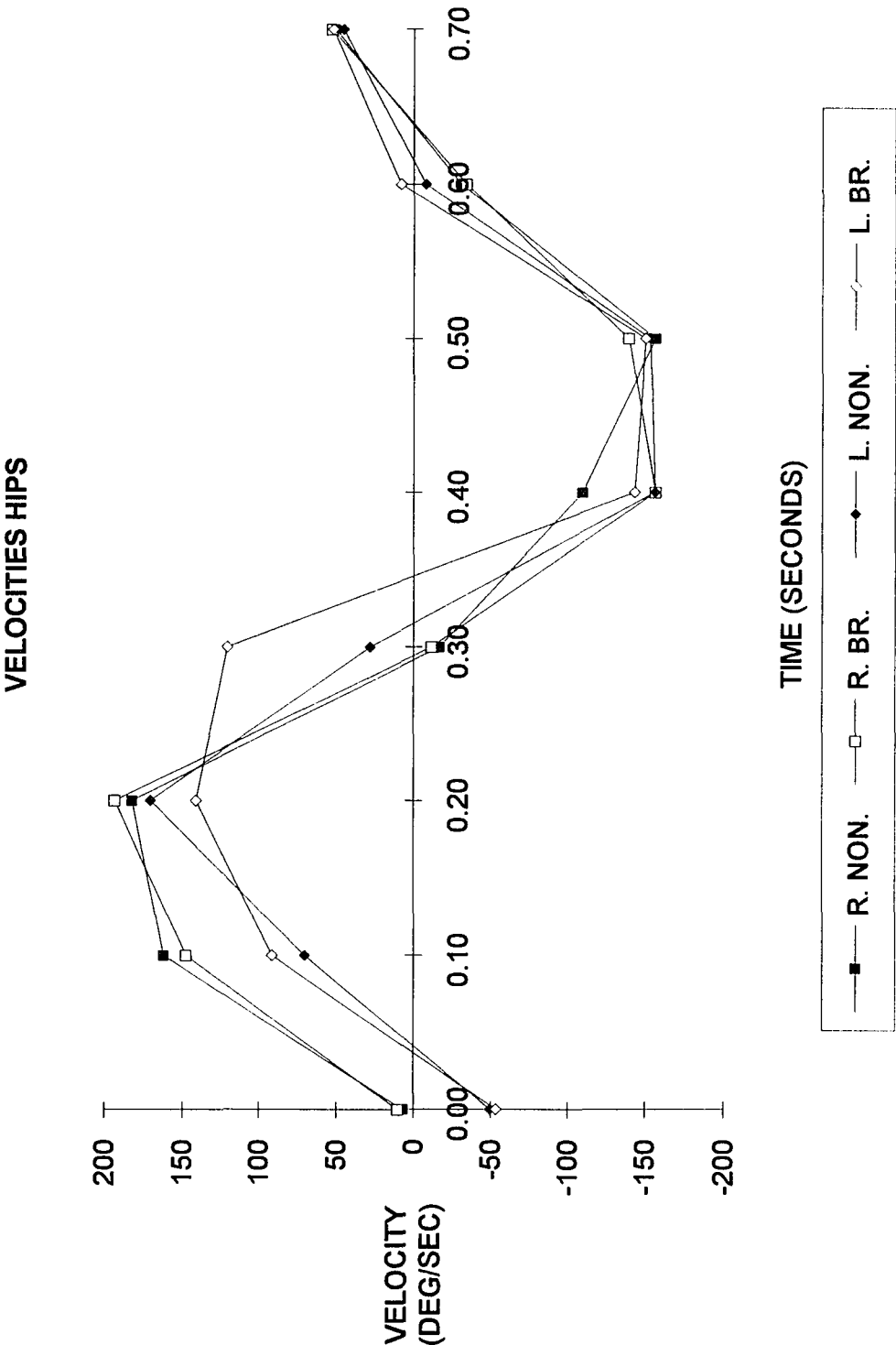
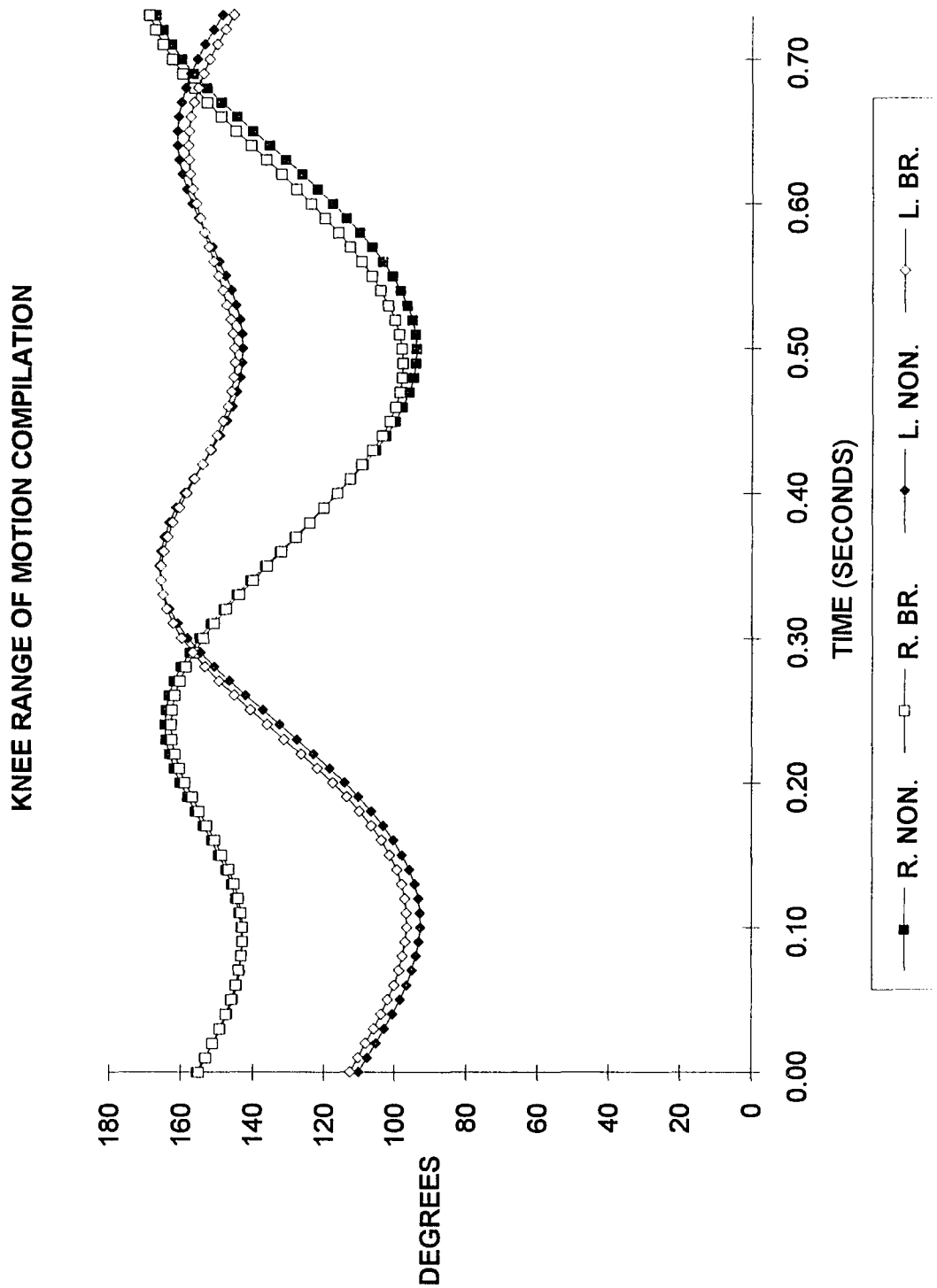
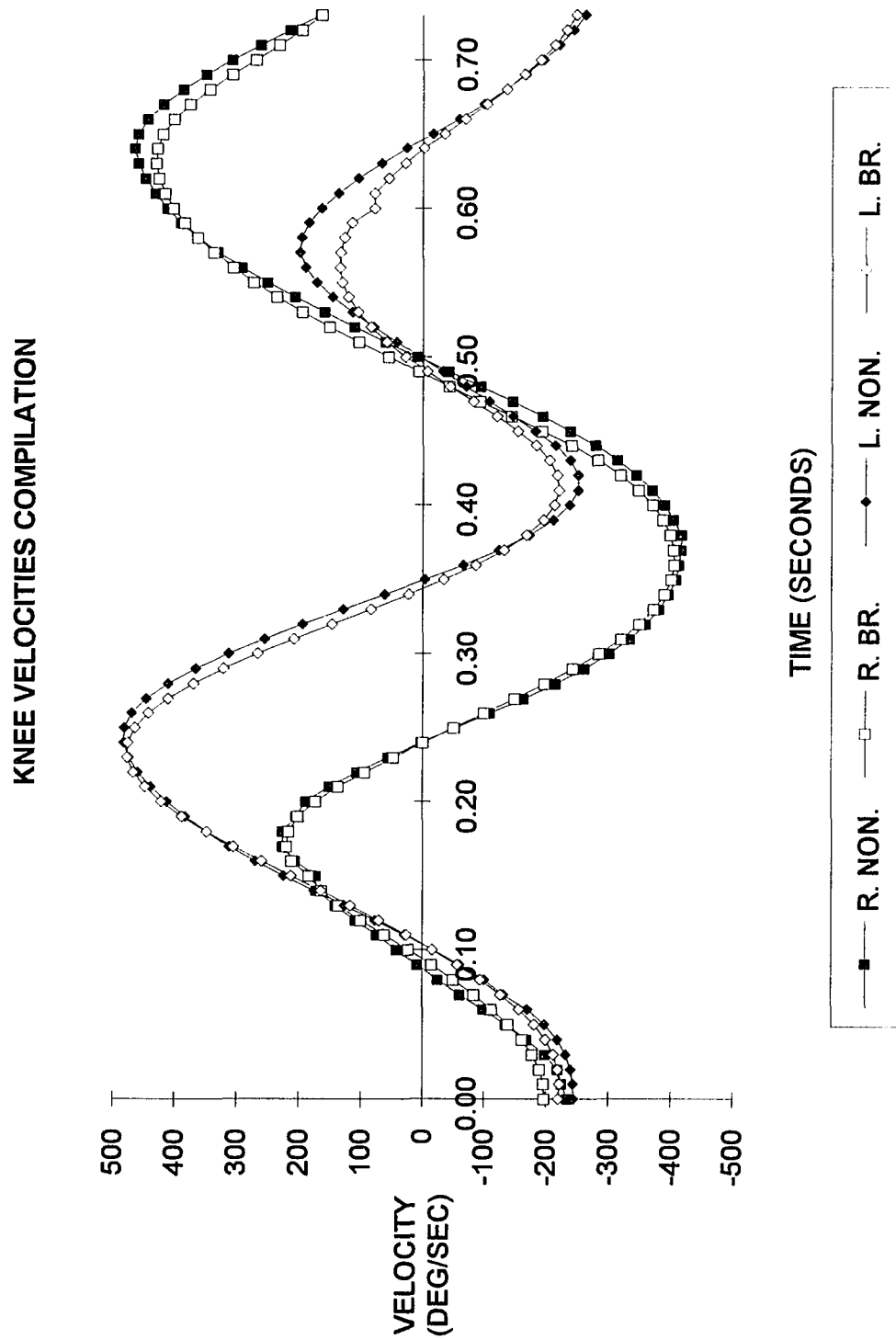


Figure 6 Right and Left Knee Range of Motion Composite



of 180 degrees. The velocity of the knee during the support phase was approximately 200 degrees per second (Figure 7). As the support phase continued, the knee flexed more as the leg came under the body and reached a point of minimal flexion at 0.10 seconds. At this point, the velocity of the knee was almost zero because the knee was slowing and changing directions. As the leg came under the body and continued behind the body, the knee began to extend back to a point similar to that at the start of the support phase, and the knee had a similar velocity as that at the start of the support phase. At approximately 0.20 seconds the support phase was ending and the knee was nearly in full extension, about 160 degrees. Then lift off of the foot occurred and the leg began the swing phase. During the swing phase, the knee flexed to its smallest angle of flexion, about 90 degrees. This occurred at the mid point of the swing phase, approximately 0.49 seconds. The knee was back under the body at this point as it was swinging forward for the next foot strike. As the knee was flexing to its smallest point, its highest velocities were reached. Velocity started to decrease just before the knee reached its smallest angle of flexion, and velocity was again almost zero. The knee then started to extend in the swing phase and continued to a point where the knee was ready for foot strike again (ie another gait cycle). The knee reached similar velocities as those earlier in the swing phase as it prepared for foot contact. In contrast to the knee, the hip

Figure 7 Right and Left Knee Velocity Composite



went through a limited range of motion during the gait cycle (Figure 8). At foot strike, the start of the support phase, the hip was nearly at its smallest point of flexion, 150 degrees, and the velocity of the hip was almost zero (Figure 9). As the support phase continued, the ROM of the hip increased as the leg went under and behind the body. Hip extension continued even after the end of the support phase, 0.20 seconds. The velocity was also increasing at this point. Hip extension continued into the swing phase, increasing for about 0.30 seconds of the full gait cycle, or about 0.10 seconds into the swing phase. This was the point where the hip reached its maximal ROM about 190 degrees. At the time the hip was reaching the largest degree of extension, the velocity was back to zero, the hip then started to flex, and its velocity was increased as the leg swung forward for the foot strike. As shown in the plot for the left hip ROM (Figure 10) near the end of the swing phase, 0.20 to 0.30 seconds, the hip reached minimal flexion and then extended slightly before foot contact. This was also reflected as a quick change in the velocity from a positive to a negative.

The ankle, like the knee, showed a larger ROM during the gait cycle (Figure 11) than did the hip. As the right ankle started the support phase, 0.00 seconds, it was at approximately 110 degrees of flexion. As the leg came under the body during the support phase, the ankle dorsiflexed to about 90 degrees, 0.10 seconds. The velocity went from

Figure 8 Right and Left Hip Range of Motion Composite

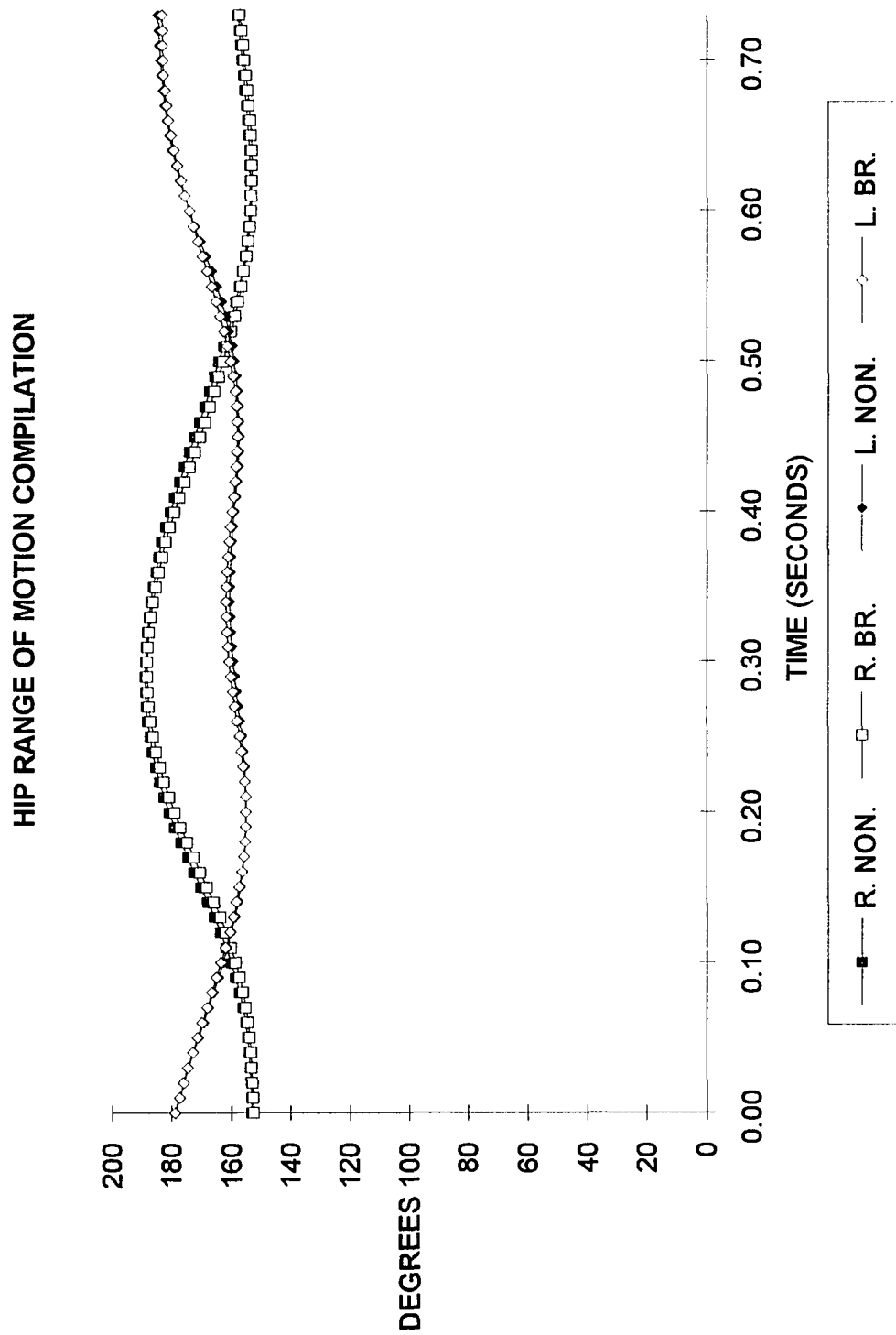


Figure 9 Right and Left Hip Velocities Composite

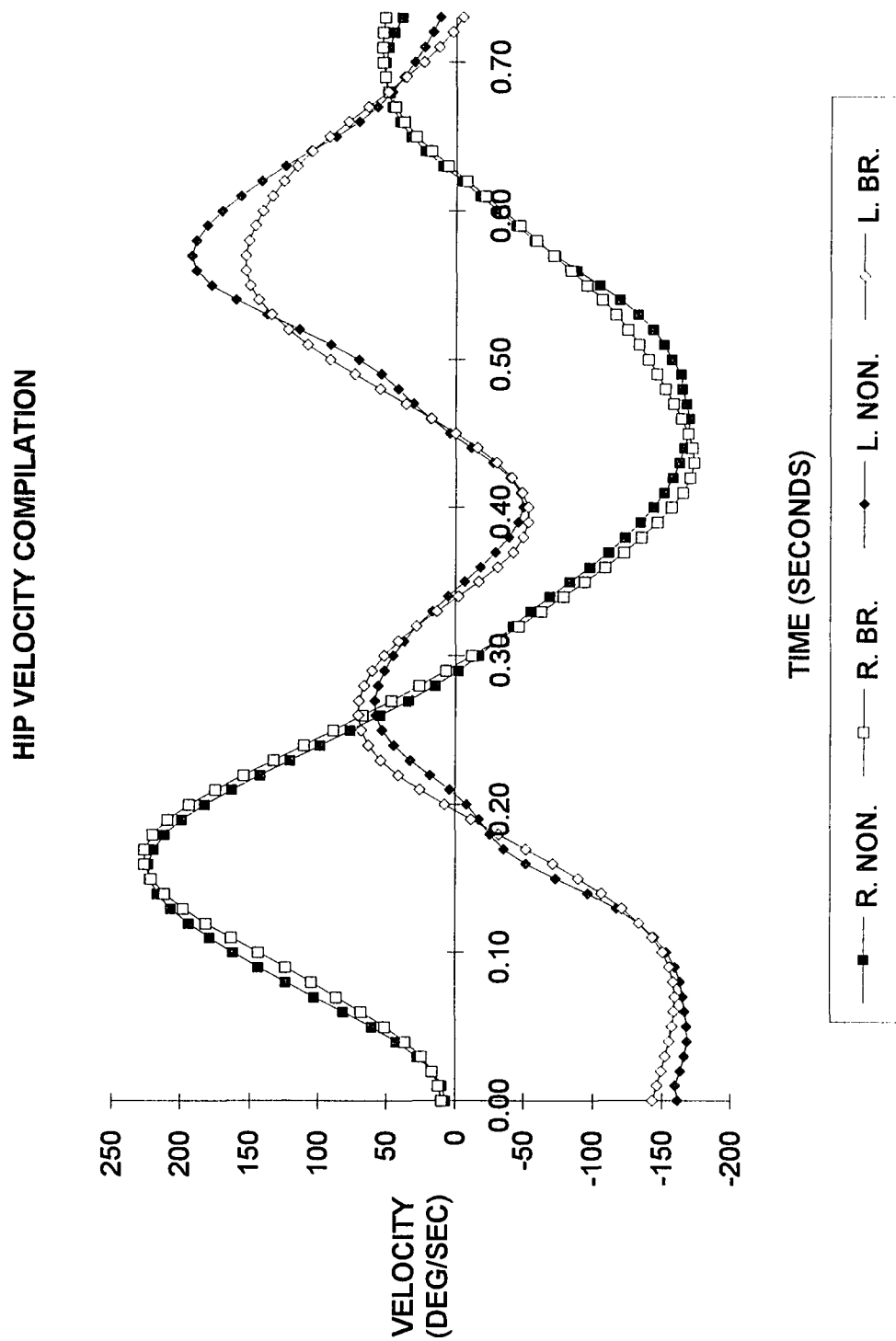


Figure 10 Left Hip Range of Motion

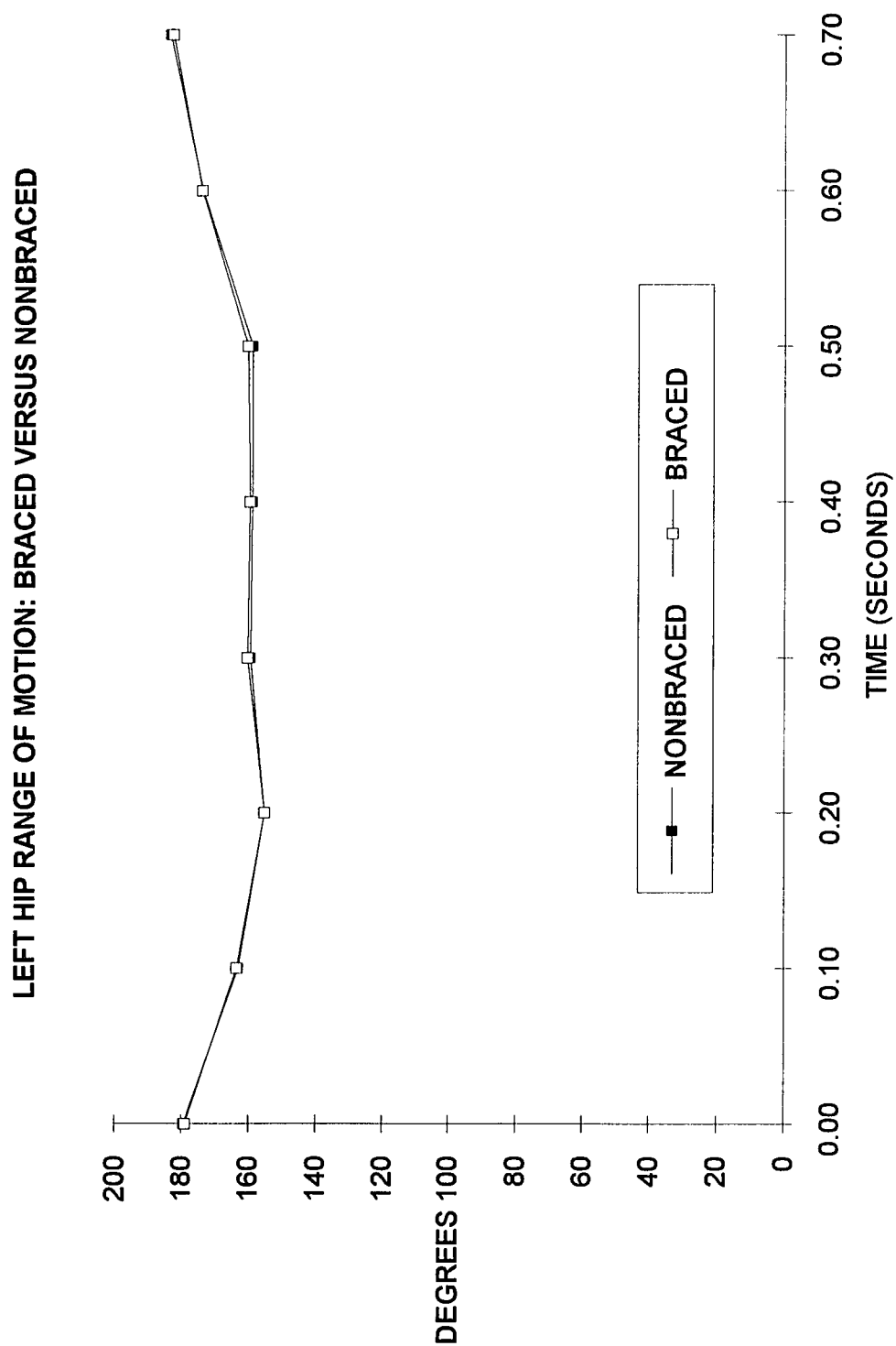
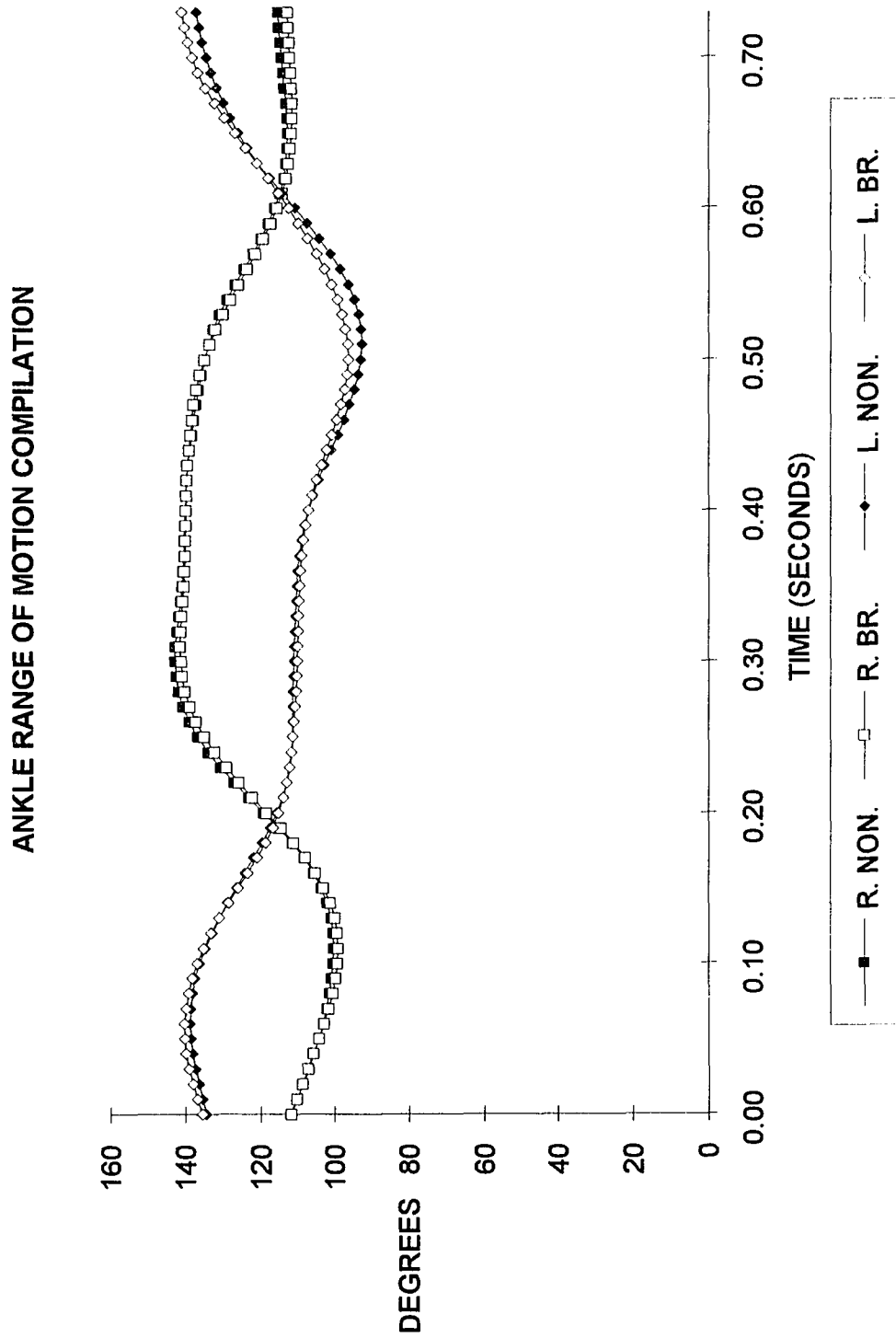


Figure 11 Right and Left Ankle Range of Motion Composite



negative to positive showing that a change of direction was occurring with this increase in flexion (Figure 12). As the support phase ended the ankle was extending. This was shown in a slowing in the velocity as the ankle prepared to change direction. Extension continued for about 0.30 seconds of the full gait cycle. The ankle then slowly dorsiflexed for about 0.20 seconds, from 0.30 to 0.50 seconds of the entire cycle. This coincided with the point of knee flexion during the swing phase. As the leg moved forward, velocity of ankle flexion increased until 0.60 seconds, when ankle flexion again slowed right before foot contact.

Questionnaire

Following the testing session subjects were asked to complete a questionnaire about their perceptions, of exercise with and without knee braces (Appendix III). The results of the questionnaire are presented in Table 4. Overall, the results suggest that subjects had little difficulty in adjusting to the wearing of the knee braces while running.

Two subjects, one male and one female, did not report any differences between conditions. Questions one and four were intended to find how subjects felt about the speed, 5 mph, at which they were running. Two of the male subjects felt the speed was slow when not wearing braces, and one of these males felt the running speed was also slow when braced. The remainder of the subjects felt the speed of running without the braces was fine. With bracing, two of

Figure 12 Right and Left Ankle Velocities Composite

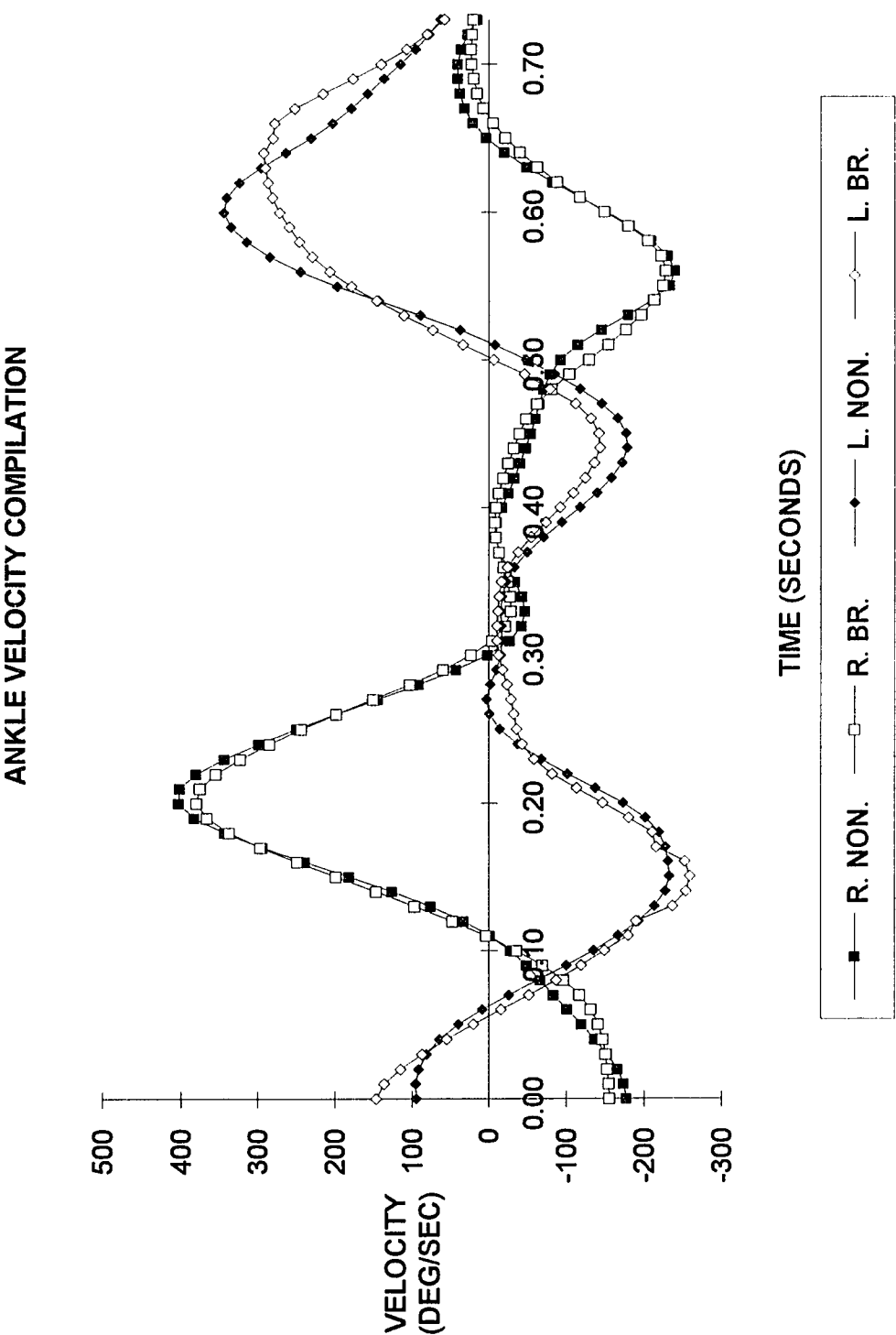


Table 4 Post-Trial Questionnaire Results:

Number of responses to each question is shown.

Total number of subjects was 10.

1. The speed when running without the braces felt.

slow	fine	fast
2	8	
2. When running without the braces applied did you feel any fatigue?

some	none	great deal
1	9	
3. When the braces were applied how did they feel?

tight	fine	loose
4	6	
4. When running with the braces how did the speed feel.

slow	fine	fast
1	7	2
5. When running with the braces applied did you feel any fatigue?

some	none	great deal
7	3	
6. Did you feel a difference between running without the braces and running with the braces.

some	none	great deal
6	2	2
7. If you ran for a longer period of time do you feel you would have fatigued faster with the braces applied.

some	none	great deal
3	5	2

the females felt the speed was too fast, while the rest of the subjects felt the speed was fine. Since fatigue could be a possible factor affecting the perceptions about the speed, the order of bracing was randomized between the subjects. Only one female subject, who wore braces second, felt fatigue without the braces (question 2). When wearing the braces, five subjects felt some fatigue (question 5). Two of these were male, with one wearing the braces second. Of the females two wore the braces second. One of these also reported fatigue without wearing braces. Brace application could also have affected performance (Regalbuto, et al., 1989). The third question asked how the braces felt when applied. All braces were applied following manufactures recommendations for application by the same person who was experienced in applying braces for athletic competition. Four subjects felt the braces were tight. Two of these were male both of whom wore the braces second. Of the two females, only one wore the brace first. The rest of the subjects felt the braces were fine. The sixth question was designed to determine whether a difference in gait detected by video analysis, matched that of the subjects perceptions. Two subjects, one female and one male, felt a great deal of difference in gait when braced. Both reported that the braces felt tight, which may account for this feeling of difference. The female wore the braces first and the male second. Six other subjects felt some difference between conditions. Two of these were males of whom one

wore the braces first. Of the females, only one wore the braces first. The final question asked if the subjects had run longer would they have fatigued faster. Here the same two subjects who felt a great deal of difference between conditions also felt they would fatigue more rapidly. Only three of the subjects felt they would fatigue somewhat faster, and all three felt some difference between conditions. One was a male with braces worn first, while the two females wore the braces second. The rest of the subjects felt they would not fatigue faster while wearing braces.

Chapter 5

Discussion

The gait cycle duration, and lower limb joint ROM and velocity of the subjects in this study were not affected by the wearing of prophylactic knee braces. Minimal differences in ROM and velocity were observed between braced and nonbraced conditions for the ankle, knee and hip joints. Although conditions were not varied during testing of gait, Dowd, et al. (1992) showed that the same patterns for gait were produced in repeated trials. Ten trials were used for each subject, and gait pattern in trials 2 through 10 were not different. Trial 1 was disregarded because of possible errors in digitizing. These findings suggest that if a difference in gait were to occur with the wearing of knee braces, differences would be detected in analysis of the results.

The results of the present study showed that the wearing of prophylactic braces on both knees did not change the overall timing of the gait cycle, or the overall ROM at the knee, ankle and hip joints. These findings were similar to those of Knutzen, et al. (1987) and Devita, Hunter and Skelly (1992) who found no change in gait with functional bracing of only one knee. Devita, Hunter and Skelly (1992) suggested that if the time between brace application and testing for functional braces was too long, adaptations

could occur before testing was performed. This adaptation would become the subject's normal gait, explaining why no difference in gait was found between braced and nonbraced legs. However, the results of the present study suggest that gait was not altered in new wearers of knee braces, since all subjects stated before testing that they had not previously worn knee braces. These findings were in contrast to those of Fujiwara, Perrin and Buxton (1990) who found that when doing speed and agility testing of subjects, wearing knee braces, only differences in speed occurred for the experienced wearers, whereas the new wearers had differences in speed and at all levels of agility tested. This testing was similar to that which occurs on most football fields for speed, namely a forty-yard dash and 20 yard backward sprint, and for agility, a 10-yard shuttle run and a 40-yard square cone drill.

One important point about brace application was proper positioning of the brace on the wearer. Regalbuto, Rovick and Walker (1989) showed that braces placed incorrectly or out of position caused changes to the forces in the knee joint and may have led to anatomical and mechanical changes. The braces in this study were applied to all subjects by the same person, and according to manufactures specifications. However, it was possible that the braces could have been misaligned, which would explain some of the variability that was seen in the velocities of the knee, hip, and ankle joints. A more likely explanation for the variability may

be due to errors in digitizing of the data. The variability tended to occur between the right and left leg and not between the braced and nonbraced conditions. During the digitizing of the data, the right knee, ankle and foot disappeared from view at times. The gait patterns were filmed with two cameras, so that when a point was blocked on one camera it was still visible on the other. When digitizing, the system does attempt to compensate for this fact; however, there was still a degree of human interpretation and hence possible error. The velocity was affected to a greater extent when a point being digitized was a little off mark than was the ROM, since a mark located a little behind where it should be located would show the joint slowing in velocity or even starting to change direction early. The same person did all the digitizing of the data in this study which may be why there was a consistent difference between the right and left lower extremities.

Digitizing error can be demonstrated by examining the support and swing phases of the gait for the knee joint (Figure 4). During the support phase, approximately from 0.00 to 0.20 seconds the velocities were similar, but as the swing phase began, greater variation was occurring. Since more motion was occurring during the swing phase, the chance of error was greater. Also, it was during the swing phase when the right knee, hip and ankle became blocked from view. The amount and duration of the point being blocked were

different for each subject, but occurred for all. The right hip became blocked, from the back view, as the subject twisted at the trunk going through the end of the swing phase bringing the leg forward for foot contact. The right knee, ankle and foot were blocked as they passed the left leg on their track forward during the swing phase for foot contact, and as they went backward during the end of the support phase.

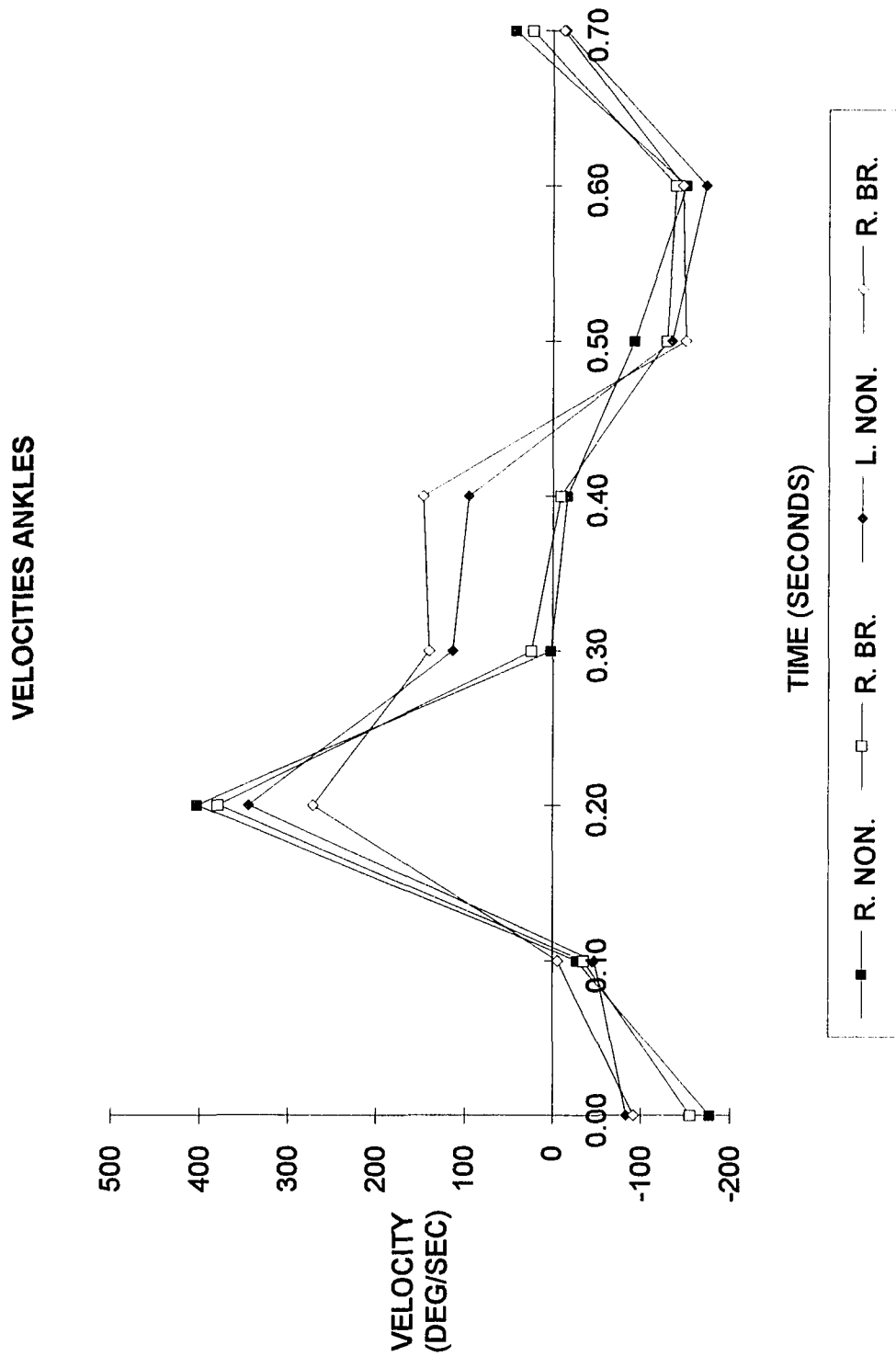
During the ROM of the knee, there appeared to be a slight variation between the right and left knees (Figure 1). This variation occurred during the support phase at the third time mark (0.20 seconds). At this point, digitizing from the rear view required an estimation of exactly where the right knee was positioned and may account for difference between the stance phases for right and left knees. Similarly, the difference between the knees at the start of the swing phase may have been due to the left leg swinging through and obstructing the front view of the right knee on all subjects, and the rear view of the ankle on a few of the subjects. Both knees seem to track near the same ROM until the end of the support phase (0.70 seconds) where they diverge again. At this point the right foot and ankle were again being blocked by the left leg.

The right and left hips (Figure 5) show the same movement pattern, except during the support phase where a variation between limbs was present. The left leg shows lower velocities for the start and mid points of the support

phase. ROM (Figure 2) varies little between right and left hip. During the support phase ROMs were almost the same, however during the swing phase some differences occurred. This may be due to the fact that as the hands traveled back and forth they block views of the hips both the right and left. Also, during the swing phase the right hip swung back and it became obstructed from the front view.

The ankle joints showed the most variability in velocity (Figure 13). This may have been due to the fact that the right foot and ankle were blocked for the longest total amount of time. The ankle, like the knee, had a negative velocity at the start of the support phase. By the end of the support phase, the ankle had large positive velocity. The ankle was at its greatest point of extension at the start of the support phase and flexed as the gait cycle proceeded. During the swing phase, the ankle reached a point of almost no motion as the foot pushed off the ground. As the leg was traveling behind the body, the ankle extended (ROM increases), then flexed (ROM decreases) as the leg swung from push off to back in front of the body. The velocity of the left ankle was probably more accurate than that of the right, especially when velocity changed from positive to negative during the swing phase. In contrast, the right ankle only showed negative velocities after the swing phase started. The ROM of the ankles were very similar during the support phase (Figure 3). The only variation that occurred was during the swing phase at

Figure 13 Right and Left Ankles Velocities



approximately 0.30 seconds, where the right ankle was blocked from the back view and the front view by the left leg at sequential times. At the end of the swing phase, right ankle ROM matched the left ankle ROM.

Chapter 6

Conclusions

Based on the results of this study it can be concluded that prophylactic knee bracing does not have an effect on gait cycle duration, ROM, or velocity during running. The hypothesis tested was that prophylactic knee braces, specifically the Omni Anderson Knee Stabler Brace, do not affect duration of the gait cycle, ROM, and velocities of the knee, hip and ankle joints. Thus, this hypothesis was not rejected based on the results obtained in this study. The brace employed did meet the one criteria of the AAOS (Paulos, et al., 1986) tested namely that, the Omni Anderson Knee Stabler brace did not interfere with the normal function of the lower extremity while running on a treadmill at 5 mph.

Future Research

Future research would be enhanced by the addition of electromyography and force platforms to this current analysis. A larger selection of braces used for testing would be advisable. Also, testing that would examine subjects at greater speeds than 5 mph up to and including a sprint could be important.

APPENDIX I INFORMED CONSENT

Exercise Physiology Laboratory

University of Nevada, Las Vegas

Informed Consent: Running Gait Analysis

In volunteering as a subject for this study your height, weight, leg length, lower leg length and body composition will be measured for classification. A requirement of you being video taped for a total of two times to analyze your running gait will be needed. A possible third and fourth taping will be needed depending on initial results. With the first two occurring on the same day. this will require you to bring a pair of shorts and a type of sports shoe.

Subject is instructed that at no time are they forced to do anything against their will, or in which they can not do. It is wished that after signing this form, that they will continue through out the entire study, but at anytime they wish to withdraw from this study they may with no questions asked or repercussions from withdrawal. By signing this form you are stating you have no known previous knee injuries. That in no way do you have any other limitations that could hamper your performance in any way, or put you at risk to perform any part of this study. At any time during this study should you become injured for any reason you are responsible for your own care that may be needed.

The subject is also informed that their name shall remain confidential from any reporting or publication of the results. The form being signed shall remain the property of this experimenter and the Exercise Physiology Laboratory of UNLV.

By signing I understand and will follow the instructions given on this form. Also I understand the risks involved in this study.

Printed Name
of Participant

Signature of
Participant

Date

Printed Name
of Witness

Signature of
Witness

Date

APPENDIX II DATA COLLECTION FORM

Exercise Physiology Laboratory

University of Nevada, Las Vegas

Running Gait: Data Collection Form

Subject's: Name _____ Age ____ ID Number _____

weight _____lb _____kg height _____in _____cm

leg length R_____in _____cm L_____in _____cm

thigh length R_____in _____cm L_____in _____cm

lower leg length R_____in _____cm L_____in _____cm

Body composition: Y's Way Sum of Four

Abdomen _____ Ilium _____
Triceps _____ Thigh _____

Body Composition _____%

Condition One: Braced / Unbraced

Number of Trials ____ Synchronizing Event _____

Shutter Speed _____ Camera angle _____ Camera distance _____

Filename _____ Skip Factor ____ Trial Selected ____

Number of Frames From View 1 ____ Number Digitized ____

Number of Frames From View 2 ____ Number Digitized ____

Condition Two: Braced / Unbraced

Number of Trials ____ Synchronizing Event _____

Shutter Speed _____ Camera angle _____ Camera distance _____

Filename _____ Skip Factor ____ Trial Selected ____

Number of Frames From View 1 ____ Number Digitized ____

Number of Frames From View 2 ____ Number Digitized ____

APPENDIX III POST TRIAL QUESTIONNAIRE

ID# _____
Date _____**Exercise Physiology Laboratory
University of Nevada, Las Vegas
Running Gait: Post trial Questionnaire**

Please answer the following questions/statements honestly and the best you can. Answer the question by circling the number under the word the fits best your answer. These questions contain information that will be helpful to the experimenter in evaluating your performance on the treadmill.

1. The speed when running without the braces felt.

slow	fine	fast	not applicable
1	2	3	0
2. When running without the braces applied did you feel any fatigue?

some	none	great deal	not applicable
1	2	3	0
3. When the braces were applied how did they feel?

tight	fine	loose	not applicable
1	2	3	0
4. When running with the braces how did the speed feel.

slow	fine	fast	not applicable
1	2	3	0
5. When running with the braces applied did you feel any fatigue?

some	none	great deal	not applicable
1	2	3	0
6. Did you feel a difference between running without the braces and running with the braces.

some	none	great deal	not applicable
1	2	3	0
7. If you ran for a longer period of time do you feel you would have fatigued faster with the braces applied.

some	none	great deal	not applicable
1	2	3	0

Table 5 Questionnaire Results By Individual Subject

Questionnaire Results Broken Down by Subject										
Sub	1	2	3	4	5	6	7	8	9	10
Gen	M	M	M	F	F	F	F	M	F	F
BR.	2ND	1ST	2ND	1ST	2ND	1ST	2ND	1ST	2ND	1ST
Q.1	1	2	1	2	2	2	2	2	2	2
Q.2	2	2	2	2	1	2	2	2	2	2
Q.3	1	2	1	2	2	1	2	2	1	2
Q.4	2	2	1	2	2	2	3	2	3	2
Q.5	1	2	2	2	1	1	1	1	2	2
Q.6	3	2	1	1	1	3	1	1	1	2
Q.7	3	2	2	2	2	3	1	1	1	2

KEY:

Sub = Subject

Gen = Gender

BR. = Bracing

Q.# = Question Number

APPENDIX IV DIGITAL ANALYSIS INFORMATION

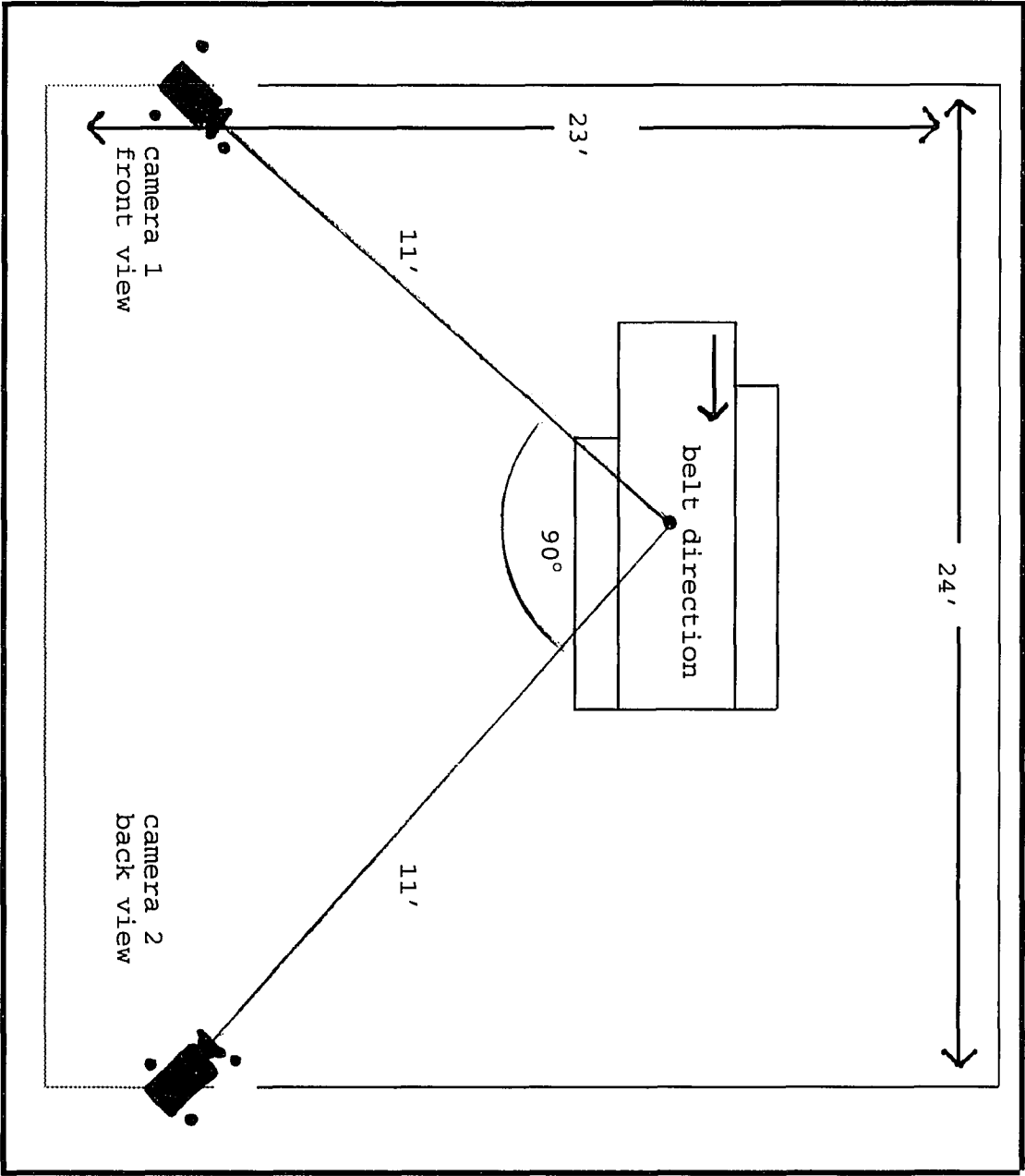
**Video Filming Information
for Digital Analysis**

Name _____ Date (D/M/Y) _____ ID number _____
 Age ____ Ht _____ in _____ cm Wt _____ lb _____ kg
 Activity Performing _____
 Condition _____
 Sequence _____ Number of trials _____
 Markers on Subject yes / no Cameras Focused yes / no
 Synchronizing Event _____ Shutter Speed _____
 Control Points Distances: X _____ Y _____ Z _____
 Camera \approx Δ _____ Camera Distance \approx _____
 Background Consistency: Fair Good Excellent
 Comments:

Filename _____ Skip Factor _____

Trial Selected _____	Number of Frames From View 1	_____
	Number Digitized	_____
	Number of Frames From View 2	_____
	Number Digitized	_____
	Number of Frames From View 3	_____
	Number Digitized	_____
	Number of Frames From View 4	_____
	Number Digitized	_____

APPENDIX V CAMERA PLACEMENT SCHEMATIC



APPENDIX VI INDIVIDUAL JOINT ROM FIGURES - FIGURE 14

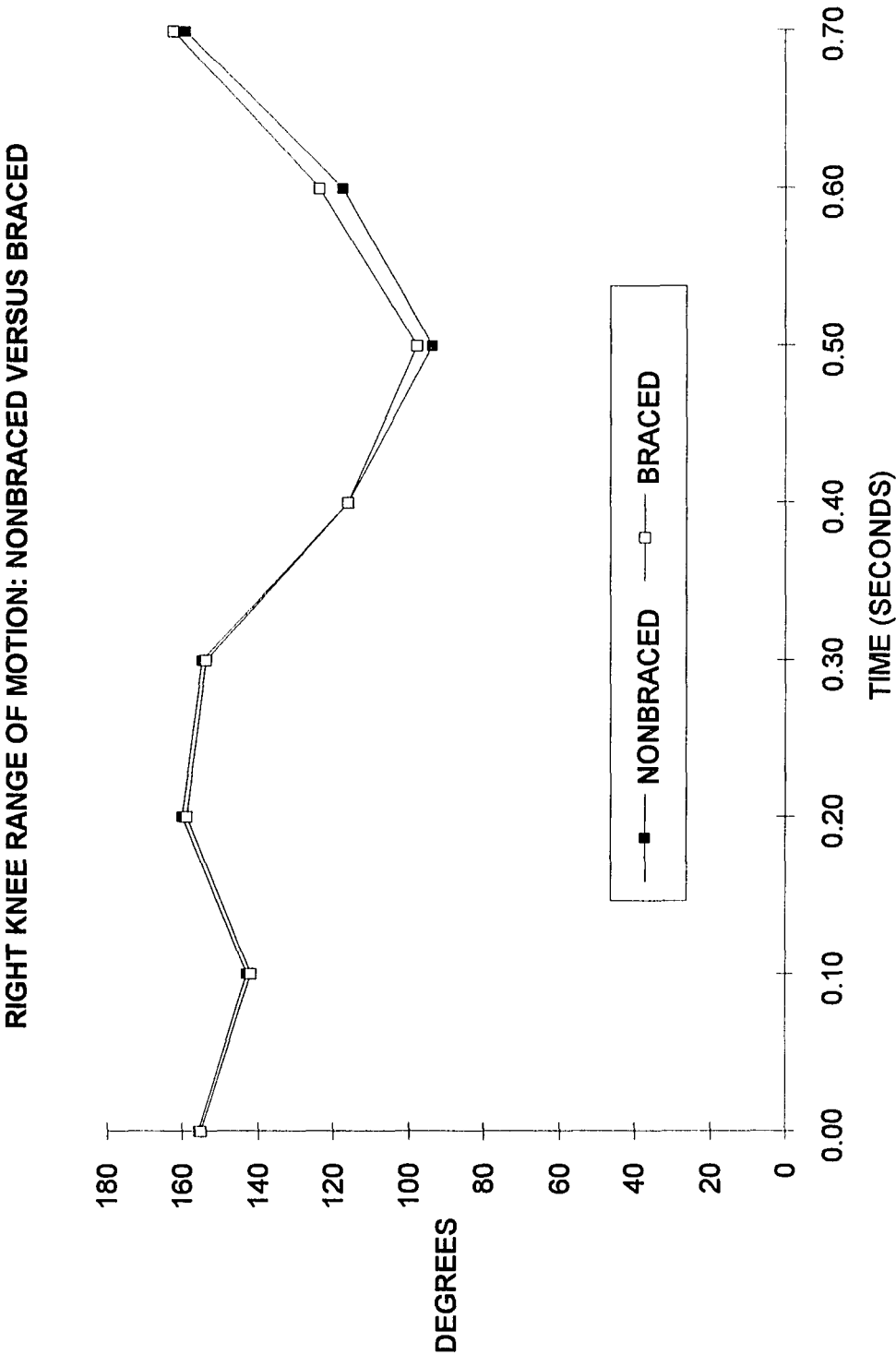


FIGURE 15 Left Knee Range of Motion

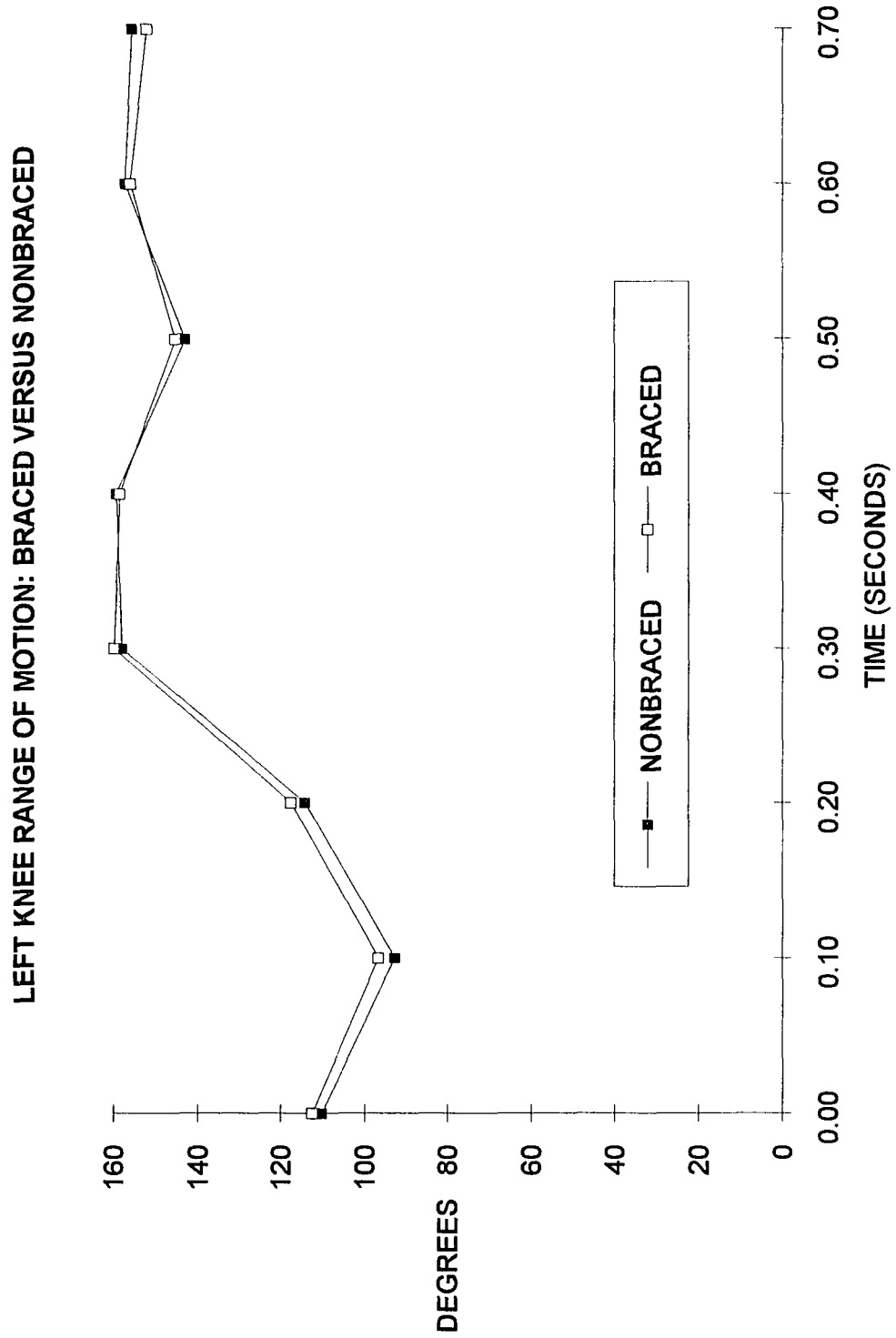


FIGURE 16 Right Hip Range of Motion

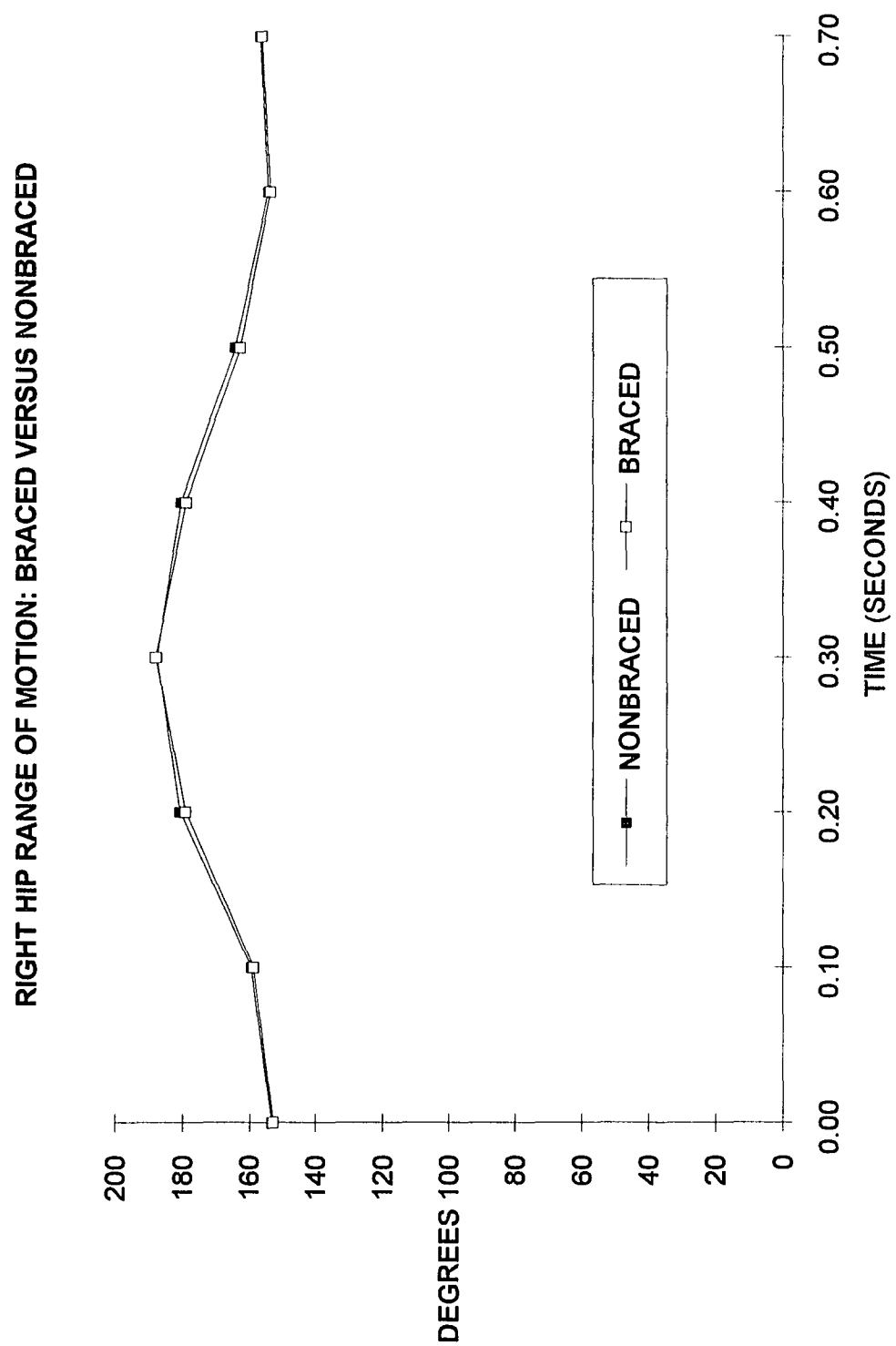


Figure 17 Right Ankle Range of Motion

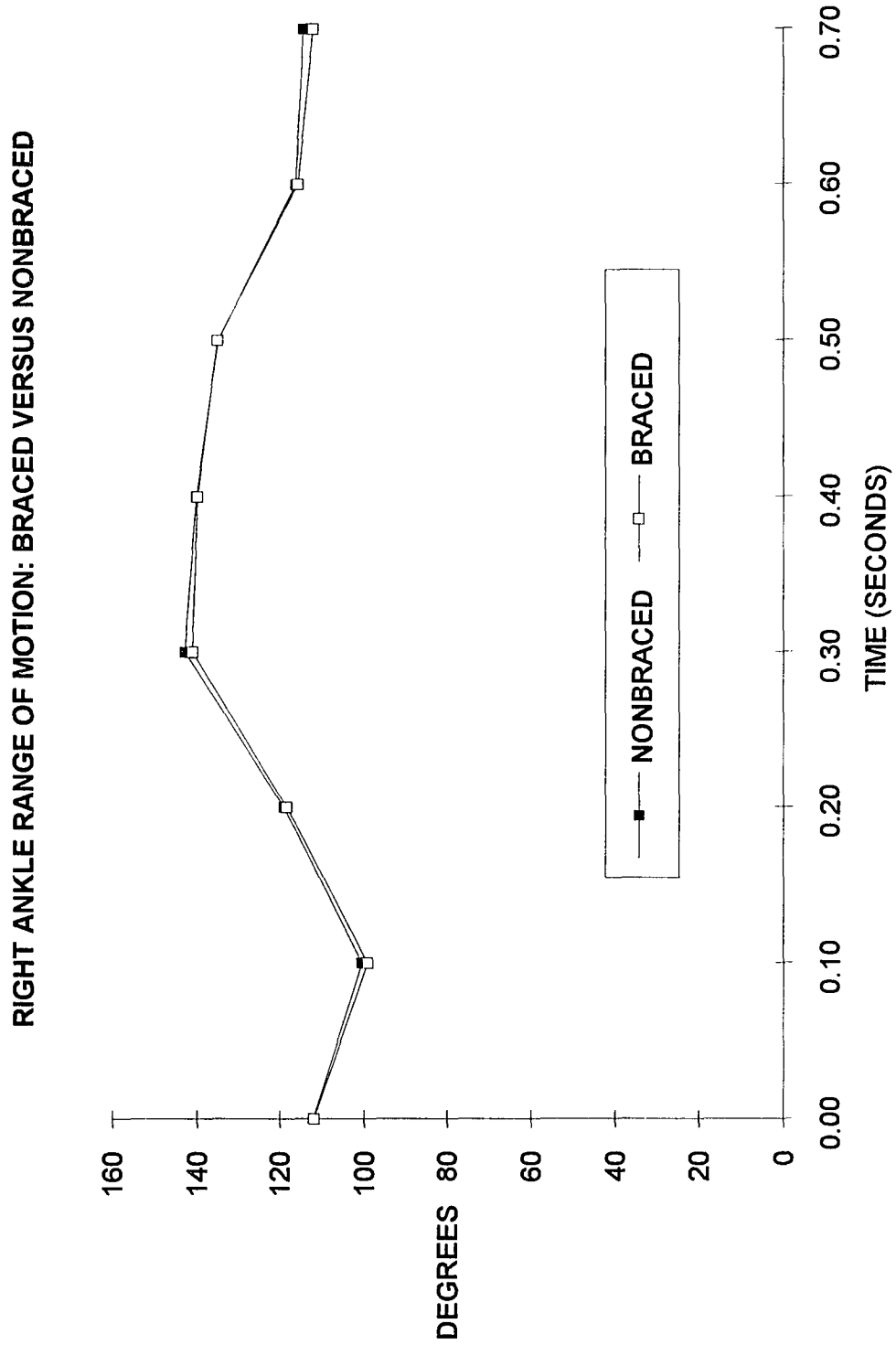
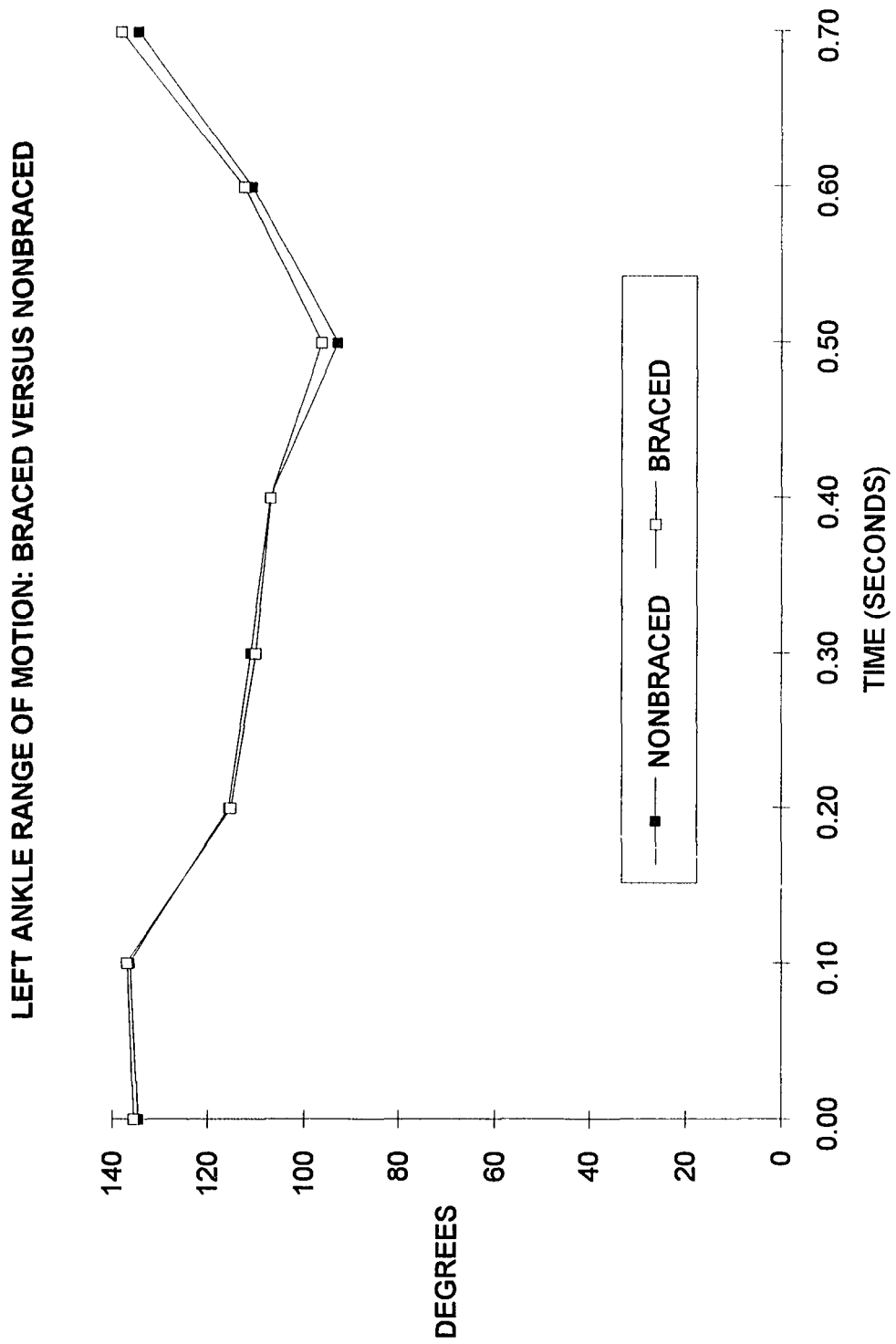


Figure 18 Left Ankle Range of Motion



APPENDIX VII INDIVIDUAL JOINT VELOCITY FIGURES - Figure 19

RIGHT KNEE VELOCITIES: BRACED VERSUS NONBRACED

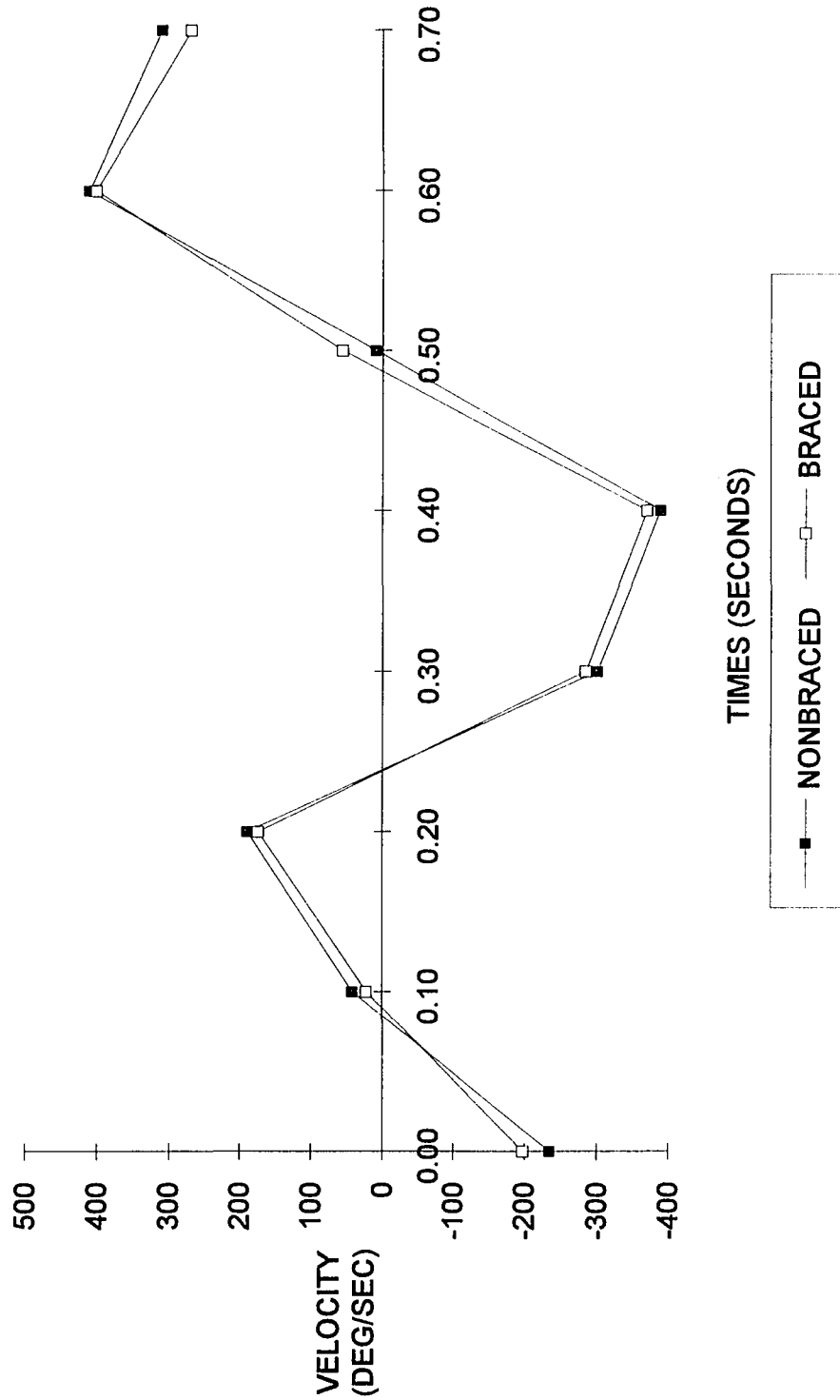


Figure 20 Left Knee Velocities

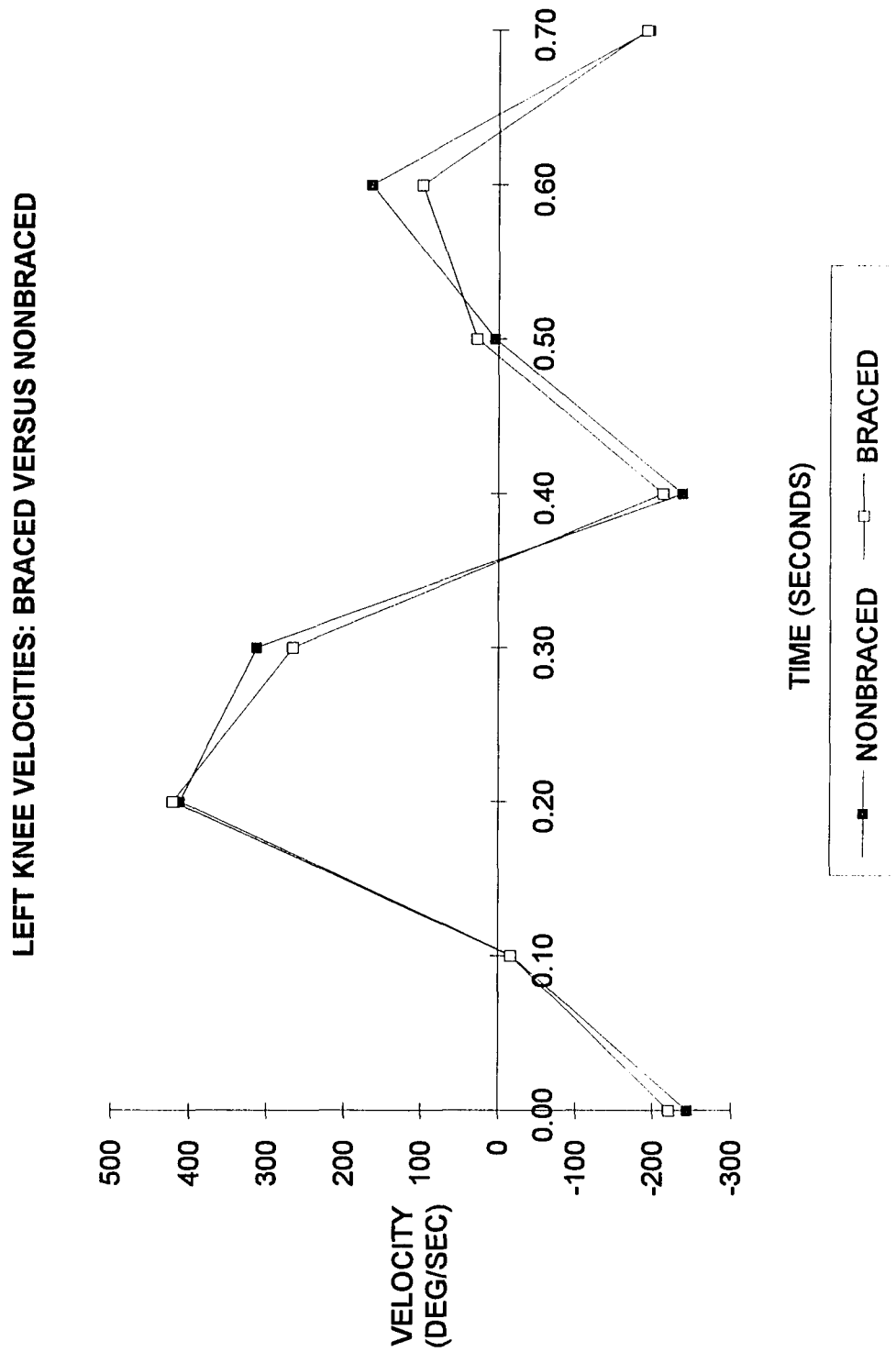


Figure 21 Right Hip Velocities

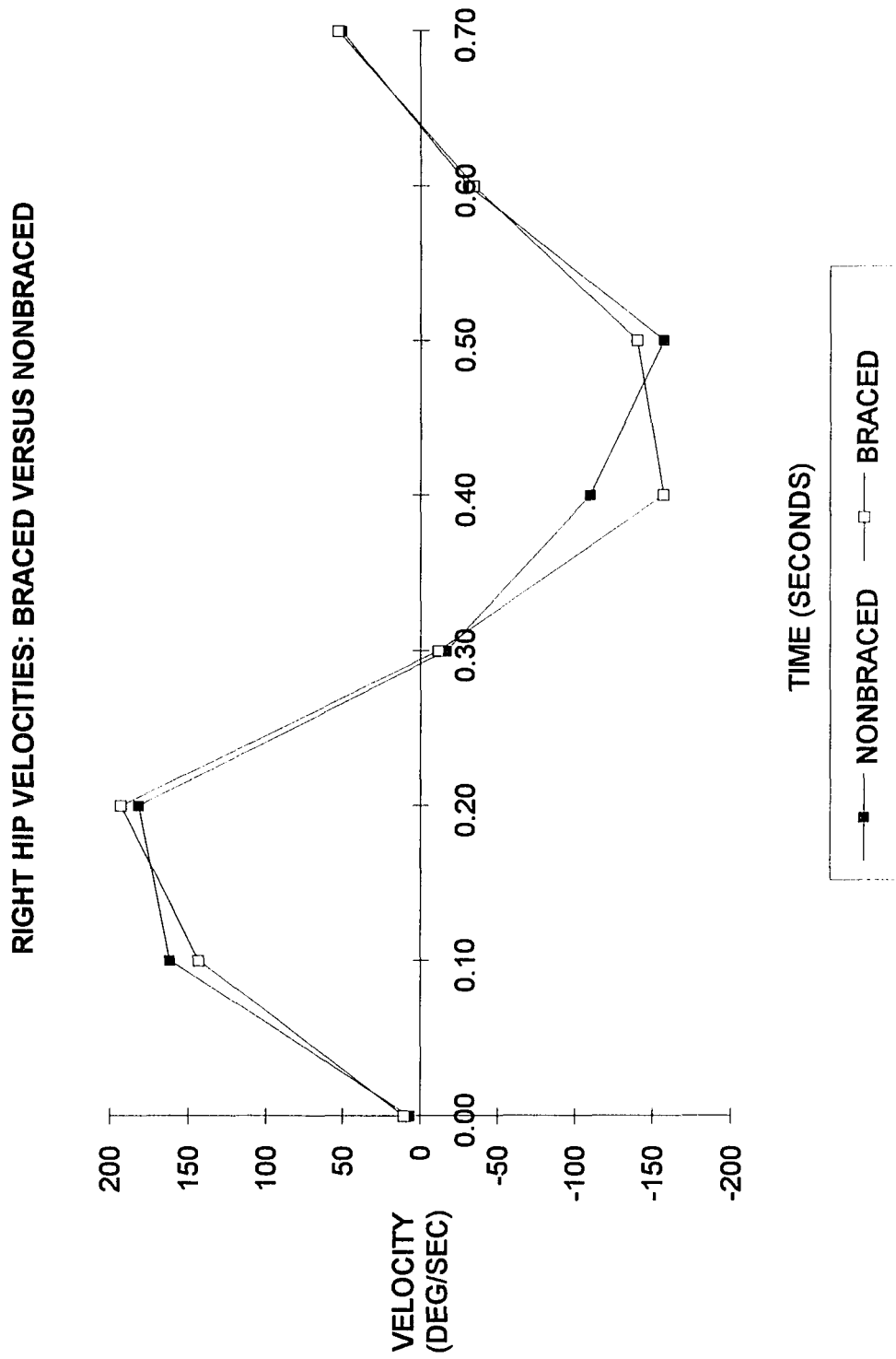


Figure 22 Left Hip Velocities

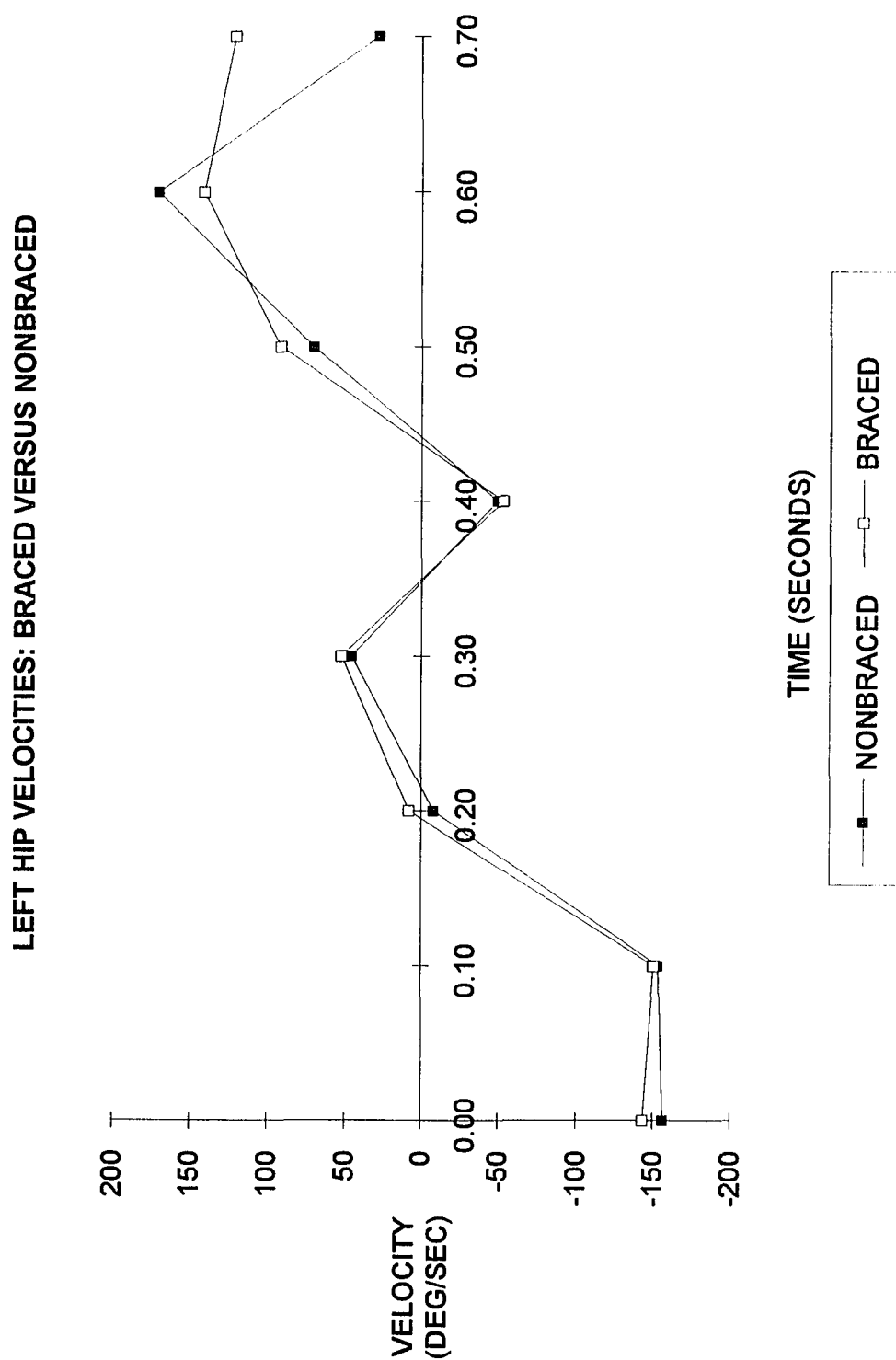


Figure 23 Right Ankle Velocities

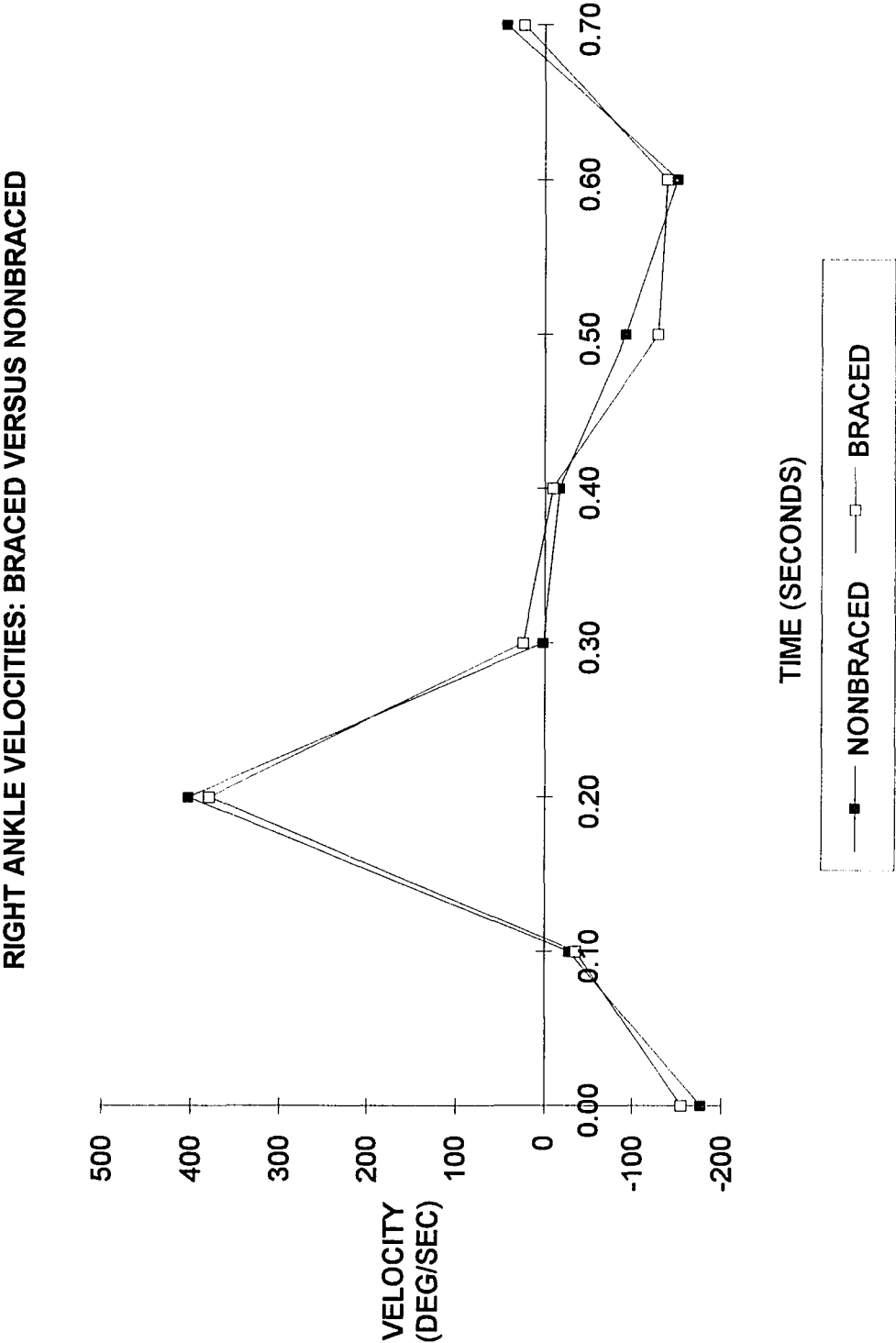
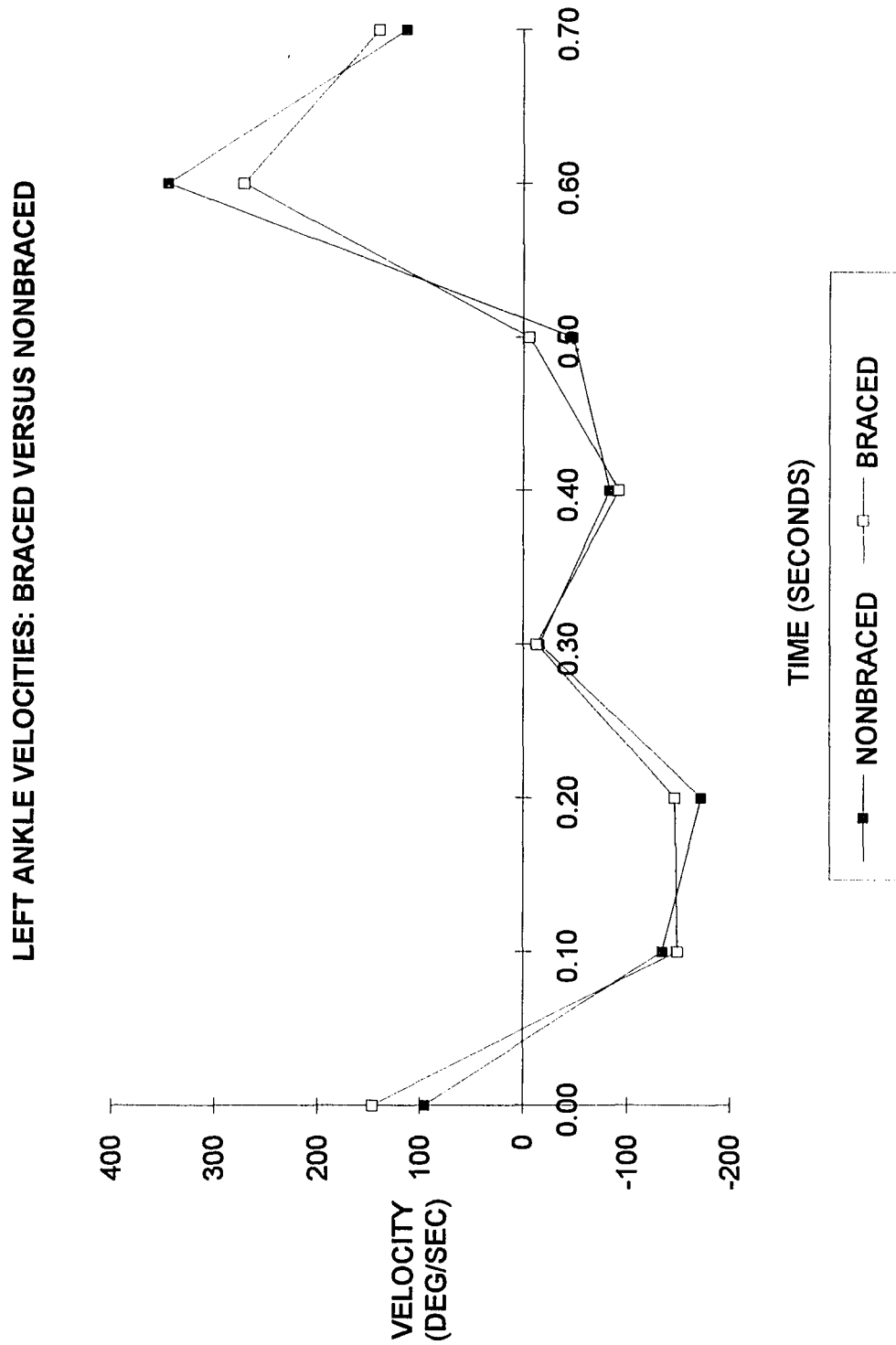


Figure 24 Left Ankle Velocities



APPENDIX VIII TABLE 6 KNEE RANGE OF MOTION - RAW DATA

RIGHT KNEE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	152.893	145.420	152.626	165.142	146.987
0.01	151.048	143.167	149.595	162.447	145.967
0.02	149.253	140.991	146.810	159.788	144.916
0.03	147.539	138.968	144.464	157.256	143.872
0.04	145.964	137.153	142.754	154.948	142.883
0.05	144.607	135.559	141.828	152.911	141.977
0.06	143.541	134.179	141.780	151.155	141.169
0.07	142.800	133.026	142.631	149.690	140.473
0.08	142.378	132.137	144.299	148.545	139.915
0.09	142.241	131.575	146.593	147.771	139.536
0.10	142.346	131.423	149.283	147.417	139.398
0.11	142.656	131.755	152.171	147.520	139.557
0.12	143.161	132.606	155.145	148.102	140.043
0.13	143.876	133.978	158.138	149.157	140.874
0.14	144.835	135.846	161.086	150.633	142.073
0.15	146.078	138.167	163.914	152.423	143.678
0.16	147.613	140.880	166.520	154.395	145.713
0.17	149.378	143.911	168.753	156.439	148.164
0.18	151.259	147.165	170.385	158.456	150.981
0.19	153.119	150.533	171.128	160.349	154.080
0.20	154.813	153.895	170.717	162.019	157.334
0.21	156.218	157.136	168.965	163.376	160.582
0.22	157.257	160.141	165.816	164.347	163.649
0.23	157.882	162.816	161.360	164.892	166.354
0.24	158.055	165.093	155.831	165.009	168.523
0.25	157.744	166.923	149.566	164.721	170.015
0.26	156.916	168.270	142.923	164.052	170.722
0.27	155.536	169.092	136.208	163.020	170.575
0.28	153.564	169.335	129.649	161.632	169.554
0.29	150.982	168.931	123.403	159.893	167.690
0.30	147.833	167.830	117.569	157.805	165.066
0.31	144.216	166.021	112.186	155.364	161.802
0.32	140.238	163.541	107.223	152.574	158.034
0.33	136.007	160.459	102.588	149.446	153.907
0.34	131.619	156.864	98.177	146.006	149.567
0.35	127.152	152.870	93.946	142.305	145.159
0.36	122.675	148.605	89.896	138.413	140.809
0.37	118.245	144.196	86.049	134.419	136.596
0.38	113.910	139.754	82.436	130.403	132.548
0.39	109.702	135.372	79.099	126.434	128.651
0.40	105.649	131.112	76.085	122.584	124.881
0.41	101.782	127.014	73.475	118.931	121.225
0.42	98.144	123.091	71.386	115.554	117.701
0.43	94.774	119.334	69.942	112.519	114.355
0.44	91.694	115.719	69.228	109.875	111.260

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION NONBRACED

TIME	1	2	3	4	5
0.45	88.919	112.233	69.275	107.677	108.502
0.46	86.461	108.882	70.071	105.983	106.176
0.47	84.349	105.689	71.594	104.844	104.367
0.48	82.631	102.685	73.809	104.272	103.139
0.49	81.378	99.906	76.667	104.238	102.520
0.50	80.663	97.392	80.092	104.693	102.504
0.51	80.537	95.180	83.996	105.592	103.060
0.52	81.016	93.299	88.284	106.921	104.145
0.53	82.100	91.789	92.848	108.681	105.720
0.54	83.780	90.716	97.579	110.876	107.754
0.55	86.039	90.164	102.415	113.513	110.217
0.56	88.850	90.206	107.352	116.607	113.079
0.57	92.168	90.874	112.418	120.186	116.306
0.58	95.925	92.160	117.621	124.268	119.865
0.59	100.037	94.029	122.921	128.820	123.719
0.60	104.434	96.455	128.279	133.714	127.828
0.61	109.080	99.423	133.693	138.749	132.133
0.62	113.947	102.914	139.236	143.710	136.536
0.63	119.006	106.907	144.964	148.425	140.945
0.64	124.201	111.374	150.797	152.780	145.295
0.65	129.422	116.268	156.443	156.697	149.534
0.66	134.534	121.503	161.531	160.113	153.610
0.67	139.432	126.949	165.816	162.969	157.461
0.68	144.051	132.490	169.167	165.224	161.018
0.69	148.340	138.050	171.532	166.866	164.225
0.70	152.228	143.543	172.964	167.915	167.074
0.71	155.636	148.837	173.581	168.425	169.604
0.72	158.523	153.758	173.514	168.478	171.878
0.73	160.878	158.121	172.879	168.181	173.968
0.74	162.718	161.774	171.791	167.650	175.943
0.75	164.087	164.625	170.388	166.983	*
0.76	165.061	166.650	168.815	166.248	*
0.77	165.747	167.880	*	*	*
0.78	166.268	168.385	*	*	*
0.79	*	168.252	*	*	*
0.80	*	167.573	*	*	*
0.81	*	166.444	*	*	*
0.82	*	164.968	*	*	*
0.83	*	163.265	*	*	*
0.84	*	161.465	*	*	*
0.85	*	159.668	*	*	*
0.86	*	157.938	*	*	*
0.87	*	156.293	*	*	*
0.88	*	154.712	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.00	157.902	159.513	155.112	163.177	157.360
0.01	154.586	157.301	153.808	160.725	154.169
0.02	151.451	155.198	152.512	158.284	151.060
0.03	148.627	153.320	151.266	155.897	148.132
0.04	146.226	151.774	150.122	153.597	145.496
0.05	144.374	150.613	149.121	151.415	143.220
0.06	143.187	149.838	148.295	149.379	141.347
0.07	142.696	149.407	147.681	147.513	139.925
0.08	142.791	149.278	147.320	145.835	139.008
0.09	143.266	149.428	147.254	144.362	138.649
0.10	143.958	149.842	147.526	143.118	138.889
0.11	144.829	150.504	148.170	142.130	139.729
0.12	145.980	151.406	149.207	141.423	141.086
0.13	147.569	152.536	150.635	141.019	142.839
0.14	149.682	153.883	152.428	140.943	144.872
0.15	152.234	155.424	154.539	141.217	147.107
0.16	155.037	157.129	156.901	141.853	149.488
0.17	157.935	158.967	159.440	142.844	151.941
0.18	160.801	160.906	162.068	144.154	154.363
0.19	163.498	162.914	164.692	145.718	156.626
0.20	165.852	164.945	167.223	147.444	158.607
0.21	167.705	166.934	169.575	149.222	160.195
0.22	168.987	168.787	171.662	150.940	161.296
0.23	169.649	170.386	173.403	152.505	161.830
0.24	169.613	171.597	174.722	153.860	161.726
0.25	168.807	172.280	175.546	154.972	160.915
0.26	167.203	172.303	175.803	155.817	159.359
0.27	164.851	171.571	175.431	156.365	157.081
0.28	161.867	170.047	174.391	156.584	154.171
0.29	158.403	167.764	172.680	156.455	150.764
0.30	154.595	164.817	170.329	155.973	147.000
0.31	150.555	161.343	167.405	155.148	143.000
0.32	146.371	157.497	163.996	154.070	138.847
0.33	142.082	153.425	160.198	152.573	134.598
0.34	137.666	149.247	156.100	150.859	130.283
0.35	133.066	145.046	151.773	148.863	125.919
0.36	128.244	140.881	147.278	146.588	121.501
0.37	123.237	136.786	142.676	144.053	117.019
0.38	118.149	132.781	138.033	141.295	112.476
0.39	113.126	128.875	133.408	138.362	107.897
0.40	108.323	125.072	128.861	135.320	103.315
0.41	103.872	121.383	124.453	132.249	98.773
0.42	99.859	117.825	120.252	129.224	94.333
0.43	96.308	114.439	116.320	126.309	90.099
0.44	93.194	111.288	112.705	123.558	86.203

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	90.490	108.457	109.449	121.019	82.767
0.46	88.218	106.034	106.587	118.738	79.892
0.47	86.465	104.094	104.151	116.757	77.649
0.48	85.308	102.692	102.165	115.110	76.080
0.49	84.773	101.863	100.648	113.820	75.202
0.50	84.866	101.615	99.616	112.903	75.023
0.51	85.610	101.940	99.076	112.367	75.533
0.52	87.071	102.813	99.026	112.213	76.699
0.53	89.333	104.195	99.455	112.438	78.473
0.54	92.444	106.046	100.340	113.035	80.796
0.55	96.329	108.345	101.658	114.005	83.594
0.56	100.765	111.088	103.379	115.360	86.787
0.57	105.451	114.280	105.484	117.127	90.301
0.58	110.090	117.924	107.955	119.338	94.064
0.59	114.471	122.006	110.776	122.007	98.008
0.60	118.509	126.492	113.921	125.105	102.107
0.61	122.261	131.305	117.351	128.571	106.388
0.62	125.895	136.314	121.027	132.336	110.911
0.63	129.608	141.357	124.909	136.312	115.703
0.64	133.560	146.266	128.958	140.384	120.725
0.65	137.840	150.894	133.128	144.436	125.895
0.66	142.451	155.128	137.364	148.371	131.112
0.67	147.295	158.896	141.606	152.125	136.275
0.68	152.221	162.173	145.786	155.660	141.266
0.69	157.065	164.977	149.834	158.946	145.946
0.70	161.638	167.366	153.681	161.933	150.186
0.71	165.707	169.423	157.266	164.556	153.887
0.72	168.986	171.235	160.548	166.763	156.990
0.73	171.217	172.866	163.513	168.525	159.496
0.74	172.260	174.358	166.169	169.835	161.464
0.75	172.144	175.746	168.549	170.719	162.993
0.76	171.030	177.063	170.701	171.223	164.180
0.77	169.148	*	172.690	171.407	165.105
0.78	166.783	*	174.583	171.340	165.848
0.79	164.220	*	*	171.093	166.492
0.80	*	*	*	170.740	*
0.81	*	*	*	170.338	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	139.797	154.010	156.606	159.634	149.893
0.01	140.741	151.513	153.567	157.046	148.835
0.02	141.680	149.011	150.751	154.425	147.728
0.03	142.607	146.551	148.277	151.840	146.554
0.04	143.524	144.189	146.223	149.441	145.287
0.05	144.440	141.995	144.635	147.392	143.943
0.06	145.372	140.042	143.545	145.786	142.592
0.07	146.339	138.389	142.964	144.588	141.345
0.08	147.357	137.080	142.898	143.728	140.334
0.09	148.442	136.149	143.396	143.168	139.682
0.10	149.607	135.624	144.396	142.907	139.482
0.11	150.860	135.533	146.042	142.974	139.776
0.12	152.188	135.901	148.307	143.420	140.553
0.13	153.552	136.729	151.111	144.322	141.781
0.14	154.887	137.986	154.283	145.757	143.429
0.15	156.115	139.619	157.638	147.754	145.471
0.16	157.153	141.567	160.994	150.238	147.874
0.17	157.936	143.771	164.167	152.997	150.575
0.18	158.411	146.157	166.991	155.729	153.467
0.19	158.538	148.642	169.302	158.127	153.401
0.20	158.296	151.155	170.893	159.969	159.189
0.21	157.676	153.632	171.572	161.151	161.655
0.22	156.671	156.003	171.259	161.678	163.676
0.23	155.266	158.195	169.940	161.641	165.188
0.24	153.441	160.132	167.638	161.170	166.171
0.25	151.174	161.756	164.410	160.402	166.615
0.26	148.460	163.026	160.366	159.436	166.492
0.27	145.316	163.914	155.658	158.319	165.737
0.28	141.784	164.401	150.456	157.058	164.279
0.29	137.919	164.470	144.927	155.635	162.082
0.30	133.784	164.100	139.247	154.021	159.176
0.31	129.442	163.276	133.593	152.185	155.630
0.32	124.956	161.984	128.121	150.100	151.527
0.33	120.396	160.233	122.921	147.724	146.975
0.34	115.836	158.038	118.006	145.003	142.130
0.35	111.352	155.420	113.346	141.880	137.175
0.36	107.012	152.406	108.897	138.353	132.283
0.37	102.883	149.040	104.630	134.520	127.572
0.38	99.027	145.387	100.521	130.535	123.121
0.39	95.489	141.519	96.558	126.547	118.975
0.40	92.298	137.516	92.746	122.822	115.148
0.41	89.485	133.448	89.125	119.430	111.654
0.42	87.099	129.381	85.767	116.484	108.533
0.43	85.200	125.377	82.780	114.031	105.840
0.44	83.843	121.492	80.288	112.109	103.624

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	83.073	117.767	78.406	110.735	101.913
0.46	82.927	114.218	77.214	109.894	100.718
0.47	83.430	110.833	76.739	109.548	100.048
0.48	84.592	107.589	76.979	109.655	99.917
0.49	86.405	104.482	77.922	110.187	100.357
0.50	88.846	101.544	79.536	111.126	101.403
0.51	91.873	98.841	81.776	112.474	103.080
0.52	95.431	96.454	84.613	114.271	105.370
0.53	99.444	94.471	88.042	116.538	108.204
0.54	103.826	92.974	92.069	119.238	111.476
0.55	108.496	92.033	96.711	122.292	115.053
0.56	113.383	91.705	101.929	125.631	118.804
0.57	118.412	92.038	107.569	129.234	122.631
0.58	123.507	93.069	113.433	133.030	126.503
0.59	128.591	94.817	119.351	136.866	130.440
0.60	133.597	97.275	125.178	140.590	134.458
0.61	138.469	100.407	130.818	144.115	138.519
0.62	143.161	104.149	136.266	147.422	142.538
0.63	147.619	108.404	141.560	150.529	146.410
0.64	151.770	113.044	146.714	153.453	150.051
0.65	155.533	117.945	151.704	156.184	153.412
0.66	158.834	123.007	156.461	158.677	156.461
0.67	161.634	128.158	160.860	160.864	159.156
0.68	163.941	133.343	164.739	162.706	161.455
0.69	165.806	138.519	167.936	164.230	163.319
0.70	167.320	143.644	170.329	165.527	164.713
0.71	168.581	148.659	171.869	166.728	165.628
0.72	169.685	153.473	172.583	167.945	166.110
0.73	170.710	157.979	172.582	169.227	166.264
0.74	*	162.072	172.044	*	166.228
0.75	*	165.658	171.158	*	*
0.76	*	168.664	170.088	*	*
0.77	*	171.045	*	*	*
0.78	*	172.784	*	*	*
0.79	*	173.890	*	*	*
0.80	*	174.400	*	*	*
0.81	*	174.375	*	*	*
0.82	*	173.909	*	*	*
0.83	*	173.108	*	*	*
0.84	*	172.075	*	*	*
0.85	*	170.894	*	*	*
0.86	*	169.618	*	*	*
0.87	*	168.275	*	*	*
0.88	*	166.885	*	*	*
* END OF SUBJECT'S GAIT					

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.00	166.697	149.116	159.520	160.447	154.737
0.01	164.218	148.319	156.408	157.865	152.228
0.02	161.649	147.557	153.406	155.280	149.914
0.03	158.990	146.870	150.614	152.736	147.896
0.04	156.283	146.302	148.117	150.279	146.241
0.05	153.597	145.890	145.978	147.970	144.982
0.06	151.021	145.656	144.232	145.869	144.125
0.07	148.639	145.608	142.894	144.021	143.658
0.08	146.541	145.750	141.994	142.468	143.561
0.09	144.810	146.091	141.584	141.245	143.820
0.10	143.498	146.645	141.718	140.381	144.418
0.11	142.605	147.433	142.423	139.903	145.337
0.12	142.082	148.475	143.686	139.844	146.550
0.13	141.874	149.777	145.463	140.234	148.030
0.14	141.954	151.318	147.681	141.085	149.751
0.15	142.313	153.059	150.244	142.393	151.674
0.16	142.973	154.938	153.036	144.127	153.743
0.17	143.992	156.864	155.932	146.220	155.884
0.18	145.435	158.721	158.808	148.574	157.990
0.19	147.337	160.388	161.557	151.053	159.920
0.20	149.688	161.744	164.095	153.496	161.537
0.21	152.417	162.682	166.367	155.734	162.726
0.22	155.391	163.104	168.354	157.625	163.400
0.23	158.445	162.932	170.057	159.068	163.507
0.24	161.396	162.108	171.474	160.001	163.021
0.25	164.054	160.612	172.595	160.410	161.943
0.26	166.231	158.461	173.381	160.317	160.279
0.27	167.763	155.713	173.756	159.776	158.028
0.28	168.541	152.451	173.615	158.853	155.199
0.29	168.515	148.776	172.847	157.614	151.819
0.30	167.679	144.795	171.368	156.116	147.925
0.31	166.064	140.623	169.159	154.400	143.562
0.32	163.733	136.366	166.287	152.487	138.805
0.33	160.784	132.115	162.867	150.379	133.759
0.34	157.341	127.940	159.028	148.070	128.564
0.35	153.540	123.882	154.872	145.559	123.365
0.36	149.508	119.961	150.470	142.863	118.288
0.37	145.347	116.183	145.872	140.019	113.417
0.38	141.123	112.562	141.133	137.064	108.791
0.39	136.887	109.121	136.337	134.028	104.429
0.40	132.670	105.895	131.596	130.934	100.342
0.41	128.520	102.923	127.030	127.816	96.558
0.42	124.502	100.247	122.744	124.734	93.114
0.43	120.701	97.908	118.822	121.765	90.053
0.44	117.200	95.949	115.324	119.007	87.423

TABLE 6 CONTINUED

RIGHT KNEE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	114.053	94.424	112.281	116.568	85.280
0.46	111.285	93.391	109.697	114.552	83.680
0.47	108.906	92.897	107.550	113.042	82.678
0.48	106.926	92.969	105.808	112.083	82.301
0.49	105.352	93.606	104.443	111.681	82.551
0.50	104.187	94.791	103.438	111.817	83.417
0.51	103.429	96.492	102.794	112.460	84.870
0.52	103.078	98.663	102.517	113.576	86.861
0.53	103.134	101.248	102.602	115.137	89.331
0.54	103.591	104.184	103.025	117.112	92.225
0.55	104.442	107.409	103.757	119.472	95.510
0.56	105.675	110.878	104.779	122.187	99.169
0.57	107.280	114.579	106.080	125.230	103.184
0.58	109.279	118.519	107.654	128.571	107.510
0.59	111.729	122.705	109.503	132.192	112.085
0.60	114.684	127.130	111.648	136.088	116.833
0.61	118.166	131.751	114.143	140.246	121.675
0.62	122.152	136.462	117.062	144.617	126.529
0.63	126.595	141.128	120.452	149.121	131.321
0.64	131.436	145.626	124.308	153.658	135.988
0.65	136.619	149.857	128.566	158.108	140.460
0.66	142.071	153.745	133.124	162.344	144.663
0.67	147.667	157.235	137.860	166.256	148.533
0.68	153.225	160.301	142.640	169.764	152.034
0.69	158.535	162.948	147.341	172.823	155.168
0.70	163.399	165.196	151.861	175.416	157.954
0.71	167.670	167.090	156.101	177.551	160.421
0.72	171.258	168.702	159.946	179.260	162.600
0.73	174.117	170.123	163.298	180.605	164.530
0.74	176.226	171.436	166.102	181.669	166.263
0.75	177.593	*	168.363	182.543	167.865
0.76	178.255	*	170.142	183.313	169.394
0.77	178.284	*	171.569	*	*
0.78	177.788	*	172.793	*	*
0.79	176.903	*	*	*	*
0.80	175.769	*	*	*	*
0.81	174.507	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	109.094	107.245	90.571	127.172	121.836
0.01	106.199	104.026	89.960	124.352	119.231
0.02	103.297	100.864	89.326	121.530	116.648
0.03	100.450	97.805	88.704	118.738	114.126
0.04	97.572	94.904	88.166	116.018	111.709
0.05	94.887	92.224	87.824	113.416	109.448
0.06	92.457	89.823	87.773	110.984	107.397
0.07	90.379	87.752	88.032	108.785	105.613
0.08	88.720	86.050	88.568	106.891	104.159
0.09	87.526	84.751	89.337	105.377	103.095
0.10	86.821	83.884	90.312	104.306	102.480
0.11	86.597	83.471	91.499	103.737	102.364
0.12	86.821	83.529	92.949	103.710	102.776
0.13	87.465	84.066	94.773	104.262	103.730
0.14	88.520	85.087	97.109	105.411	105.227
0.15	89.993	86.595	100.061	107.162	107.261
0.16	91.877	88.589	103.636	109.498	109.822
0.17	94.139	91.048	107.729	112.391	112.891
0.18	96.761	93.937	112.189	115.800	116.432
0.19	99.771	97.206	116.884	119.669	120.392
0.20	103.232	100.817	121.733	123.938	124.687
0.21	107.171	104.751	126.713	128.534	129.205
0.22	111.506	108.998	131.847	133.360	133.803
0.23	116.111	113.553	137.123	138.312	138.331
0.24	120.890	118.409	142.459	143.288	142.655
0.25	125.779	123.546	147.722	148.163	146.673
0.26	130.721	128.906	152.737	152.790	150.311
0.27	135.619	134.374	157.295	157.023	153.516
0.28	140.368	139.792	161.215	160.738	156.247
0.29	144.881	145.002	164.388	163.845	158.476
0.30	149.078	149.865	166.759	166.287	160.183
0.31	152.882	154.283	168.306	168.035	161.363
0.32	156.209	158.191	169.025	169.078	162.024
0.33	158.949	161.530	168.935	169.434	162.186
0.34	160.969	164.227	168.068	169.146	161.883
0.35	162.159	166.204	166.474	168.284	161.164
0.36	162.443	167.401	164.240	166.931	160.077
0.37	161.798	167.802	161.532	165.170	158.659
0.38	160.287	167.417	158.595	163.073	156.949
0.39	158.061	166.273	155.723	160.703	154.996
0.40	155.316	164.423	153.203	158.127	152.875
0.41	152.271	161.949	151.261	155.421	150.683
0.42	149.173	158.956	150.037	152.677	148.532
0.43	146.273	155.571	149.577	150.001	146.535
0.44	143.785	151.940	149.839	147.515	144.798

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.45	141.831	148.213	150.711	145.350	143.410
0.46	140.443	144.539	152.021	143.617	142.427
0.47	139.601	141.046	153.548	142.389	141.857
0.48	139.259	137.837	155.092	141.709	141.683
0.49	139.373	134.981	156.533	141.587	141.888
0.50	139.937	132.535	157.865	142.001	142.459
0.51	140.962	130.554	159.158	142.896	143.378
0.52	142.431	129.093	160.494	144.199	144.616
0.53	144.315	128.194	161.956	145.829	146.124
0.54	146.584	127.889	163.589	147.708	147.837
0.55	149.184	128.208	165.346	149.751	149.681
0.56	152.019	129.173	167.061	151.869	151.584
0.57	154.936	130.771	168.483	153.970	153.477
0.58	157.742	132.957	169.367	155.973	155.295
0.59	160.235	135.646	169.540	157.812	156.977
0.60	162.250	138.723	168.916	159.436	158.467
0.61	163.681	142.064	167.491	160.798	159.723
0.62	164.476	145.567	165.329	161.848	160.710
0.63	164.601	149.131	162.520	162.538	161.403
0.64	164.019	152.657	159.148	162.841	161.786
0.65	162.710	156.044	155.282	162.748	161.857
0.66	160.733	159.196	151.005	162.264	161.624
0.67	158.276	162.015	146.437	161.397	161.101
0.68	155.568	164.415	141.704	160.166	160.316
0.69	152.775	166.338	136.913	158.601	159.310
0.70	149.914	167.761	132.137	156.741	158.150
0.71	146.911	168.678	127.426	154.630	156.876
0.72	143.709	169.080	122.817	152.322	155.537
0.73	140.242	168.955	118.318	149.875	154.169
0.74	136.429	168.296	113.915	147.346	152.798
0.75	132.195	167.100	109.584	144.785	*
0.76	127.527	165.378	105.319	142.233	*
0.77	122.517	163.152	*	*	*
0.78	117.334	160.456	*	*	*
0.79	*	157.329	*	*	*
0.80	*	153.814	*	*	*
0.81	*	149.955	*	*	*
0.82	*	145.801	*	*	*
0.83	*	141.403	*	*	*
0.84	*	136.816	*	*	*
0.85	*	132.106	*	*	*
0.86	*	127.339	*	*	*
0.87	*	122.580	*	*	*
0.88	*	117.878	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.00	96.533	107.619	131.809	115.006	94.356
0.01	95.185	105.100	128.550	112.749	91.461
0.02	93.854	102.589	125.322	110.527	88.618
0.03	92.590	100.106	122.151	108.394	85.895
0.04	91.448	97.676	119.090	106.403	83.375
0.05	90.485	95.338	116.188	104.605	81.141
0.06	89.748	93.149	113.493	103.050	79.272
0.07	89.284	91.180	111.050	101.793	77.833
0.08	89.134	89.511	108.904	100.884	76.885
0.09	89.339	88.214	107.091	100.363	76.482
0.10	89.934	87.353	105.643	100.264	76.672
0.11	90.945	86.978	104.579	100.617	77.485
0.12	92.375	87.123	103.911	101.448	78.933
0.13	94.215	87.803	103.644	102.770	81.007
0.14	96.438	89.013	103.788	104.575	83.675
0.15	99.006	90.727	104.355	106.839	86.885
0.16	101.872	92.900	105.353	109.525	90.575
0.17	105.005	95.517	106.793	112.590	94.680
0.18	108.380	98.524	108.680	115.990	99.137
0.19	111.977	101.919	111.014	119.686	103.878
0.20	115.773	105.708	113.787	123.629	108.832
0.21	119.742	109.905	116.985	127.766	113.927
0.22	123.855	114.514	120.585	132.055	119.099
0.23	128.076	119.520	124.565	136.447	124.302
0.24	132.356	124.863	128.892	140.888	129.503
0.25	136.623	130.433	133.514	145.312	134.664
0.26	140.792	136.072	138.347	149.643	139.726
0.27	144.785	141.594	143.284	153.789	144.603
0.28	148.535	146.813	148.194	157.650	149.188
0.29	151.985	151.572	152.936	161.137	153.364
0.30	155.083	155.762	157.368	164.162	157.021
0.31	157.733	159.312	161.364	166.652	160.065
0.32	159.999	162.175	164.819	168.551	162.421
0.33	161.705	164.312	167.655	169.838	164.052
0.34	162.845	165.688	169.818	170.513	164.966
0.35	163.391	166.283	171.276	170.596	165.204
0.36	163.332	166.106	172.017	170.116	164.823
0.37	162.686	165.207	172.053	169.128	163.878
0.38	161.512	163.658	171.414	167.695	162.422
0.39	159.902	161.545	170.152	165.889	160.509
0.40	157.967	158.978	168.340	163.783	158.207
0.41	155.827	156.110	166.079	161.453	155.608
0.42	153.613	153.132	163.502	158.982	152.824
0.43	151.454	150.234	160.765	156.450	149.990
0.44	149.474	147.576	158.029	153.939	147.243

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	147.786	145.278	155.444	151.521	144.699
0.46	146.480	143.416	153.136	149.270	142.443
0.47	145.614	142.025	151.195	147.253	140.538
0.48	145.203	141.120	149.680	145.516	139.027
0.49	145.237	140.707	148.614	144.082	137.941
0.50	145.695	140.781	147.996	142.951	137.307
0.51	146.549	141.341	147.805	142.110	137.147
0.52	147.762	142.390	148.023	141.548	137.473
0.53	149.278	143.922	148.629	141.255	138.272
0.54	151.024	145.902	149.600	141.223	139.499
0.55	152.918	148.264	150.913	141.457	141.090
0.56	154.871	150.914	152.545	141.962	142.970
0.57	156.801	153.741	154.475	142.734	145.045
0.58	158.619	156.619	156.668	143.752	147.212
0.59	160.233	159.404	159.078	144.979	149.368
0.60	161.549	161.956	161.644	146.358	151.420
0.61	162.477	164.144	164.298	147.823	153.283
0.62	162.941	165.853	166.957	149.307	154.877
0.63	162.889	166.987	169.536	150.744	156.125
0.64	162.300	167.476	171.943	152.074	156.954
0.65	161.187	167.275	174.080	153.239	157.294
0.66	159.592	166.390	175.846	154.188	157.081
0.67	157.570	164.887	177.156	154.875	156.269
0.68	155.188	162.863	177.944	155.267	154.842
0.69	152.511	160.420	178.172	155.335	152.820
0.70	149.598	157.652	177.828	155.058	150.258
0.71	146.503	154.648	176.924	154.421	147.238
0.72	143.274	151.492	175.489	153.426	143.855
0.73	139.942	148.262	173.579	152.087	140.218
0.74	136.529	145.018	171.280	150.433	136.432
0.75	133.057	141.803	168.706	148.506	132.587
0.76	129.554	138.639	165.976	146.361	128.743
0.77	126.050	*	163.189	144.057	124.927
0.78	122.569	*	160.412	141.650	121.153
0.79	119.125	*	*	139.189	117.441
0.80	*	*	*	136.709	*
0.81	*	*	*	134.234	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	97.971	113.583	91.343	124.887	116.413
0.01	96.788	110.468	90.781	123.026	114.117
0.02	95.622	107.331	90.234	121.179	111.832
0.03	94.525	104.202	89.741	119.380	109.600
0.04	93.567	101.121	89.349	117.670	107.475
0.05	92.815	98.135	89.112	116.098	105.519
0.06	92.330	95.295	89.070	114.713	103.797
0.07	92.157	92.647	89.242	113.557	102.371
0.08	92.333	90.237	89.628	112.662	101.306
0.09	92.880	88.114	90.218	112.051	100.655
0.10	93.811	86.324	91.009	111.752	100.464
0.11	95.127	84.908	92.006	111.794	100.757
0.12	96.824	83.897	93.224	112.207	101.544
0.13	98.911	83.315	94.700	113.017	102.826
0.14	101.402	83.184	96.494	114.241	104.602
0.15	104.304	83.523	98.688	115.893	106.873
0.16	107.609	84.347	101.364	117.987	109.641
0.17	111.295	85.659	104.596	120.537	112.897
0.18	115.321	87.459	108.433	123.550	116.619
0.19	119.629	89.736	112.886	127.015	120.762
0.20	124.149	92.482	117.903	130.897	125.265
0.21	128.796	95.685	123.368	135.119	130.049
0.22	133.462	99.340	129.127	139.551	135.007
0.23	138.025	103.433	135.019	144.031	140.012
0.24	142.364	107.942	140.894	148.393	144.924
0.25	146.368	112.826	146.617	152.480	149.607
0.26	149.933	118.026	152.058	156.159	153.926
0.27	152.957	123.462	157.098	159.329	157.752
0.28	155.359	129.038	161.622	161.930	160.982
0.29	157.096	134.640	165.516	163.931	163.544
0.30	158.169	140.149	168.671	165.331	165.393
0.31	158.605	145.439	171.003	166.143	166.515
0.32	158.447	150.382	172.465	166.388	166.931
0.33	157.749	154.851	173.064	166.102	166.688
0.34	156.586	158.730	172.853	165.332	165.847
0.35	155.065	161.928	171.917	164.150	164.472
0.36	153.316	164.378	170.362	162.643	162.628
0.37	151.483	166.037	168.313	160.922	160.389
0.38	149.704	166.893	165.907	159.096	157.837
0.39	148.098	166.976	163.296	157.258	155.074
0.40	146.751	166.350	160.642	155.480	152.227
0.41	145.726	165.090	158.111	153.818	149.446
0.42	145.070	163.271	155.870	152.316	146.874
0.43	144.809	160.975	154.069	151.018	144.629
0.44	144.945	158.305	152.815	149.971	142.794

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	145.466	155.385	152.169	149.210	141.423
0.46	146.346	152.355	152.144	148.758	140.545
0.47	147.550	149.349	152.715	148.606	140.179
0.48	149.031	146.483	153.815	148.730	140.329
0.49	150.731	143.847	155.346	149.100	140.979
0.50	152.583	141.500	157.193	149.703	142.084
0.51	154.517	139.482	159.232	150.527	143.573
0.52	156.462	137.820	161.328	151.539	145.361
0.53	158.342	136.526	163.368	152.691	147.355
0.54	160.074	135.606	165.272	153.929	149.458
0.55	161.577	135.055	166.977	155.200	151.586
0.56	162.767	134.863	168.412	156.457	153.669
0.57	163.564	135.019	169.482	157.654	155.641
0.58	163.902	135.521	170.087	158.746	157.453
0.59	163.738	136.376	170.147	159.691	159.066
0.60	163.056	137.589	169.618	160.446	160.448
0.61	161.861	139.154	168.498	160.973	161.563
0.62	160.184	141.058	166.800	161.244	162.366
0.63	158.064	143.271	164.537	161.240	162.809
0.64	155.546	145.741	161.727	160.948	162.852
0.65	152.676	148.388	158.427	160.365	162.461
0.66	149.495	151.119	154.738	159.489	161.619
0.67	146.028	153.849	150.791	158.320	160.338
0.68	142.304	156.492	146.707	156.874	158.660
0.69	138.358	158.949	142.568	155.187	156.648
0.70	134.244	161.127	138.420	153.307	154.374
0.71	130.023	162.941	134.279	151.291	151.907
0.72	125.765	164.331	130.133	149.198	149.305
0.73	121.536	165.248	125.958	147.080	146.625
0.74	*	165.652	121.734	*	143.921
0.75	*	165.511	117.460	*	*
0.76	*	164.796	113.157	*	*
0.77	*	163.480	*	*	*
0.78	*	161.560	*	*	*
0.79	*	159.071	*	*	*
0.80	*	156.065	*	*	*
0.81	*	152.612	*	*	*
0.82	*	148.787	*	*	*
0.83	*	144.676	*	*	*
0.84	*	140.371	*	*	*
0.85	*	135.960	*	*	*
0.86	*	131.523	*	*	*
0.87	*	127.122	*	*	*
0.88	*	122.803	*	*	*

* END OF SUBJECT'S GAIT

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.00	127.549	105.101	133.128	119.297	95.672
0.01	125.671	102.265	129.433	116.849	93.437
0.02	123.752	99.480	125.748	114.411	91.204
0.03	121.784	96.821	122.119	112.033	89.011
0.04	119.776	94.362	118.615	109.776	86.916
0.05	117.755	92.173	115.314	107.701	84.979
0.06	115.765	90.322	112.286	105.877	83.260
0.07	113.860	88.876	109.592	104.369	81.814
0.08	112.099	87.898	107.282	103.234	80.698
0.09	110.536	87.442	105.404	102.519	79.972
0.10	109.219	87.540	104.004	102.265	79.700
0.11	108.195	88.208	103.119	102.511	79.937
0.12	107.506	89.445	102.769	103.291	80.720
0.13	107.195	91.242	102.954	104.631	82.066
0.14	107.303	93.586	103.654	106.545	83.977
0.15	107.854	96.458	104.839	109.019	86.445
0.16	108.859	99.824	106.472	112.012	89.451
0.17	110.310	103.629	108.516	115.468	92.969
0.18	112.193	107.799	110.945	119.311	96.972
0.19	114.482	112.252	113.750	123.458	101.440
0.20	117.147	116.910	116.931	127.821	106.345
0.21	120.152	121.707	120.487	132.320	111.653
0.22	123.467	126.592	124.394	136.887	117.314
0.23	127.058	131.525	128.597	141.453	123.232
0.24	130.880	136.472	133.017	145.949	129.245
0.25	134.874	141.379	137.568	150.291	135.159
0.26	138.958	146.175	142.163	154.384	140.795
0.27	143.037	150.759	146.720	158.136	146.016
0.28	147.007	155.019	151.148	161.467	150.726
0.29	150.768	158.840	155.347	164.319	154.863
0.30	154.230	162.119	159.200	166.647	158.385
0.31	157.318	164.758	162.588	168.412	161.269
0.32	159.969	166.713	165.399	169.586	163.509
0.33	162.134	167.908	167.544	170.154	165.109
0.34	163.178	168.338	168.958	170.124	166.082
0.35	164.879	168.031	169.614	169.525	166.435
0.36	165.429	167.048	169.522	168.405	166.172
0.37	165.447	165.474	168.728	166.827	165.315
0.38	164.964	163.421	167.309	164.869	163.893
0.39	164.014	161.021	165.374	162.615	161.944
0.40	162.629	158.416	163.047	160.163	159.512
0.41	160.849	155.749	160.464	157.610	156.664
0.42	158.739	153.156	157.764	155.051	153.505
0.43	156.387	150.759	155.082	152.574	150.174
0.44	153.901	148.660	152.537	150.258	146.835

TABLE 6 CONTINUED

LEFT KNEE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	151.400	146.948	150.226	148.162	143.670
0.46	149.000	145.698	148.222	146.316	140.864
0.47	146.790	144.973	146.576	144.730	138.575
0.48	144.837	144.819	145.315	143.416	136.898
0.49	143.183	145.253	144.438	142.403	135.849
0.50	141.861	146.247	143.932	141.716	135.397
0.51	140.895	147.743	143.778	141.360	135.487
0.52	140.309	149.664	143.955	141.308	136.058
0.53	140.123	151.917	144.448	141.512	137.060
0.54	140.352	154.387	145.241	141.930	138.441
0.55	140.993	156.948	146.312	142.528	140.124
0.56	142.026	159.477	147.640	143.287	142.008
0.57	143.414	161.863	149.206	144.199	143.991
0.58	145.107	164.004	150.992	145.254	145.973
0.59	147.042	165.808	152.971	146.425	147.849
0.60	149.137	167.192	155.115	147.672	149.530
0.61	151.294	168.091	157.389	148.941	150.939
0.62	153.409	168.468	159.741	150.169	152.001
0.63	155.391	168.306	162.114	151.294	152.634
0.64	157.163	167.599	164.439	152.253	152.742
0.65	158.657	166.349	166.641	152.988	152.225
0.66	159.812	164.578	168.640	153.443	151.019
0.67	160.580	162.343	170.357	153.568	149.139
0.68	160.932	159.717	171.718	153.325	146.652
0.69	160.858	156.776	172.660	152.706	143.655
0.70	160.362	153.591	173.138	151.729	140.258
0.71	159.464	150.229	173.132	150.438	136.571
0.72	158.194	146.755	172.652	148.881	132.689
0.73	156.579	143.243	171.728	147.120	128.691
0.74	154.635	139.766	170.412	145.218	124.648
0.75	152.387	*	168.778	143.235	120.619
0.76	149.877	*	166.923	141.221	116.648
0.77	147.166	*	164.945	*	*
0.78	144.319	*	162.925	*	*
0.79	141.393	*	*	*	*
0.80	138.433	*	*	*	*
0.81	135.470	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

APPENDIX IX TABLE 7 HIP RANGE OF MOTION - RAW DATA

RIGHT HIP RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	151.491	152.884	153.269	158.368	147.855
0.01	151.630	152.709	153.056	158.507	148.603
0.02	151.827	152.586	152.971	158.672	149.353
0.03	152.110	152.560	153.112	158.887	150.120
0.04	152.544	152.662	153.573	159.175	150.926
0.05	153.181	152.908	154.429	159.554	151.793
0.06	154.057	153.300	155.736	160.038	152.745
0.07	155.186	153.842	157.519	160.651	153.798
0.08	156.555	154.545	159.748	161.428	154.966
0.09	158.134	155.426	162.322	162.405	156.256
0.10	159.894	156.514	165.099	163.610	157.674
0.11	161.807	157.836	167.936	165.055	159.218
0.12	163.846	159.406	170.727	166.735	160.883
0.13	165.989	161.223	173.404	168.623	162.660
0.14	168.210	163.273	175.921	170.673	164.536
0.15	170.479	165.530	178.246	172.818	166.494
0.16	172.761	167.959	180.348	174.984	168.515
0.17	175.016	170.516	182.191	177.112	170.578
0.18	177.194	173.144	183.727	179.147	172.663
0.19	179.241	175.783	184.900	181.040	174.746
0.20	181.107	178.372	185.971	182.745	176.796
0.21	182.755	180.852	186.027	184.227	178.778
0.22	184.173	183.167	185.991	185.460	180.656
0.23	185.354	185.279	185.601	186.443	182.395
0.24	186.293	187.164	184.906	187.190	183.958
0.25	186.982	188.823	183.963	187.727	185.315
0.26	187.418	190.264	182.839	188.079	186.443
0.27	187.605	191.492	181.600	188.261	187.321
0.28	187.554	192.504	180.314	188.282	187.937
0.29	187.282	193.287	179.055	188.151	188.289
0.30	186.813	193.832	177.898	187.879	188.382
0.31	186.175	194.142	176.905	187.475	188.227
0.32	185.398	194.232	176.093	186.948	187.841
0.33	184.507	194.118	175.415	186.295	187.239
0.34	183.520	193.818	174.776	185.507	186.440
0.35	182.443	193.360	174.091	184.573	185.464
0.36	181.274	192.775	173.309	183.487	184.334
0.37	180.005	192.096	172.398	182.258	183.067
0.38	178.626	191.355	171.350	180.891	181.673
0.39	177.124	190.583	170.178	179.388	180.159
0.40	175.483	189.799	168.910	177.754	178.528
0.41	173.696	189.006	167.604	176.002	176.786
0.42	171.763	188.188	166.349	174.159	174.941
0.43	169.693	187.311	165.223	172.257	173.008
0.44	167.499	186.333	164.252	170.331	171.007

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.45	165.198	185.222	163.404	168.425	168.967
0.46	162.823	183.957	162.625	166.587	166.917
0.47	160.420	182.528	161.879	164.860	164.893
0.48	158.044	180.934	161.141	163.260	162.928
0.49	155.745	179.174	160.381	161.771	161.047
0.50	153.558	177.260	159.570	160.367	159.263
0.51	151.509	175.210	158.704	159.030	157.583
0.52	149.623	173.047	157.829	157.763	156.013
0.53	147.922	170.823	157.011	156.583	154.564
0.54	146.417	168.621	156.322	155.508	153.243
0.55	145.123	166.539	155.823	154.567	152.059
0.56	144.063	164.658	155.554	153.794	151.018
0.57	143.262	163.018	155.513	153.233	150.126
0.58	142.735	161.624	155.640	152.916	149.391
0.59	142.477	160.459	155.855	152.843	148.819
0.60	142.464	159.504	156.121	152.974	148.414
0.61	142.670	158.749	156.461	153.242	148.178
0.62	143.068	158.181	156.924	153.584	148.115
0.63	143.638	157.786	157.541	153.957	148.226
0.64	144.358	157.552	158.290	154.339	148.504
0.65	145.211	157.458	159.079	154.721	148.934
0.66	146.182	157.476	159.792	155.094	149.491
0.67	147.262	157.572	160.352	155.445	150.149
0.68	148.440	157.738	160.714	155.759	150.876
0.69	149.703	157.984	160.859	156.024	151.641
0.70	151.020	158.310	160.808	156.227	152.422
0.71	152.354	158.685	160.609	156.361	153.203
0.72	153.669	159.054	160.313	156.426	153.977
0.73	154.941	159.361	159.958	156.430	154.740
0.74	156.158	159.555	159.573	156.393	155.491
0.75	157.327	159.606	159.181	156.331	*
0.76	158.467	159.508	158.800	156.256	*
0.77	159.597	159.276	*	*	*
0.78	160.734	158.942	*	*	*
0.79	*	158.543	*	*	*
0.80	*	158.112	*	*	*
0.81	*	157.674	*	*	*
0.82	*	157.254	*	*	*
0.83	*	156.875	*	*	*
0.84	*	156.563	*	*	*
0.85	*	156.331	*	*	*
0.86	*	156.182	*	*	*
0.87	*	156.105	*	*	*
0.88	*	156.077		*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.00	154.348	156.670	148.768	156.772	152.985
0.01	154.350	157.034	149.342	156.512	152.483
0.02	154.431	157.427	149.941	156.280	152.026
0.03	154.651	157.879	150.588	156.099	151.668
0.04	155.074	158.420	151.310	155.989	151.469
0.05	155.769	159.077	152.126	155.972	151.469
0.06	156.796	159.870	153.048	156.064	151.690
0.07	158.175	160.812	154.093	156.282	152.158
0.08	159.866	161.913	155.281	156.633	152.900
0.09	161.788	163.181	156.625	157.124	153.941
0.10	163.875	164.616	158.136	157.764	155.300
0.11	166.104	166.211	159.817	158.558	156.975
0.12	168.502	167.950	161.665	159.509	158.930
0.13	171.107	169.813	163.673	160.611	161.105
0.14	173.918	171.772	165.822	161.853	163.441
0.15	176.840	173.793	168.085	163.226	165.895
0.16	179.730	175.842	170.431	164.715	168.426
0.17	182.469	177.886	172.821	166.311	170.988
0.18	184.977	179.889	175.212	167.996	173.518
0.19	187.203	181.819	177.564	169.754	175.948
0.20	189.116	183.638	179.833	171.560	178.217
0.21	190.716	185.310	181.983	173.385	180.277
0.22	192.032	186.813	183.979	175.191	182.091
0.23	193.091	188.129	185.795	176.940	183.634
0.24	193.900	189.254	187.409	178.606	184.894
0.25	194.451	190.186	188.806	180.164	185.860
0.26	194.739	190.927	189.972	181.592	186.530
0.27	194.781	191.479	190.893	182.866	186.917
0.28	194.626	191.842	191.561	183.966	187.058
0.29	194.345	192.020	191.977	184.876	187.005
0.30	193.991	192.019	192.146	185.582	186.807
0.31	193.590	191.845	192.080	186.081	186.506
0.32	193.129	191.504	191.799	186.370	186.125
0.33	192.567	191.001	191.321	186.451	185.677
0.34	191.847	190.342	190.663	186.323	185.166
0.35	190.913	189.535	189.837	185.989	184.587
0.36	189.732	188.595	188.851	185.456	183.924
0.37	188.318	187.542	187.719	184.735	183.154
0.38	186.716	186.398	186.455	183.840	182.258
0.39	184.982	185.185	185.075	182.789	181.224
0.40	183.173	183.919	183.594	181.609	180.031
0.41	181.340	182.611	182.027	180.333	178.645
0.42	179.518	181.265	180.393	178.994	177.038
0.43	177.701	179.886	178.706	177.615	175.217
0.44	175.850	178.484	176.978	176.212	173.232

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	173.936	177.077	175.219	174.790	171.157
0.46	171.984	175.681	173.438	173.346	169.067
0.47	170.079	174.308	171.647	171.876	167.030
0.48	168.294	172.966	169.856	170.381	165.087
0.49	166.644	171.660	168.080	168.865	163.250
0.50	165.128	170.395	166.334	167.345	161.518
0.51	163.758	169.180	164.635	165.844	159.883
0.52	162.580	168.029	163.001	164.384	158.337
0.53	161.645	166.958	161.447	162.980	156.881
0.54	160.969	165.985	159.987	161.639	155.534
0.55	160.501	165.122	158.633	160.362	154.318
0.56	160.143	164.381	157.394	159.151	153.248
0.57	159.803	163.769	156.281	158.010	152.337
0.58	159.423	163.288	155.306	156.948	151.583
0.59	158.978	162.937	154.473	155.973	150.974
0.60	158.465	162.710	153.786	155.095	150.518
0.61	157.915	162.595	153.243	154.320	150.242
0.62	157.415	162.568	152.840	153.659	150.182
0.63	157.057	162.599	152.578	153.122	150.348
0.64	156.902	162.662	152.456	152.717	150.721
0.65	156.983	162.738	152.468	152.447	151.264
0.66	157.301	162.815	152.606	152.314	151.941
0.67	157.829	162.886	152.859	152.314	152.717
0.68	158.522	162.951	153.212	152.439	153.555
0.69	159.326	163.010	153.647	152.673	154.407
0.70	160.176	163.069	154.146	152.988	155.234
0.71	160.996	163.134	154.689	153.353	156.007
0.72	161.704	163.205	155.256	153.745	156.709
0.73	162.216	163.280	155.833	154.145	157.343
0.74	162.475	163.355	156.407	154.544	157.921
0.75	162.473	163.427	156.969	154.936	158.465
0.76	162.254	163.496	157.515	155.319	158.988
0.77	161.892	*	158.047	155.690	159.491
0.78	161.467	*	158.568	156.050	159.973
0.79	161.030	*	*	156.398	160.442
0.80	*	*	*	156.737	*
0.81	*	*	*	157.071	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	145.049	154.532	156.327	155.338	143.097
0.01	146.995	154.331	155.909	155.338	143.512
0.02	148.946	154.162	155.576	155.285	143.966
0.03	150.895	154.051	155.382	155.258	144.487
0.04	152.840	154.025	155.374	155.300	145.100
0.05	154.781	154.106	155.596	155.488	145.825
0.06	156.721	154.317	156.080	155.878	146.682
0.07	158.664	154.674	156.838	156.477	147.689
0.08	160.617	155.191	157.870	157.277	148.868
0.09	162.588	155.877	159.176	158.274	150.241
0.10	164.581	156.744	160.770	159.474	151.822
0.11	166.599	157.796	162.688	160.886	153.620
0.12	168.638	159.038	164.869	162.524	155.632
0.13	170.681	160.468	167.324	164.407	157.839
0.14	172.700	162.078	169.940	166.551	160.209
0.15	174.656	163.856	172.621	168.948	162.701
0.16	176.502	165.787	175.280	171.541	165.268
0.17	178.196	167.846	177.837	174.206	167.855
0.18	179.707	169.999	180.232	176.776	170.406
0.19	181.014	172.204	182.409	179.089	172.870
0.20	182.109	174.420	184.301	181.043	175.201
0.21	182.995	176.606	185.846	182.607	177.362
0.22	183.680	178.726	187.030	183.809	179.320
0.23	184.171	180.745	187.868	184.711	181.052
0.24	184.469	182.633	188.383	185.384	182.538
0.25	184.573	184.373	188.610	185.895	183.763
0.26	184.486	185.953	188.597	186.288	184.717
0.27	184.217	187.365	188.397	186.586	185.392
0.28	183.785	188.598	188.046	186.793	185.785
0.29	183.208	189.649	187.560	186.904	185.901
0.30	182.498	190.516	186.952	186.902	185.754
0.31	181.661	191.199	186.248	186.762	185.369
0.32	180.694	191.705	185.487	186.457	184.770
0.33	179.593	192.039	184.697	185.958	183.979
0.34	178.357	192.208	183.876	185.229	183.020
0.35	176.988	192.215	183.006	184.232	181.913
0.36	175.495	192.062	182.057	182.944	180.681
0.37	173.896	191.753	180.996	181.379	179.335
0.38	172.210	191.296	179.775	179.587	177.892
0.39	170.452	190.701	178.337	177.636	176.373
0.40	168.630	189.972	176.651	175.612	174.805
0.41	166.755	189.106	174.718	173.598	173.217
0.42	164.858	188.093	172.571	171.644	171.644
0.43	162.980	186.923	170.277	169.779	170.126
0.44	161.162	185.594	167.939	168.028	168.706

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	159.444	184.107	165.653	166.398	167.406
0.46	157.859	182.461	163.483	164.877	166.224
0.47	156.430	180.653	161.451	163.435	165.150
0.48	155.170	178.674	159.574	162.045	164.168
0.49	154.078	176.525	157.879	160.690	163.258
0.50	153.143	174.221	156.375	159.369	162.399
0.51	152.348	171.796	155.067	158.101	161.572
0.52	151.679	169.291	153.973	156.926	160.758
0.53	151.126	166.756	153.120	155.874	159.942
0.54	150.687	164.248	152.535	154.952	159.115
0.55	150.368	161.828	152.247	154.147	158.267
0.56	150.183	159.549	152.237	153.451	157.404
0.57	150.141	157.455	152.403	152.882	156.541
0.58	150.252	155.578	152.634	152.438	155.701
0.59	150.515	153.935	152.858	152.082	154.906
0.60	150.922	152.529	153.051	151.783	154.174
0.61	151.457	151.357	153.231	151.529	153.523
0.62	152.101	150.410	153.461	151.331	152.968
0.63	152.826	149.678	153.800	151.213	152.522
0.64	153.596	149.150	154.280	151.190	152.197
0.65	154.372	148.813	154.902	151.262	151.996
0.66	155.122	148.655	155.644	151.409	151.915
0.67	155.829	148.669	156.461	151.601	151.937
0.68	156.489	148.849	157.291	151.815	152.044
0.69	157.107	149.187	158.072	152.051	152.212
0.70	157.693	149.674	158.757	152.324	152.413
0.71	158.258	150.295	159.319	152.661	152.620
0.72	158.810	151.025	159.748	153.080	152.812
0.73	159.357	151.831	160.050	153.570	152.981
0.74	*	152.671	160.251	*	153.132
0.75	*	153.503	160.383	*	*
0.76	*	154.285	160.480	*	*
0.77	*	154.987	*	*	*
0.78	*	155.589	*	*	*
0.79	*	156.085	*	*	*
0.80	*	156.480	*	*	*
0.81	*	156.788	*	*	*
0.82	*	157.032	*	*	*
0.83	*	157.234	*	*	*
0.84	*	157.418	*	*	*
0.85	*	157.597	*	*	*
0.86	*	157.773	*	*	*
0.87	*	157.945	*	*	*
0.88	*	158.110	*	*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

TIME	RIGHT HIP RANGE OF MOTION BRACED				
	6	7	8	9	10
0.00	158.022	151.511	152.035	156.494	154.646
0.01	157.596	151.916	151.657	156.053	154.853
0.02	157.171	152.361	151.324	155.646	155.125
0.03	156.771	152.883	151.083	155.297	155.505
0.04	156.434	153.526	150.983	155.035	156.026
0.05	156.208	154.323	151.070	154.885	156.714
0.06	156.140	155.296	151.381	154.873	157.583
0.07	156.267	156.445	151.938	155.017	158.637
0.08	156.618	157.762	152.756	155.330	159.876
0.09	157.215	159.234	153.841	155.825	161.301
0.10	158.071	160.844	155.192	156.513	162.916
0.11	159.181	162.574	156.799	157.406	164.712
0.12	160.520	164.405	158.643	158.518	166.674
0.13	162.059	166.319	160.702	159.859	168.777
0.14	163.773	168.288	162.945	161.428	170.993
0.15	165.639	170.283	165.334	163.219	173.287
0.16	167.641	172.264	167.817	165.216	175.621
0.17	169.771	174.184	170.339	167.390	177.953
0.18	172.027	175.997	172.847	169.695	180.231
0.19	174.400	177.666	175.296	172.067	182.392
0.20	176.868	179.164	177.648	174.425	184.373
0.21	179.395	180.472	179.871	176.687	186.123
0.22	181.929	181.575	181.935	178.782	187.608
0.23	184.411	182.461	183.820	180.658	188.814
0.24	186.779	183.127	185.505	182.284	189.736
0.25	188.969	183.577	186.978	183.648	190.384
0.26	190.919	183.825	188.228	184.755	190.773
0.27	192.578	183.891	189.246	185.625	190.912
0.28	193.919	183.797	190.019	186.284	190.814
0.29	194.942	183.552	190.537	186.760	190.491
0.30	195.661	183.160	190.787	187.077	189.953
0.31	196.098	182.623	190.764	187.249	189.211
0.32	196.276	181.948	190.465	187.277	188.278
0.33	196.224	181.147	189.892	187.154	187.177
0.34	195.967	180.241	189.052	186.863	185.938
0.35	195.530	179.255	187.957	186.390	184.598
0.36	194.928	178.215	186.624	185.729	183.192
0.37	194.163	177.148	185.075	184.882	181.740
0.38	193.229	176.069	183.342	183.849	180.250
0.39	192.115	174.985	181.462	182.625	178.726
0.40	190.819	173.893	179.480	181.200	177.174
0.41	189.348	172.787	177.440	179.573	175.605
0.42	187.722	171.665	175.384	177.759	174.026
0.43	185.981	170.527	173.344	175.799	172.439
0.44	184.170	169.374	171.348	173.750	170.834

TABLE 7 CONTINUED

RIGHT HIP RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	182.321	168.216	169.410	171.680	169.207
0.46	180.458	167.075	167.533	169.651	167.570
0.47	178.592	165.975	165.713	167.723	165.948
0.48	176.732	164.934	163.943	165.932	164.366
0.49	174.883	163.961	162.216	164.288	162.843
0.50	173.056	163.056	160.530	162.785	161.393
0.51	171.270	162.220	158.885	161.409	160.029
0.52	169.542	161.451	157.278	160.147	158.763
0.53	167.886	160.739	155.704	158.992	157.615
0.54	166.304	160.074	154.156	157.943	156.614
0.55	164.795	159.450	152.633	157.003	155.795
0.56	163.355	158.873	151.143	156.185	155.196
0.57	161.983	158.360	149.703	155.507	154.839
0.58	160.697	157.931	148.335	154.986	154.730
0.59	159.525	157.603	147.063	154.641	154.852
0.60	158.498	157.388	145.915	154.491	155.179
0.61	157.637	157.290	144.914	154.551	155.672
0.62	156.963	157.300	144.080	154.815	156.292
0.63	156.486	157.404	143.432	155.262	157.000
0.64	156.216	157.588	142.978	155.860	157.763
0.65	156.159	157.832	142.725	156.571	158.550
0.66	156.317	158.112	142.669	157.355	159.338
0.67	156.677	158.399	142.800	158.171	160.109
0.68	157.209	158.666	143.102	158.987	160.860
0.69	157.874	158.898	143.551	159.779	161.596
0.70	158.623	159.088	144.117	160.532	162.326
0.71	159.410	159.236	144.768	161.233	163.054
0.72	160.197	159.354	145.474	161.874	163.781
0.73	160.950	159.454	146.207	162.455	164.502
0.74	161.642	159.546	146.947	162.984	165.216
0.75	162.253	*	147.679	163.478	165.921
0.76	162.766	*	148.394	163.949	166.619
0.77	163.178	*	149.087	*	*
0.78	163.495	*	149.760	*	*
0.79	163.736	*	*	*	*
0.80	163.928	*	*	*	*
0.81	164.095	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	178.295	180.032	184.045	179.422	175.701
0.01	176.861	178.356	182.199	177.910	173.627
0.02	175.401	176.680	180.238	176.353	171.521
0.03	173.921	175.010	178.140	174.750	169.390
0.04	172.449	173.358	175.940	173.102	167.248
0.05	171.009	171.737	173.744	171.415	165.120
0.06	169.589	170.159	171.644	169.703	163.046
0.07	168.106	168.629	169.614	167.996	161.078
0.08	166.485	167.152	167.554	166.329	159.284
0.09	164.723	165.737	165.351	164.739	157.731
0.10	162.905	164.396	162.925	163.259	156.474
0.11	161.152	163.146	160.259	161.918	155.549
0.12	159.553	162.000	157.433	160.739	154.954
0.13	158.175	160.975	154.655	159.738	154.655
0.14	157.066	160.085	152.223	158.924	154.588
0.15	156.257	159.345	150.418	158.293	154.673
0.16	155.708	158.761	149.366	157.836	154.832
0.17	155.259	158.333	148.952	157.540	155.004
0.18	154.671	158.043	148.959	157.389	155.151
0.19	153.778	157.872	149.192	157.367	155.259
0.20	152.680	157.807	149.517	157.464	155.331
0.21	151.647	157.851	149.897	157.678	155.378
0.22	150.864	158.008	150.397	158.003	155.420
0.23	150.375	158.283	151.077	158.428	155.483
0.24	150.120	158.678	151.923	158.929	155.592
0.25	150.029	159.187	152.887	159.473	155.768
0.26	150.045	159.789	153.877	160.016	156.023
0.27	150.115	160.453	154.746	160.520	156.349
0.28	150.210	161.141	155.384	160.954	156.713
0.29	150.344	161.819	155.763	161.302	157.064
0.30	150.559	162.460	155.902	161.559	157.342
0.31	150.900	163.040	155.847	161.727	157.499
0.32	151.365	163.542	155.673	161.813	157.518
0.33	151.913	163.946	155.457	161.820	157.399
0.34	152.483	164.232	155.252	161.752	157.156
0.35	153.023	164.377	155.056	161.612	156.810
0.36	153.469	164.361	154.849	161.405	156.380
0.37	153.710	164.178	154.654	161.139	155.872
0.38	153.633	163.823	154.563	160.818	155.280
0.39	153.185	163.292	154.718	160.448	154.604
0.40	152.401	162.586	155.255	160.047	153.857
0.41	151.421	161.720	156.268	159.641	153.067
0.42	150.472	160.721	157.786	159.266	152.282
0.43	149.771	159.633	159.765	158.962	151.562
0.44	149.438	158.507	162.070	158.770	150.971

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION NONBRACED

TIME	1	2	3	4	5
0.45	149.469	157.399	164.497	158.736	150.573
0.46	149.803	156.364	166.789	158.900	150.416
0.47	150.402	155.455	168.686	159.288	150.520
0.48	151.234	154.713	170.013	159.915	150.892
0.49	152.284	154.171	170.764	160.782	151.529
0.50	153.601	153.855	171.134	161.880	152.424
0.51	155.256	153.791	171.421	163.187	153.567
0.52	157.249	153.999	171.912	164.670	154.947
0.53	159.520	154.494	172.856	166.292	156.541
0.54	161.669	155.283	174.426	168.013	158.309
0.55	164.469	156.369	176.633	169.791	160.197
0.56	166.895	157.749	179.317	171.582	162.134
0.57	169.181	159.401	182.196	173.338	164.036
0.58	171.312	161.289	184.981	175.020	165.817
0.59	173.288	163.358	187.459	176.594	167.403
0.60	175.076	165.548	189.509	178.041	168.758
0.61	176.613	167.804	191.086	179.351	169.877
0.62	177.840	170.094	192.198	180.512	170.775
0.63	178.719	172.389	192.846	181.523	171.487
0.64	179.242	174.652	192.994	182.384	172.065
0.65	179.447	176.844	192.605	183.105	172.586
0.66	179.438	178.929	191.713	183.692	173.130
0.67	179.380	180.874	190.477	184.151	173.757
0.68	179.441	182.647	189.102	184.489	174.493
0.69	179.726	184.232	187.752	184.714	175.328
0.70	180.233	185.621	186.530	184.836	176.237
0.71	180.849	186.811	185.491	184.870	177.196
0.72	181.403	187.798	184.673	184.835	178.186
0.73	181.755	188.575	184.057	184.746	179.200
0.74	181.830	189.139	183.570	184.623	180.234
0.75	181.578	189.491	183.127	184.478	*
0.76	180.980	189.637	182.679	184.324	*
0.77	180.091	189.590	*	*	*
0.78	179.020	189.362	*	*	*
0.79	*	188.962	*	*	*
0.80	*	188.402	*	*	*
0.81	*	187.696	*	*	*
0.82	*	186.857	*	*	*
0.83	*	185.901	*	*	*
0.84	*	184.845	*	*	*
0.85	*	183.706	*	*	*
0.86	*	182.509	*	*	*
0.87	*	181.275	*	*	*
0.88	*	180.026	*	*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.00	177.136	174.723	189.103	174.181	178.798
0.01	176.230	173.781	187.678	172.510	176.409
0.02	175.321	172.783	186.219	170.838	174.023
0.03	174.408	171.703	184.728	169.181	171.665
0.04	173.476	170.521	183.212	167.554	169.358
0.05	172.491	169.232	181.675	165.967	167.119
0.06	171.424	167.854	180.127	164.429	164.961
0.07	170.266	166.415	178.579	162.947	162.903
0.08	169.028	164.941	177.048	161.526	160.980
0.09	167.737	163.451	175.545	160.170	159.233
0.10	166.437	161.967	174.083	158.889	157.683
0.11	165.165	160.516	172.669	157.696	156.328
0.12	163.927	159.131	171.313	156.609	155.147
0.13	162.720	157.848	170.027	155.639	154.136
0.14	161.551	156.709	168.827	154.795	153.323
0.15	160.431	155.751	167.732	154.085	152.748
0.16	159.371	154.995	166.755	153.513	152.434
0.17	158.380	154.442	165.908	153.085	152.378
0.18	157.483	154.078	165.197	152.805	152.558
0.19	156.725	153.874	164.625	152.675	152.953
0.20	156.138	153.803	164.190	152.689	153.549
0.21	155.741	153.851	163.888	152.836	154.341
0.22	155.541	154.024	163.716	153.104	155.316
0.23	155.530	154.334	163.668	153.478	156.442
0.24	155.683	154.787	163.742	153.943	157.669
0.25	155.973	155.369	163.931	154.480	158.933
0.26	156.384	156.048	164.225	155.067	160.175
0.27	156.924	156.780	164.607	155.681	161.356
0.28	157.598	157.520	165.054	156.298	162.454
0.29	158.383	158.229	165.536	156.894	163.460
0.30	159.209	158.870	166.021	157.447	164.366
0.31	159.970	159.404	166.477	157.937	165.168
0.32	160.551	159.793	166.870	158.346	165.861
0.33	160.855	160.005	167.174	158.663	166.444
0.34	160.840	160.017	167.366	158.879	166.919
0.35	160.527	159.837	167.433	158.992	167.285
0.36	159.995	159.486	167.364	159.002	167.538
0.37	159.348	158.986	167.161	158.913	167.665
0.38	158.693	158.354	166.832	158.736	167.640
0.39	158.123	157.616	166.393	158.479	167.421
0.40	157.699	156.808	165.870	158.155	166.960
0.41	157.453	155.982	165.300	157.778	166.232
0.42	157.391	155.197	164.726	157.365	165.279
0.43	157.505	154.511	164.193	156.934	164.196
0.44	157.779	153.973	163.747	156.508	163.110

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	158.195	153.610	163.429	156.111	162.143
0.46	158.739	153.429	163.269	155.773	161.386
0.47	159.397	153.430	163.280	155.520	160.869
0.48	160.162	153.622	163.465	155.374	160.581
0.49	161.026	154.027	163.817	155.353	160.486
0.50	161.993	154.681	164.328	155.467	160.555
0.51	163.073	155.609	164.687	155.723	160.790
0.52	164.282	156.817	165.789	156.127	161.223
0.53	165.637	158.281	166.733	156.686	161.886
0.54	167.143	159.959	167.821	157.403	162.786
0.55	168.774	161.809	169.051	158.277	163.896
0.56	170.473	163.801	170.427	159.304	165.165
0.57	172.169	165.910	171.945	160.476	166.534
0.58	173.798	168.106	173.599	161.778	167.957
0.59	175.317	170.344	175.377	163.188	169.418
0.60	176.707	172.561	177.259	164.682	170.930
0.61	177.963	174.684	179.222	166.233	172.517
0.62	179.080	176.644	181.231	167.812	174.189
0.63	180.041	178.383	183.248	169.390	175.931
0.64	180.822	179.872	185.227	170.929	177.699
0.65	181.404	181.109	187.121	172.400	179.431
0.66	181.785	182.112	188.880	173.776	181.052
0.67	181.973	182.917	190.464	175.035	182.468
0.68	181.992	183.571	191.844	176.162	183.554
0.69	181.875	184.130	193.007	177.148	184.174
0.70	181.663	184.653	193.952	177.986	184.263
0.71	181.401	185.186	194.689	178.676	183.875
0.72	181.122	185.747	195.230	179.223	183.171
0.73	180.840	186.335	195.599	179.636	182.333
0.74	180.554	186.945	195.828	179.926	181.493
0.75	180.261	187.568	195.953	180.106	180.721
0.76	179.962	188.194	196.016	180.192	180.031
0.77	179.657	*	196.048	180.206	179.409
0.78	179.347	*	196.070	180.167	178.823
0.79	179.031	*	*	180.094	178.248
0.80	*	*	*	180.002	*
0.81	*	*	*	179.903	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT CYCLE

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	175.506	183.633	183.103	177.784	172.071
0.01	173.560	181.929	182.319	176.618	170.328
0.02	171.595	180.167	181.502	175.429	168.559
0.03	169.617	178.351	180.644	174.219	166.764
0.04	167.638	176.490	179.735	172.994	164.951
0.05	165.672	174.595	178.765	171.764	163.137
0.06	163.733	172.680	177.724	170.541	161.344
0.07	161.838	170.757	176.590	169.340	159.602
0.08	160.008	168.836	175.344	168.170	157.944
0.09	158.262	166.932	173.972	167.038	156.406
0.10	156.618	165.065	172.475	165.950	155.020
0.11	155.089	163.259	170.870	164.919	153.814
0.12	153.684	161.536	169.194	163.962	152.808
0.13	152.417	159.921	167.498	163.097	152.018
0.14	151.302	158.444	165.854	162.335	151.452
0.15	150.349	157.131	164.348	161.682	151.115
0.16	149.563	156.007	163.066	161.144	151.005
0.17	148.941	155.087	162.073	160.721	151.119
0.18	148.474	154.381	161.416	160.413	151.452
0.19	148.148	153.897	161.116	160.217	151.992
0.20	147.952	153.638	161.168	160.125	152.712
0.21	147.875	153.604	161.537	160.122	153.577
0.22	147.900	153.788	162.163	160.189	154.537
0.23	148.008	154.180	162.968	160.307	155.537
0.24	148.175	154.762	163.868	160.459	156.517
0.25	148.378	155.511	164.781	160.630	157.419
0.26	148.592	156.405	165.645	160.800	158.193
0.27	148.787	157.426	166.418	160.955	158.802
0.28	148.937	158.556	167.065	161.079	159.224
0.29	149.022	159.771	167.553	161.159	159.454
0.30	149.036	161.045	167.844	161.187	159.495
0.31	148.983	162.347	167.903	161.158	159.355
0.32	148.876	163.647	167.700	161.069	159.051
0.33	148.731	164.910	167.215	160.920	158.604
0.34	148.571	166.095	166.443	160.717	158.045
0.35	148.428	167.162	165.402	160.469	157.411
0.36	148.340	168.075	164.146	160.190	156.744
0.37	148.357	168.805	162.758	159.903	156.085
0.38	148.529	169.334	161.340	159.633	155.469
0.39	148.899	169.656	160.002	159.410	154.922
0.40	149.497	169.773	158.848	159.265	154.463
0.41	150.337	169.688	157.973	159.226	154.098
0.42	151.419	169.404	157.453	159.318	153.832
0.43	152.728	168.933	157.344	159.563	153.674
0.44	154.236	168.299	157.669	159.979	153.633

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	155.913	167.549	158.415	160.575	153.726
0.46	157.730	166.735	159.541	161.349	153.977
0.47	159.661	165.912	160.973	162.294	154.413
0.48	161.684	165.124	162.628	163.391	155.059
0.49	163.777	164.409	164.435	164.620	155.930
0.50	165.913	163.789	166.350	165.962	157.024
0.51	168.066	163.276	168.348	167.396	158.325
0.52	170.204	162.870	170.388	168.898	159.805
0.53	172.292	162.571	172.434	170.438	161.423
0.54	174.292	162.378	174.449	171.987	163.134
0.55	176.161	162.292	176.399	173.513	164.892
0.56	177.858	162.324	178.240	174.984	166.656
0.57	179.348	162.496	179.930	176.374	168.387
0.58	180.611	162.835	181.438	177.660	170.053
0.59	181.638	163.365	182.750	178.830	171.633
0.60	182.429	164.100	183.867	179.871	173.111
0.61	182.990	165.046	184.800	180.778	174.479
0.62	183.333	166.195	185.552	181.542	175.733
0.63	183.466	167.527	186.124	182.163	176.875
0.64	183.399	169.007	186.513	182.637	177.905
0.65	183.142	170.583	186.726	182.968	178.823
0.66	182.706	172.200	186.780	183.163	179.629
0.67	182.102	173.819	186.702	183.232	180.332
0.68	181.344	175.405	186.519	183.190	180.946
0.69	180.449	176.926	186.259	183.053	181.486
0.70	179.436	178.353	185.946	182.837	181.967
0.71	178.329	179.665	185.599	182.560	182.403
0.72	177.152	180.853	185.228	182.240	182.800
0.73	175.934	181.908	184.841	181.899	183.169
0.74	*	182.819	184.440	*	183.517
0.75	*	183.570	184.032	*	*
0.76	*	184.143	183.621	*	*
0.77	*	184.529	*	*	*
0.78	*	184.733	*	*	*
0.79	*	184.772	*	*	*
0.80	*	184.667	*	*	*
0.81	*	184.444	*	*	*
0.82	*	184.128	*	*	*
0.83	*	183.744	*	*	*
0.84	*	183.310	*	*	*
0.85	*	182.843	*	*	*
0.86	*	182.356	*	*	*
0.87	*	181.863	*	*	*
0.88	*	181.373	*	*	*

* END OF SUBJECT'S GAIT

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.00	182.573	174.619	185.357	173.876	180.544
0.01	181.760	172.900	183.983	172.06	179.130
0.02	180.910	171.177	182.581	170.217	177.668
0.03	180.003	169.473	181.154	168.361	176.136
0.04	179.019	167.800	179.707	166.508	174.513
0.05	177.944	166.162	178.249	164.671	172.779
0.06	176.772	164.560	176.788	162.865	170.919
0.07	175.503	163.003	175.330	161.107	168.932
0.08	174.143	161.506	173.880	159.417	166.847
0.09	172.704	160.086	172.444	157.815	164.716
0.10	171.199	158.753	171.038	156.329	162.602
0.11	169.652	157.503	169.683	154.988	160.564
0.12	168.097	156.323	168.408	153.823	158.648
0.13	166.576	155.205	167.243	152.866	156.893
0.14	165.123	154.155	166.207	152.138	155.325
0.15	163.760	153.194	165.310	151.649	153.975
0.16	162.500	152.355	164.551	151.395	152.873
0.17	161.352	151.669	163.924	151.369	152.049
0.18	160.323	151.160	163.430	151.553	151.534
0.19	159.422	150.846	163.075	151.919	151.355
0.20	158.651	150.730	162.874	152.437	151.531
0.21	158.012	150.810	162.836	153.08	152.068
0.22	157.507	151.075	162.963	153.831	152.956
0.23	157.136	151.514	163.240	154.675	154.159
0.24	156.892	152.110	163.641	155.593	155.608
0.25	156.764	152.834	164.144	156.558	157.226
0.26	156.734	153.656	164.729	157.533	158.941
0.27	156.782	154.549	165.382	158.48	160.969
0.28	156.884	155.484	166.081	159.36	162.446
0.29	157.015	156.430	166.798	160.139	164.150
0.30	157.152	157.345	167.491	160.79	165.767
0.31	157.273	158.179	168.109	161.288	167.250
0.32	157.358	158.867	168.604	161.612	168.557
0.33	157.391	159.348	168.932	161.746	169.649
0.34	157.357	159.575	169.062	161.687	170.493
0.35	157.244	159.513	168.977	161.443	171.053
0.36	157.044	159.155	168.677	161.03	171.302
0.37	156.757	158.518	168.178	160.464	171.225
0.38	156.388	157.658	167.507	159.764	170.822
0.39	155.947	156.661	166.700	158.957	170.114
0.40	155.444	155.620	165.794	158.082	169.140
0.41	154.894	154.624	164.830	157.185	167.956
0.42	154.325	153.763	163.852	156.31	166.626
0.43	153.767	153.113	162.899	155.505	165.220
0.44	153.259	152.728	162.012	154.813	163.813

TABLE 7 CONTINUED

LEFT HIP RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	152.842	152.639	161.224	154.261	162.493
0.46	152.555	152.849	160.564	153.866	161.355
0.47	152.434	153.345	160.058	153.628	160.500
0.48	152.504	154.105	159.724	153.549	160.008
0.49	152.782	155.108	159.566	153.636	159.932
0.50	153.278	156.341	159.589	153.895	160.295
0.51	153.995	157.799	159.793	154.329	161.087
0.52	154.928	159.489	160.182	154.926	162.258
0.53	156.072	161.405	160.761	155.673	163.752
0.54	157.421	163.517	161.530	156.558	165.516
0.55	158.960	165.772	162.483	157.574	167.481
0.56	160.669	168.094	163.615	158.718	169.569
0.57	162.520	170.404	164.915	159.982	171.712
0.58	164.480	172.630	166.375	161.349	173.848
0.59	166.513	174.728	167.981	162.79	175.922
0.60	168.574	176.687	169.718	164.266	177.889
0.61	170.616	178.523	171.565	165.734	179.713
0.62	172.592	180.253	173.495	167.16	181.364
0.63	174.464	181.892	175.473	168.513	182.814
0.64	176.205	183.443	177.461	169.768	184.035
0.65	177.791	184.892	179.411	170.904	184.998
0.66	179.205	186.201	181.279	171.905	185.694
0.67	180.433	187.322	183.022	172.76	186.149
0.68	181.472	188.211	184.604	173.465	186.401
0.69	182.323	188.839	185.996	174.026	186.484
0.70	182.995	189.207	187.180	174.456	186.432
0.71	183.497	189.339	188.149	174.769	186.274
0.72	183.845	189.272	188.911	174.975	186.038
0.73	184.053	189.060	189.482	175.086	185.756
0.74	184.128	188.772	189.891	175.119	185.458
0.75	184.082	*	190.172	175.094	185.166
0.76	183.934	*	190.360	175.031	184.887
0.77	183.710	*	190.488	*	*
0.78	183.437	*	190.586	*	*
0.79	183.136	*	*	*	*
0.80	182.824	*	*	*	*
0.81	182.509	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

APPENDIX X TABLE 8 ANKLE RANGE OF MOTION - RAW DATA

RIGHT ANKLE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	112.020	101.875	103.884	123.480	107.503
0.01	110.805	100.859	101.024	120.180	107.235
0.02	109.567	99.907	98.237	116.939	106.848
0.03	108.193	99.060	95.674	113.870	106.303
0.04	106.610	98.321	93.549	111.104	105.604
0.05	104.853	97.642	92.045	108.711	104.698
0.06	103.039	96.963	91.263	106.704	103.494
0.07	101.279	96.273	91.212	105.070	101.963
0.08	99.659	95.613	91.832	103.785	100.161
0.09	98.239	95.058	93.035	102.826	98.238
0.10	97.048	94.726	94.780	102.171	96.418
0.11	96.130	94.750	97.102	101.828	94.908
0.12	95.588	95.233	100.103	101.851	93.817
0.13	95.553	96.242	103.868	102.332	93.228
0.14	96.167	97.807	108.405	103.342	93.274
0.15	97.606	99.953	113.633	104.872	94.145
0.16	100.005	102.708	119.386	106.855	96.057
0.17	103.348	106.091	125.397	109.237	99.205
0.18	107.514	110.066	131.241	111.973	103.760
0.19	112.310	114.514	136.385	115.018	109.770
0.20	117.446	119.267	140.399	118.313	116.925
0.21	122.567	124.117	143.033	121.802	124.498
0.22	127.349	128.823	144.222	125.444	131.653
0.23	131.576	133.168	144.093	129.194	137.781
0.24	135.162	136.992	142.964	132.980	142.656
0.25	138.110	140.191	141.287	136.699	146.325
0.26	140.425	142.718	139.517	140.237	148.940
0.27	142.043	144.582	137.993	143.492	150.635
0.28	142.832	145.782	136.920	146.391	151.470
0.29	142.701	146.296	136.389	148.865	151.459
0.30	141.742	146.127	136.394	150.807	150.640
0.31	140.193	145.349	136.839	152.112	149.141
0.32	138.317	144.107	137.542	152.731	147.203
0.33	136.372	142.573	138.246	152.678	145.053
0.34	134.563	140.910	138.746	152.011	142.882
0.35	132.985	139.286	139.022	150.835	140.939
0.36	131.651	137.859	139.166	149.277	139.506
0.37	130.549	136.762	139.246	147.455	138.792
0.38	129.666	136.070	139.279	145.474	138.829
0.39	128.997	135.773	139.236	143.427	139.446
0.40	128.562	135.776	139.045	141.384	140.322
0.41	128.432	135.964	138.645	139.389	141.146
0.42	128.723	136.270	138.023	137.451	141.750
0.43	129.467	136.647	137.205	135.561	142.072
0.44	130.531	137.042	136.249	133.699	142.113

TABLE 8 CONTINUED

TIME	RIGHT ANKLE RANGE OF MOTION NONBRACED				
	1	2	3	4	5
0.45	131.650	137.390	135.251	131.849	141.948
0.46	132.534	137.638	134.327	129.990	141.699
0.47	132.969	137.771	133.577	128.128	141.488
0.48	132.854	137.783	133.088	126.210	141.343
0.49	132.194	137.656	132.911	124.194	141.147
0.50	131.036	137.368	133.008	122.027	140.654
0.51	129.414	136.893	133.205	119.689	139.537
0.52	127.297	136.201	133.195	117.212	137.494
0.53	124.681	135.266	132.612	114.647	134.390
0.54	121.656	134.082	131.135	112.041	130.390
0.55	118.407	132.655	128.593	109.455	125.917
0.56	115.165	130.981	125.111	106.999	121.540
0.57	112.114	129.010	121.183	104.845	117.772
0.58	109.342	126.659	117.513	103.195	114.806
0.59	106.895	123.856	114.649	102.220	112.549
0.60	104.892	120.575	112.684	101.986	110.880
0.61	103.498	116.884	111.486	102.432	109.725
0.62	102.825	112.939	111.037	103.400	108.994
0.63	102.891	108.990	111.362	104.702	108.613
0.64	103.595	105.369	112.369	106.172	108.564
0.65	104.701	102.421	113.764	107.689	108.896
0.66	105.969	100.369	115.153	109.169	109.649
0.67	107.306	99.224	116.214	110.554	110.802
0.68	108.708	98.841	116.776	111.802	112.276
0.69	110.146	99.041	116.824	112.886	113.977
0.70	111.488	99.664	116.469	113.795	115.855
0.71	112.571	100.562	115.864	114.545	117.907
0.72	113.321	101.573	115.125	115.181	120.148
0.73	113.721	102.538	114.299	115.763	122.598
0.74	113.765	103.333	113.375	116.338	125.281
0.75	113.448	103.907	112.321	116.926	*
0.76	112.791	104.272	111.135	117.528	*
0.77	111.870	104.490	*	*	*
0.78	110.803	104.631	*	*	*
0.79	*	104.757	*	*	*
0.80	*	104.927	*	*	*
0.81	*	105.208	*	*	*
0.82	*	105.679	*	*	*
0.83	*	106.444	*	*	*
0.84	*	107.625	*	*	*
0.85	*	109.321	*	*	*
0.86	*	111.592	*	*	*
0.87	*	114.464	*	*	*
0.88	*	117.917	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

TIME	RIGHT ANKLE RANGE OF MOTION NONBRACED				
	6	7	8	9	10
0.00	120.302	112.481	114.279	112.810	111.801
0.01	118.090	109.762	112.924	111.878	110.122
0.02	116.150	107.214	111.539	111.014	108.499
0.03	114.584	104.990	110.148	110.234	106.918
0.04	113.407	103.222	108.791	109.523	105.356
0.05	112.632	101.971	107.503	108.853	103.810
0.06	112.274	101.210	106.306	108.192	102.317
0.07	112.304	100.838	105.210	107.509	100.934
0.08	112.594	100.738	104.238	106.775	99.729
0.09	112.941	100.821	103.439	105.977	98.767
0.10	113.167	101.024	102.887	105.122	98.112
0.11	113.232	101.309	102.659	104.228	97.799
0.12	113.295	101.671	102.818	103.338	97.803
0.13	113.608	102.159	103.400	102.514	98.075
0.14	114.413	102.861	104.417	101.827	98.582
0.15	115.879	103.856	105.858	101.320	99.334
0.16	118.119	105.198	107.706	101.010	100.372
0.17	121.221	106.924	109.957	100.910	101.742
0.18	125.223	109.075	112.602	101.048	103.479
0.19	130.020	111.725	115.603	101.481	105.596
0.20	135.270	114.977	118.911	102.279	108.077
0.21	140.507	118.901	122.450	103.496	110.885
0.22	145.361	123.434	126.095	105.136	113.957
0.23	149.548	128.370	129.701	107.152	117.172
0.24	152.873	133.362	133.129	109.481	120.325
0.25	155.279	137.946	136.242	112.086	123.167
0.26	156.842	141.625	138.919	114.939	125.494
0.27	157.702	144.023	141.076	117.959	127.249
0.28	157.968	144.993	142.679	121.047	128.504
0.29	157.699	144.646	143.751	124.114	129.398
0.30	156.973	143.281	144.369	127.062	130.091
0.31	155.963	141.314	144.641	129.800	130.727
0.32	154.964	139.210	144.691	132.281	131.405
0.33	154.285	137.406	144.631	134.495	132.133
0.34	154.112	136.241	144.548	136.442	132.844
0.35	154.416	135.892	144.476	138.098	133.455
0.36	154.986	136.358	144.431	139.420	133.882
0.37	155.539	137.477	144.440	140.389	134.044
0.38	155.863	138.984	144.495	141.004	133.897
0.39	155.903	140.586	144.532	141.273	133.444
0.40	155.757	142.030	144.472	141.214	132.723
0.41	155.570	143.149	144.248	140.850	131.794
0.42	155.430	143.866	143.828	140.207	130.727
0.43	155.355	144.185	143.222	139.296	129.609
0.44	155.314	144.165	142.474	138.123	128.519

TABLE 8 CONTINUED

RIGHT ANKLE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	155.257	143.901	141.654	136.729	127.498
0.46	155.124	143.512	140.821	135.174	126.554
0.47	154.841	143.129	140.001	133.501	125.686
0.48	154.354	142.855	139.181	131.713	124.918
0.49	153.645	142.730	138.323	129.766	124.299
0.50	152.754	142.703	137.386	127.571	123.855
0.51	151.770	142.636	136.344	125.036	123.554
0.52	150.823	142.325	135.187	122.123	123.308
0.53	150.075	141.562	133.897	118.847	122.995
0.54	149.652	140.224	132.444	115.287	122.514
0.55	149.504	138.355	130.810	111.633	121.812
0.56	149.378	136.162	129.016	108.178	120.888
0.57	148.928	133.910	127.128	105.251	119.749
0.58	147.817	131.873	125.227	103.079	118.423
0.59	145.888	130.273	123.396	101.717	116.964
0.60	143.343	129.218	121.711	101.049	115.454
0.61	140.611	128.690	120.230	100.881	114.006
0.62	138.008	128.558	118.981	101.014	112.751
0.63	135.741	128.625	117.967	101.262	111.787
0.64	133.976	128.676	117.175	101.496	111.131
0.65	132.798	128.520	116.585	101.711	110.718
0.66	132.190	128.015	116.171	101.995	110.462
0.67	132.042	127.077	115.891	102.446	110.320
0.68	132.251	125.706	115.695	103.134	110.255
0.69	132.757	123.996	115.535	104.072	110.216
0.70	133.486	122.109	115.382	105.195	110.140
0.71	134.259	120.222	115.220	106.389	109.969
0.72	134.749	118.465	115.033	107.543	109.662
0.73	134.626	116.891	114.803	108.562	109.214
0.74	133.677	115.489	114.516	109.377	108.657
0.75	131.836	114.223	114.160	109.960	108.034
0.76	129.127	113.059	113.734	110.315	107.375
0.77	125.640	*	113.243	110.455	106.690
0.78	121.625	*	112.696	110.395	105.988
0.79	117.442	*	*	110.163	105.288
0.80	*	*	*	109.806	*
0.81	*	*	*	109.382	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

RIGHT ANKLE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	95.955	114.157	102.934	118.794	116.466
0.01	95.357	112.546	101.644	115.771	115.314
0.02	94.824	110.832	100.498	112.744	114.067
0.03	94.427	108.994	99.519	109.767	112.600
0.04	94.226	107.055	98.700	106.930	110.764
0.05	94.277	105.090	97.985	104.326	108.498
0.06	94.640	103.208	97.335	101.995	105.869
0.07	95.378	101.521	96.794	99.879	103.064
0.08	96.532	100.101	96.470	97.908	100.365
0.09	98.110	98.967	96.500	96.066	98.078
0.10	100.097	98.120	97.053	94.402	96.434
0.11	102.472	97.581	98.308	93.010	95.534
0.12	105.217	97.414	100.426	92.008	95.364
0.13	108.288	97.684	103.508	91.511	95.873
0.14	111.596	98.426	107.579	91.612	97.048
0.15	115.003	99.668	112.562	92.375	98.952
0.16	118.383	101.452	118.271	93.821	101.690
0.17	121.666	103.829	124.428	95.919	105.341
0.18	124.802	106.790	130.677	98.619	109.899
0.19	127.741	110.246	136.626	101.860	115.220
0.20	130.453	114.087	141.898	105.541	120.982
0.21	132.923	118.202	146.191	109.498	126.702
0.22	135.110	122.462	149.345	113.519	131.889
0.23	136.959	126.711	151.337	117.423	136.248
0.24	138.428	130.766	152.242	121.128	139.755
0.25	139.525	134.445	152.169	124.654	142.557
0.26	140.300	137.631	151.240	128.060	144.791
0.27	140.827	140.316	149.604	131.372	146.440
0.28	141.190	142.555	147.492	134.549	147.415
0.29	141.455	144.405	145.223	137.505	147.667
0.30	141.634	145.876	143.146	140.178	147.267
0.31	141.691	146.935	141.570	142.543	146.307
0.32	141.579	147.536	140.697	144.598	144.785
0.33	141.277	147.657	140.570	146.315	142.753
0.34	140.798	147.323	141.064	147.620	140.416
0.35	140.150	146.599	141.937	148.424	138.097
0.36	139.331	145.575	142.912	148.675	136.186
0.37	138.349	144.334	143.783	148.396	135.071
0.38	137.207	142.933	144.436	147.653	134.968
0.39	135.917	141.410	144.832	146.533	135.800
0.40	134.509	139.821	144.966	145.148	137.220
0.41	133.018	138.257	144.858	143.607	138.816
0.42	131.462	136.830	144.547	141.981	140.317
0.43	129.850	135.658	144.074	140.316	141.578
0.44	128.185	134.830	143.466	138.643	142.514

TABLE 8 CONTINUED

RIGHT ANKLE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	126.457	134.359	142.753	136.969	143.084
0.46	124.639	134.166	141.979	135.269	143.272
0.47	122.687	134.078	141.184	133.491	143.068
0.48	120.548	133.917	140.386	131.571	142.467
0.49	118.190	133.564	139.563	129.429	141.477
0.50	115.665	132.984	138.640	126.957	140.127
0.51	113.117	132.206	137.503	124.096	138.453
0.52	110.730	131.275	136.042	120.927	136.473
0.53	108.672	130.229	134.196	117.602	134.176
0.54	107.054	129.095	131.985	114.280	131.534
0.55	105.917	127.906	129.472	111.168	128.555
0.56	105.225	126.714	126.776	108.482	125.280
0.57	104.876	125.592	124.107	106.368	121.784
0.58	104.752	124.568	121.708	104.839	118.352
0.59	104.773	123.588	119.715	103.798	115.419
0.60	104.934	122.544	118.022	103.142	113.251
0.61	105.269	121.318	116.428	102.804	111.820
0.62	105.787	119.805	114.873	102.762	110.887
0.63	106.471	117.893	113.450	103.013	110.238
0.64	107.283	115.482	112.316	103.546	109.814
0.65	108.175	112.589	111.606	104.411	109.667
0.66	109.099	109.405	111.379	105.522	109.832
0.67	110.033	106.232	111.584	106.836	110.249
0.68	110.979	103.380	112.075	108.300	110.803
0.69	111.960	101.084	112.661	109.890	111.375
0.70	112.994	99.460	113.168	111.621	111.856
0.71	114.090	98.489	113.465	113.517	112.172
0.72	115.251	98.056	113.467	115.580	112.314
0.73	116.471	98.009	113.149	117.774	112.327
0.74	*	98.209	112.556	*	112.275
0.75	*	98.533	111.769	*	*
0.76	*	98.896	110.879	*	*
0.77	*	99.272	*	*	*
0.78	*	99.683	*	*	*
0.79	*	100.187	*	*	*
0.80	*	100.865	*	*	*
0.81	*	101.801	*	*	*
0.82	*	103.067	*	*	*
0.83	*	104.715	*	*	*
0.84	*	106.762	*	*	*
0.85	*	109.161	*	*	*
0.86	*	111.804	*	*	*
0.87	*	114.558	*	*	*
0.88	*	117.312	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

RIGHT ANKLE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.00	124.172	105.113	116.686	113.425	110.659
0.01	122.804	105.098	114.218	111.421	108.690
0.02	121.377	105.158	111.772	109.378	106.840
0.03	119.862	105.288	109.385	107.323	105.157
0.04	118.228	105.475	107.097	105.296	103.675
0.05	116.471	105.697	104.937	103.360	102.406
0.06	114.609	105.915	102.915	101.584	101.359
0.07	112.680	106.085	101.013	100.011	100.555
0.08	110.757	106.169	99.275	98.668	100.005
0.09	108.930	106.162	97.831	97.571	99.681
0.10	107.267	106.124	96.841	96.707	99.548
0.11	105.792	106.179	96.437	96.055	99.581
0.12	104.515	106.478	96.704	95.637	99.778
0.13	103.480	107.118	97.652	95.497	100.182
0.14	102.782	108.121	99.232	95.683	100.889
0.15	102.527	109.487	101.374	96.246	102.013
0.16	102.834	111.220	103.995	97.243	103.640
0.17	103.858	113.326	106.993	98.733	105.779
0.18	105.751	115.782	110.237	100.759	108.365
0.19	108.618	118.510	113.579	103.321	111.271
0.20	112.469	121.393	116.877	106.366	114.345
0.21	117.191	124.274	120.055	109.778	117.447
0.22	122.552	126.953	123.150	113.392	120.475
0.23	128.256	129.221	126.248	117.016	123.366
0.24	133.998	130.898	129.399	120.475	126.075
0.25	139.487	131.883	132.563	123.656	128.568
0.26	144.476	132.134	135.618	126.493	130.792
0.27	148.763	131.634	138.388	128.942	132.661
0.28	152.204	130.448	140.675	130.981	134.105
0.29	154.726	128.760	142.284	132.619	135.095
0.30	153.327	126.854	143.069	133.884	135.632
0.31	157.083	125.066	143.041	134.815	135.734
0.32	157.127	123.731	142.450	135.467	135.458
0.33	156.622	123.129	141.673	135.901	134.933
0.34	155.748	123.407	141.071	136.151	134.336
0.35	154.690	124.494	140.861	136.209	133.881
0.36	153.634	126.120	141.081	136.063	133.535
0.37	152.757	127.930	141.607	135.760	133.517
0.38	152.188	129.618	142.243	135.398	133.770
0.39	151.978	131.029	142.822	135.080	134.210
0.40	152.096	132.176	143.276	134.865	134.735
0.41	152.455	133.157	143.623	134.716	135.245
0.42	152.953	134.053	143.918	134.492	135.657
0.43	153.500	134.913	144.226	133.997	135.920
0.44	154.025	135.767	144.591	133.090	136.035

TABLE 8 CONTINUED

RIGHT ANKLE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	154.460	136.629	145.013	131.792	136.043
0.46	154.741	137.504	145.415	130.219	135.993
0.47	154.813	138.380	145.636	128.452	135.903
0.48	154.639	139.214	145.478	126.568	135.763
0.49	154.193	139.924	144.758	124.662	135.562
0.50	153.452	140.392	143.355	122.815	135.304
0.51	152.390	140.489	141.264	121.046	134.992
0.52	150.978	140.105	138.647	119.277	134.597
0.53	149.168	139.159	135.717	117.406	134.085
0.54	146.909	137.611	132.646	115.381	133.424
0.55	144.202	135.472	129.561	113.237	132.545
0.56	141.120	132.830	126.573	111.093	131.336
0.57	137.785	129.849	123.778	109.117	129.673
0.58	134.383	126.773	121.240	107.466	127.453
0.59	131.162	123.914	118.999	106.250	124.644
0.60	128.343	121.591	117.128	105.524	121.331
0.61	126.058	119.942	115.780	105.298	117.753
0.62	124.331	118.780	115.150	105.556	114.258
0.63	123.117	117.807	115.298	106.230	111.165
0.64	122.353	116.792	116.089	107.203	108.662
0.65	121.990	115.635	117.287	108.320	106.799
0.66	121.992	114.349	118.633	109.426	105.529
0.67	122.288	113.011	119.895	110.419	104.762
0.68	122.741	111.674	120.903	111.258	104.388
0.69	123.178	110.337	121.588	111.955	104.299
0.70	123.480	108.966	122.002	112.552	104.403
0.71	123.612	107.532	122.225	113.099	104.634
0.72	123.601	106.044	122.241	113.645	104.952
0.73	123.490	104.537	122.002	114.225	105.336
0.74	123.312	103.050	121.491	114.850	105.775
0.75	123.099	*	120.733	115.513	106.246
0.76	122.876	*	119.791	116.200	106.721
0.77	122.661	*	118.766	*	*
0.78	122.470	*	117.748	*	*
0.79	122.314	*	*	*	*
0.80	122.198	*	*	*	*
0.81	122.119	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.00	133.384	143.143	138.957	132.055	134.872
0.01	132.513	145.119	138.939	132.985	136.844
0.02	131.811	147.030	138.908	133.949	138.848
0.03	131.311	148.806	138.872	134.928	140.796
0.04	130.949	150.350	138.825	135.892	142.579
0.05	130.606	151.573	138.722	136.770	144.080
0.06	130.177	152.412	138.480	137.432	145.188
0.07	129.661	152.827	137.994	137.676	145.805
0.08	129.155	152.818	137.154	137.305	145.834
0.09	128.777	152.425	135.860	136.162	145.176
0.10	128.523	151.731	134.054	134.133	143.760
0.11	128.268	150.825	131.783	131.166	141.563
0.12	127.825	149.729	129.259	127.322	138.623
0.13	126.919	148.387	126.790	122.778	135.072
0.14	125.254	146.685	124.622	117.867	131.169
0.15	122.692	144.486	122.809	113.110	127.283
0.16	119.328	141.668	121.244	109.053	123.824
0.17	115.417	138.170	119.765	106.028	121.128
0.18	111.372	134.072	118.222	104.141	119.360
0.19	107.706	129.688	116.538	103.343	118.498
0.20	104.856	125.570	114.750	103.497	118.371
0.21	103.025	122.195	112.984	104.415	118.704
0.22	102.123	119.625	111.374	105.886	119.157
0.23	101.956	117.624	110.004	107.728	119.403
0.24	102.352	115.902	108.904	109.802	119.195
0.25	103.178	114.260	108.089	111.960	118.413
0.26	104.286	112.635	107.564	114.043	117.069
0.27	105.472	111.066	107.320	115.902	115.284
0.28	106.569	109.548	107.312	117.425	113.263
0.29	107.512	108.033	107.480	118.550	111.255
0.30	108.310	106.518	107.779	119.267	109.496
0.31	108.981	105.078	108.161	119.599	108.167
0.32	109.492	103.828	108.537	119.579	107.375
0.33	109.776	102.848	108.785	119.248	107.139
0.34	109.763	102.165	108.766	118.654	107.374
0.35	109.406	101.782	108.333	117.849	107.892
0.36	108.678	101.714	107.373	116.877	108.456
0.37	107.562	101.990	105.858	115.763	108.851
0.38	106.066	102.605	103.850	114.513	108.895
0.39	104.230	103.463	101.495	113.113	108.454
0.40	102.111	104.365	98.991	111.526	107.487
0.41	99.764	105.043	96.537	109.700	106.034
0.42	97.248	105.276	94.268	107.608	104.187
0.43	94.647	104.946	92.275	105.271	102.077
0.44	92.074	104.042	90.635	102.766	99.866

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION NONBRACED					
TIME	1	2	3	4	5
0.45	89.633	102.623	89.426	100.220	97.737
0.46	87.421	100.762	88.724	97.772	95.868
0.47	85.527	98.533	88.595	95.553	94.404
0.48	84.022	96.030	89.097	93.692	93.464
0.49	82.962	93.383	90.267	92.312	93.141
0.50	82.435	90.749	92.108	91.499	93.478
0.51	82.554	88.280	94.554	91.296	94.458
0.52	83.448	86.108	97.475	91.706	95.999
0.53	85.269	84.378	100.733	92.703	97.987
0.54	88.188	83.262	104.229	94.246	100.294
0.55	92.360	82.940	107.857	96.299	102.803
0.56	97.805	83.573	111.456	98.835	105.441
0.57	104.236	85.266	114.781	101.837	108.210
0.58	111.093	88.005	117.598	105.324	111.145
0.59	117.730	91.598	119.770	109.358	114.240
0.60	123.645	95.697	121.276	114.001	117.392
0.61	128.562	99.901	122.181	119.221	120.450
0.62	132.362	103.900	122.598	124.800	123.297
0.63	135.034	107.602	122.705	130.362	125.889
0.64	136.639	111.138	122.743	135.493	128.259
0.65	137.271	114.728	122.999	139.857	130.501
0.66	137.112	118.522	123.766	143.238	132.711
0.67	136.485	122.493	125.282	145.522	134.925
0.68	135.703	126.483	127.625	146.706	137.098
0.69	134.982	130.313	130.640	146.887	139.140
0.70	134.461	133.876	133.982	146.213	140.975
0.71	134.240	137.134	137.238	144.863	142.594
0.72	134.396	140.059	140.069	143.022	144.071
0.73	134.987	142.645	142.290	140.837	145.484
0.74	135.986	144.940	143.876	138.405	146.865
0.75	137.197	147.060	144.886	135.829	*
0.76	138.368	149.090	145.437	133.209	*
0.77	139.362	150.977	*	*	*
0.78	140.120	152.592	*	*	*
0.79	*	153.827	*	*	*
0.80	*	154.662	*	*	*
0.81	*	155.168	*	*	*
0.82	*	155.461	*	*	*
0.83	*	155.605	*	*	*
0.84	*	155.567	*	*	*
0.85	*	155.255	*	*	*
0.86	*	154.612	*	*	*
0.87	*	153.672	*	*	*
0.88	*	152.542	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.00	148.921	134.065	139.103	126.153	115.062
0.01	151.300	134.435	139.716	127.622	115.797
0.02	153.401	134.891	140.430	128.882	116.535
0.03	155.117	135.391	141.217	129.749	117.263
0.04	156.391	135.852	142.027	130.059	117.969
0.05	157.210	136.180	142.799	129.671	118.643
0.06	157.580	136.302	143.464	128.487	119.278
0.07	157.532	136.199	143.954	126.481	119.859
0.08	157.155	135.888	144.203	123.664	120.355
0.09	156.598	135.417	144.152	120.087	120.733
0.10	155.952	134.865	143.746	115.909	120.972
0.11	155.173	134.304	142.930	111.472	121.068
0.12	154.115	133.737	141.644	107.314	121.014
0.13	152.621	133.076	139.866	103.980	120.796
0.14	150.630	132.172	137.644	101.828	120.398
0.15	148.199	130.880	135.086	100.948	119.816
0.16	145.447	129.066	132.336	101.164	119.056
0.17	142.458	126.593	129.552	102.074	118.122
0.18	139.280	123.419	126.895	103.223	117.010
0.19	135.992	119.709	124.501	104.215	115.741
0.20	132.736	115.809	122.453	104.767	114.364
0.21	129.656	112.152	120.787	104.780	112.959
0.22	126.854	109.133	119.518	104.388	111.640
0.23	124.484	107.008	118.618	103.885	110.519
0.24	122.741	105.831	118.017	103.566	109.685
0.25	121.727	105.455	117.604	103.578	109.192
0.26	121.372	105.597	117.268	103.914	109.048
0.27	121.430	105.933	116.935	104.481	109.196
0.28	121.563	106.231	116.551	105.165	109.520
0.29	121.482	106.410	116.083	105.884	109.879
0.30	121.112	106.512	115.527	106.588	110.151
0.31	120.577	106.617	114.903	107.244	110.260
0.32	120.085	106.767	114.233	107.819	110.181
0.33	119.794	106.956	113.531	108.290	109.950
0.34	119.755	107.145	112.818	108.652	109.642
0.35	119.893	107.288	112.128	108.914	109.319
0.36	120.028	107.356	111.500	109.084	108.992
0.37	119.895	107.340	110.939	109.135	108.613
0.38	119.270	107.214	110.418	109.023	108.110
0.39	118.089	106.914	109.878	108.694	107.418
0.40	116.481	106.379	109.252	108.094	106.484
0.41	114.687	105.588	108.481	107.195	105.267
0.42	112.932	104.592	107.540	106.009	103.740
0.43	111.286	103.472	106.434	104.589	101.912
0.44	109.661	102.309	105.181	103.015	99.838

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION NONBRACED					
TIME	6	7	8	9	10
0.45	107.999	101.171	103.807	101.363	97.597
0.46	106.412	100.092	102.367	99.690	95.283
0.47	105.162	99.059	100.951	98.017	92.999
0.48	104.448	98.041	99.645	96.356	90.848
0.49	104.296	97.019	98.497	94.716	88.933
0.50	104.658	96.019	97.526	93.051	87.354
0.51	105.518	95.140	96.751	91.318	86.197
0.52	106.948	94.565	96.213	89.582	85.522
0.53	109.060	94.489	95.972	87.977	85.367
0.54	111.851	95.053	96.095	86.645	85.761
0.55	114.990	96.328	96.654	85.726	86.736
0.56	118.012	98.328	97.724	85.304	88.304
0.57	120.761	101.018	99.359	85.352	90.426
0.58	123.407	104.311	101.578	85.776	93.019
0.59	126.275	108.072	104.352	86.473	95.961
0.60	129.681	112.151	107.612	87.372	99.085
0.61	133.727	116.381	111.242	88.453	102.213
0.62	138.130	120.568	115.083	89.759	105.203
0.63	142.356	124.503	118.970	91.365	107.962
0.64	145.908	127.964	122.769	93.328	110.444
0.65	148.561	130.726	126.382	95.665	112.625
0.66	150.359	132.659	129.747	98.318	114.474
0.67	151.486	133.828	132.836	101.141	115.943
0.68	152.195	134.393	135.641	103.925	117.000
0.69	152.758	134.507	138.155	106.464	117.653
0.70	153.399	134.287	140.355	108.634	117.932
0.71	154.238	133.833	142.195	110.433	117.888
0.72	155.266	133.246	143.624	111.945	117.615
0.73	156.393	132.627	144.617	113.259	117.237
0.74	157.507	132.051	145.214	114.391	116.887
0.75	158.492	131.535	145.520	115.262	116.677
0.76	159.193	131.048	145.667	115.772	116.683
0.77	159.438	*	145.754	115.897	116.942
0.78	159.233	*	145.823	115.685	117.492
0.79	158.770	*	*	115.228	118.380
0.80	*	*	*	114.625	*
0.81	*	*	*	113.953	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.00	136.919	146.668	133.613	132.531	137.383
0.01	135.614	148.274	136.389	132.741	140.991
0.02	134.275	149.997	139.195	132.984	144.369
0.03	132.863	151.804	141.939	133.236	147.376
0.04	131.356	153.620	144.457	133.442	149.856
0.05	129.763	155.346	146.564	133.520	151.675
0.06	128.109	156.874	148.103	133.365	152.740
0.07	126.385	158.101	148.974	132.852	153.018
0.08	124.547	158.972	149.110	131.883	152.522
0.09	122.540	159.471	148.465	130.427	151.303
0.10	120.323	159.586	146.962	128.524	149.447
0.11	117.894	159.280	144.480	126.241	147.043
0.12	115.304	158.478	140.893	123.637	144.143
0.13	112.649	157.079	136.272	120.788	140.808
0.14	110.016	154.989	131.060	117.825	137.146
0.15	107.426	152.183	125.947	114.933	133.312
0.16	104.881	148.721	121.542	112.306	129.530
0.17	102.454	144.731	118.122	110.109	126.103
0.18	100.300	140.371	115.639	108.444	123.304
0.19	98.599	135.812	113.867	107.367	121.278
0.20	97.494	131.275	112.541	106.897	120.013
0.21	97.043	127.035	111.442	106.972	119.353
0.22	97.200	123.383	110.440	107.415	119.014
0.23	97.858	120.501	109.475	108.019	118.679
0.24	98.885	118.401	108.538	108.626	118.107
0.25	100.143	116.957	107.652	109.133	117.218
0.26	101.482	115.979	106.848	109.495	116.114
0.27	102.749	115.272	106.158	109.719	115.020
0.28	103.806	114.668	105.621	109.844	114.170
0.29	104.554	114.037	105.274	109.910	113.707
0.30	104.936	113.297	105.118	109.940	113.634
0.31	104.919	112.428	105.114	109.945	113.845
0.32	104.482	111.472	105.200	109.919	114.192
0.33	103.630	110.494	105.307	109.844	114.545
0.34	102.414	109.578	105.373	109.683	114.789
0.35	100.925	108.830	105.347	109.378	114.783
0.36	99.272	108.339	105.182	108.876	114.397
0.37	97.548	108.147	104.831	108.166	113.576
0.38	95.821	108.229	104.237	107.266	112.345
0.39	94.145	108.512	103.326	106.198	110.775
0.40	92.575	108.911	102.028	104.987	108.946
0.41	91.187	109.344	100.332	103.653	106.917
0.42	90.087	109.714	98.340	102.209	104.709
0.43	89.391	109.900	96.264	100.684	102.347
0.44	89.206	109.767	94.371	99.137	99.904

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION BRACED					
TIME	1	2	3	4	5
0.45	89.620	109.218	92.905	97.643	97.503
0.46	90.692	108.230	92.066	96.279	95.293
0.47	92.455	106.859	92.007	95.113	93.419
0.48	94.920	105.218	92.841	94.198	92.002
0.49	98.087	103.445	94.607	93.580	91.136
0.50	101.925	101.679	97.210	93.319	90.899
0.51	106.351	100.039	100.421	93.467	91.340
0.52	111.196	98.613	103.948	94.037	92.462
0.53	116.207	97.460	107.545	95.020	94.235
0.54	121.091	96.607	111.095	96.397	96.601
0.55	125.607	96.043	114.577	98.146	99.459
0.56	129.592	95.728	118.006	100.245	102.660
0.57	132.935	95.607	121.367	102.665	106.046
0.58	135.599	95.637	124.584	105.361	109.548
0.59	137.626	95.814	127.533	108.271	113.204
0.60	139.094	96.180	130.116	111.339	117.015
0.61	140.096	96.809	132.307	114.545	120.893
0.62	140.736	97.783	134.146	117.911	124.722
0.63	141.135	99.187	135.648	121.500	128.463
0.64	141.425	101.110	136.770	125.385	132.114
0.65	141.693	103.634	137.494	129.606	135.505
0.66	141.951	106.810	137.915	134.113	138.362
0.67	142.121	110.607	138.274	138.735	140.508
0.68	142.107	114.883	138.815	143.267	141.963
0.69	141.847	119.406	139.664	147.564	142.901
0.70	141.337	123.932	140.798	151.546	143.508
0.71	140.623	128.274	142.086	155.196	143.900
0.72	139.790	132.339	143.363	158.553	144.118
0.73	138.924	136.105	144.466	161.673	144.168
0.74	*	139.577	145.270	*	144.060
0.75	*	142.748	145.738	*	*
0.76	*	145.565	145.905	*	*
0.77	*	147.925	*	*	*
0.78	*	149.739	*	*	*
0.79	*	150.982	*	*	*
0.80	*	151.669	*	*	*
0.81	*	151.839	*	*	*
0.82	*	151.552	*	*	*
0.83	*	150.907	*	*	*
0.84	*	150.049	*	*	*
0.85	*	149.140	*	*	*
0.86	*	148.318	*	*	*
0.87	*	147.666	*	*	*
0.88	*	147.201	*	*	*

* END OF SUBJECT'S GAIT

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.00	150.076	132.399	142.529	120.054	122.596
0.01	150.719	133.998	142.641	124.234	123.405
0.02	151.368	135.511	142.684	127.237	124.047
0.03	151.983	136.825	142.600	128.759	124.477
0.04	152.508	137.802	142.346	128.978	124.686
0.05	152.864	138.306	141.882	128.266	124.702
0.06	152.975	138.230	141.180	127.012	124.570
0.07	152.795	137.517	140.233	125.572	124.333
0.08	152.307	136.168	139.061	124.239	124.023
0.09	151.506	134.260	137.710	123.198	123.655
0.10	150.402	131.966	136.251	122.461	123.202
0.11	148.993	129.529	134.760	121.870	122.625
0.12	147.253	127.190	133.283	121.163	121.927
0.13	145.148	125.130	131.812	120.076	121.168
0.14	142.675	123.438	130.307	118.451	120.435
0.15	139.885	122.095	128.740	116.311	119.774
0.16	136.875	121.003	127.112	113.857	119.141
0.17	133.773	120.031	125.423	111.407	118.408
0.18	130.711	119.072	123.661	109.307	117.462
0.19	127.796	118.085	121.824	107.800	116.295
0.20	125.098	117.110	119.951	106.951	115.025
0.21	122.648	116.223	118.133	106.685	113.847
0.22	120.453	115.471	116.494	106.854	112.949
0.23	118.498	114.853	115.141	107.286	112.410
0.24	116.754	114.318	114.124	107.790	112.171
0.25	115.183	113.790	113.451	108.177	112.085
0.26	113.759	113.205	113.090	108.348	112.035
0.27	112.471	112.557	112.973	108.369	111.980
0.28	111.314	111.906	113.014	108.401	111.898
0.29	110.286	111.345	113.115	108.608	111.752
0.30	109.405	110.950	113.180	109.099	111.509
0.31	108.701	110.748	113.136	109.907	111.157
0.32	108.201	110.723	112.945	110.986	110.708
0.33	107.927	110.842	112.600	112.287	110.213
0.34	107.892	111.084	112.120	113.759	109.744
0.35	108.087	111.446	111.537	115.278	109.357
0.36	108.477	111.904	110.873	116.589	109.066
0.37	108.999	112.363	110.120	117.329	108.828
0.38	109.576	112.698	109.273	117.264	108.564
0.39	110.127	112.799	108.347	116.426	108.187
0.40	110.560	112.571	107.373	114.992	107.614
0.41	110.778	111.942	106.390	113.185	106.764
0.42	110.693	110.862	105.427	111.233	105.535
0.43	110.248	109.321	104.509	109.304	103.808
0.44	109.443	107.365	103.639	107.470	101.495

TABLE 8 CONTINUED

LEFT ANKLE RANGE OF MOTION BRACED					
TIME	6	7	8	9	10
0.45	108.349	105.109	102.797	105.760	98.612
0.46	107.077	102.742	101.941	104.134	95.326
0.47	105.736	100.522	101.037	102.444	91.945
0.48	104.411	98.693	100.087	100.555	88.821
0.49	103.166	97.412	99.136	98.454	86.237
0.50	102.056	96.724	98.253	96.238	84.335
0.51	101.150	96.617	97.518	94.068	83.124
0.52	100.533	97.091	97.015	92.123	82.531
0.53	100.281	98.170	96.848	90.558	82.479
0.54	100.440	99.901	97.110	89.498	82.922
0.55	101.030	102.359	97.814	89.048	83.830
0.56	102.057	105.602	98.905	89.250	85.180
0.57	103.516	109.613	100.336	90.002	86.958
0.58	105.403	114.279	102.070	91.148	89.150
0.59	107.708	119.377	104.080	92.637	91.762
0.60	110.394	124.564	106.364	94.614	94.845
0.61	113.401	129.438	108.939	97.273	98.452
0.62	116.660	133.628	111.829	100.573	102.542
0.63	120.103	136.882	115.042	104.396	106.986
0.64	123.660	139.118	118.566	108.733	111.577
0.65	127.254	140.413	122.372	113.595	116.043
0.66	130.788	140.947	126.375	118.722	120.110
0.67	134.155	140.944	130.390	123.327	123.564
0.68	137.259	140.620	134.211	126.645	126.217
0.69	140.034	140.131	137.690	128.441	127.910
0.70	142.441	139.536	140.739	128.938	128.618
0.71	144.458	138.825	143.320	128.564	128.474
0.72	146.063	137.969	145.444	127.747	127.716
0.73	147.218	136.982	147.154	126.799	126.552
0.74	147.870	135.938	148.499	125.892	125.112
0.75	147.998	*	149.539	125.073	123.514
0.76	147.629	*	150.353	124.312	121.871
0.77	146.854	*	151.046	*	*
0.78	145.794	*	151.690	*	*
0.79	144.574	*	*	*	*
0.80	143.285	*	*	*	*
0.81	141.987	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

APPENDIX XI TABLE 9 KNEE VELOCITIES - RAW DATA

RIGHT KNEE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.00	-186.37	-226.56	-309.95	-269.15	-99.66
0.01	-182.37	-222.79	-239.76	-268.90	-104.03
0.02	-176.14	-211.15	-259.95	-261.25	-105.48
0.03	-165.61	-192.45	-205.76	-243.34	-102.32
0.04	-148.00	-170.39	-133.80	-217.63	-95.10
0.05	-122.10	-148.65	-49.70	-189.67	-85.88
0.06	-90.51	-127.06	40.55	-161.40	-75.49
0.07	-57.79	-102.98	128.32	-131.20	-63.27
0.08	-27.24	-73.82	201.84	-96.78	-47.74
0.09	-0.85	-37.11	252.99	-57.19	-26.88
0.10	21.12	8.04	281.45	-13.08	0.28
0.11	40.68	58.92	294.41	34.14	31.88
0.12	60.59	111.39	299.37	82.28	65.55
0.13	83.02	162.58	298.22	127.88	101.01
0.14	109.55	210.28	290.27	165.42	139.58
0.15	139.32	252.79	273.72	190.15	181.87
0.16	166.52	288.60	245.06	202.47	224.90
0.17	184.45	316.01	197.67	204.71	264.47
0.18	189.52	333.03	123.57	197.15	297.53
0.19	180.04	338.46	20.50	179.69	320.10
0.20	156.62	332.10	-106.04	152.79	327.97
0.21	123.17	314.05	-245.26	117.44	318.76
0.22	83.90	285.41	-383.00	76.14	291.57
0.23	40.48	248.55	-504.25	32.86	246.39
0.24	-6.42	206.04	-595.78	-9.05	185.16
0.25	-56.42	159.43	-651.02	-48.21	111.40
0.26	-109.71	109.21	-672.32	-85.22	28.79
0.27	-166.97	54.35	-666.89	-121.15	-58.46
0.28	-227.90	-7.00	-642.38	-156.38	-145.23
0.29	-287.83	-74.70	-605.17	-191.32	-226.13
0.30	-340.10	-145.77	-560.93	-226.46	-296.60
0.31	-381.61	-215.38	-516.19	-261.65	-353.96
0.32	-412.13	-279.36	-478.03	-296.18	-397.16
0.33	-432.41	-335.54	-450.98	-328.99	-425.85
0.34	-443.97	-381.56	-431.85	-358.10	-439.73
0.35	-448.24	-415.12	-414.29	-381.02	-439.65
0.36	-446.19	-435.71	-395.27	-395.70	-429.03
0.37	-438.94	-444.28	-373.61	-401.73	-413.08
0.38	-472.64	-442.48	-348.24	-400.42	-396.84
0.39	-413.47	-432.91	-318.54	-392.25	-382.98
0.40	-396.67	-418.36	-282.89	-376.51	-371.32
0.41	-375.97	-401.10	-237.11	-352.69	-359.57
0.42	-350.93	-383.63	-178.48	-321.54	-344.55
0.43	-322.78	-368.22	-108.88	-284.80	-323.42
0.44	-292.92	-355.01	-33.42	-243.03	-294.16

TABLE 9 CONTINUED

RIGHT KNEE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.45	-261.95	-342.16	42.50	-195.54	-255.73
0.46	-229.13	-327.68	116.41	-142.27	-208.05
0.47	-192.55	-310.39	187.59	-85.44	-152.63
0.48	-149.80	-289.77	254.66	-29.53	-92.54
0.49	-99.48	-265.32	315.53	21.93	-31.41
0.50	-42.59	-236.84	368.00	68.21	27.66
0.51	17.58	-205.19	411.29	111.48	82.77
0.52	78.22	-170.43	444.51	154.37	133.61
0.53	138.40	-130.40	466.28	197.65	180.94
0.54	197.33	-82.64	478.92	241.44	225.35
0.55	254.07	-26.47	488.29	286.20	266.77
0.56	307.36	35.35	499.72	333.20	305.01
0.57	355.11	98.13	513.74	383.00	339.92
0.58	394.78	158.32	525.90	432.92	371.23
0.59	426.33	215.09	533.41	475.19	398.91
0.60	452.67	269.92	537.98	500.16	422.02
0.61	476.01	323.28	546.40	503.15	437.09
0.62	496.89	374.58	563.36	486.14	441.95
0.63	514.06	423.56	581.22	454.98	438.86
0.64	523.03	469.11	580.12	414.75	430.29
0.65	518.81	508.35	542.13	367.66	416.72
0.66	501.85	536.31	471.64	314.43	397.47
0.67	476.71	550.88	383.31	256.06	371.49
0.68	446.35	556.22	285.74	194.81	338.76
0.69	410.18	554.45	188.27	133.93	302.53
0.70	365.88	541.97	100.28	76.80	268.04
0.71	315.17	513.83	25.44	26.53	239.04
0.72	262.04	467.09	-36.96	-14.11	217.01
0.73	209.24	402.90	-88.22	-43.21	202.06
0.74	159.44	326.19	-127.01	-61.32	194.30
0.75	115.60	243.70	-151.04	-71.08	*
0.76	81.04	161.84	-161.66	-75.15	*
0.77	58.34	85.39	*	*	*
0.78	47.64	17.05	*	*	*
0.79	*	-42.15	*	*	*
0.80	*	-92.00	*	*	*
0.81	*	-132.11	*	*	*
0.82	*	-161.09	*	*	*
0.83	*	-177.17	*	*	*
0.84	*	-181.23	*	*	*
0.85	*	-177.01	*	*	*
0.86	*	-168.73	*	*	*
0.87	*	-160.69	*	*	*
0.88	*	-156.23	*	*	*

* END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

RIGHT KNEE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.00	-335.83	-223.23	-129.62	-244.33	-320.79
0.01	-324.94	-217.62	-130.59	-245.41	-316.40
0.02	-299.87	-201.02	-127.97	-242.02	-303.70
0.03	-263.16	-172.60	-120.27	-234.85	-279.74
0.04	-214.90	-135.78	-107.82	-224.59	-246.43
0.05	-153.36	-96.33	-91.90	-211.34	-208.15
0.06	-83.27	-59.54	-72.65	-195.43	-165.64
0.07	-16.92	-27.49	-49.50	-177.46	-117.81
0.08	31.93	1.34	-22.09	-157.87	-64.66
0.09	60.17	28.44	9.64	-136.32	-6.46
0.10	77.50	54.04	45.33	-112.06	54.68
0.11	98.66	78.36	83.92	-85.13	111.71
0.12	134.59	101.72	123.49	-55.93	157.65
0.13	184.99	124.15	161.67	-24.39	190.95
0.14	235.94	144.88	196.12	9.55	214.42
0.15	27.86	162.84	224.85	45.40	231.77
0.16	287.30	177.64	146.44	81.68	243.16
0.17	290.25	189.39	259.84	115.91	245.73
0.18	280.76	198.01	264.14	145.04	236.39
0.19	255.58	202.83	159.24	166.18	214.16
0.20	212.24	202.32	245.59	177.14	180.18
0.21	157.49	193.86	223.32	176.61	135.94
0.22	98.26	174.68	192.67	165.37	82.97
0.23	32.70	142.85	154.24	146.69	22.63
0.24	-41.16	97.04	108.38	123.80	-44.74
0.25	-120.67	37.26	55.20	98.33	-118.14
0.26	-199.25	-34.28	-4.87	70.15	-192.72
0.27	-269.16	-112.73	-70.23	38.77	-261.37
0.28	-324.89	-191.44	-137.81	4.74	-318.23
0.29	-365.66	-263.52	-203.91	-30.63	-360.76
0.30	-394.06	-323.61	-265.02	-65.66	-389.92
0.31	-412.30	-368.60	-318.27	-98.73	-408.78
0.32	-423.83	-398.12	-361.99	-129.11	-420.80
0.33	-434.48	-414.20	-396.12	-157.50	-428.58
0.34	-449.80	-420.10	-422.25	-185.40	-434.05
0.35	-471.04	-419.05	-442.15	-213.71	-438.92
0.36	-492.70	-413.47	-455.95	-214.03	-444.84
0.37	-506.90	-405.17	-463.29	-265.33	-451.54
0.38	-508.18	-395.63	-464.40	-285.52	-456.60
0.39	-493.78	-385.56	-459.59	-299.97	-458.65
0.40	-464.55	-374.83	-448.82	-306.93	-457.06
0.41	-424.11	-362.84	-431.52	-306.01	-450.51
0.42	-378.06	-348.07	-407.62	-298.02	-435.76
0.43	-332.70	-328.09	-378.12	-284.15	-408.72
0.44	-290.76	-300.55	-344.13	-265.27	-368.42

TABLE 9 CONTINUED

RIGHT KNEE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.45	-249.78	-264.13	-306.42	-241.74	-316.93
0.46	-202.80	-219.29	-265.40	-213.76	-256.87
0.47	-146.35	-167.80	-221.49	-181.86	-191.10
0.48	-84.77	-111.91	-175.42	-147.11	-122.51
0.49	-22.28	-53.90	-127.67	-110.51	-52.88
0.50	41.12	4.13	-78.66	-72.75	16.86
0.51	108.91	60.46	-29.34	-34.50	84.57
0.52	184.82	113.49	19.22	3.62	147.91
0.53	268.66	162.27	66.10	41.19	205.90
0.54	352.31	207.66	110.60	78.30	257.38
0.55	420.65	252.00	152.36	115.89	300.86
0.56	461.36	296.73	191.64	155.53	336.54
0.57	470.69	341.86	229.05	198.46	365.12
0.58	453.58	386.65	264.95	244.09	386.24
0.59	421.22	429.29	298.82	289.16	402.10
0.60	387.42	466.62	329.42	329.33	418.15
0.61	365.97	493.64	356.01	362.84	439.31
0.62	364.29	505.46	378.55	388.74	465.79
0.63	381.11	500.29	397.22	404.39	491.81
0.64	410.76	479.07	411.74	408.07	511.19
0.65	445.42	444.62	421.28	400.72	521.00
0.66	474.95	400.91	424.98	385.26	520.80
0.67	491.18	352.33	422.22	364.89	509.89
0.68	491.41	303.38	412.58	341.69	485.86
0.69	474.28	258.40	395.86	314.69	447.98
0.70	436.56	220.83	372.46	281.49	398.43
0.71	372.21	192.14	343.86	242.18	340.69
0.72	279.00	171.30	312.41	198.79	279.87
0.73	164.62	155.58	280.70	153.47	222.31
0.74	44.61	143.42	251.10	109.05	173.14
0.75	-64.84	134.69	225.58	68.43	134.34
0.76	-154.20	129.20	205.96	33.34	104.38
0.77	-217.37	*	193.14	4.68	81.94
0.78	-250.37	*	186.23	-16.92	68.02
0.79	-259.55	*	*	-31.14	61.89
0.80	*	*	*	-38.55	*
0.81	*	*	*	-41.12	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

TIME	RIGHT KNEE VELOCITIES BRACED				
	1	2	3	4	5
0.00	94.51	-248.19	-310.81	-256.80	-103.63
0.01	94.30	-250.66	-294.90	-260.91	-108.10
0.02	93.33	-248.95	-266.11	-262.22	-113.55
0.03	92.10	-242.17	-227.44	-252.04	-121.88
0.04	91.41	-229.04	-182.74	-224.80	-131.29
0.05	92.11	-208.46	-134.21	-183.17	-136.35
0.06	94.64	-181.13	-83.69	-139.02	-131.97
0.07	98.96	-148.73	-32.49	-101.88	-115.10
0.08	104.89	-112.53	19.49	-70.72	-85.03
0.09	112.31	-73.28	74.11	-41.34	-43.75
0.10	120.95	-31.24	133.39	-10.37	4.49
0.11	129.46	13.62	196.12	24.60	54.02
0.12	135.45	60.06	255.67	65.99	100.83
0.13	136.22	104.96	301.89	115.78	144.25
0.14	129.54	145.45	329.40	171.83	184.96
0.15	114.53	180.07	338.61	226.43	223.01
0.16	92.06	208.69	329.44	266.65	256.53
0.17	63.65	230.80	302.47	279.95	281.81
0.18	30.60	244.90	259.79	261.12	294.19
0.19	-5.47	251.03	198.71	214.71	289.23
0.20	-42.96	250.54	115.89	151.92	265.30
0.21	-81.13	243.61	18.92	84.59	225.89
0.22	-120.23	229.43	-81.70	22.55	177.30
0.23	-161.12	207.57	-181.69	-27.76	124.90
0.24	-204.31	178.90	-277.85	-63.99	71.54
0.25	-249.13	145.26	-365.83	-87.96	16.84
0.26	-293.43	108.28	-440.40	-104.52	-42.62
0.27	-334.60	69.04	-498.27	-118.75	-109.63
0.28	-370.85	28.08	-539.39	-133.81	-182.68
0.29	-401.10	-14.70	-563.45	-151.35	-256.10
0.30	-424.91	-59.50	-569.64	-172.00	-323.86
0.31	-442.44	-105.79	-558.42	-195.51	-383.95
0.32	-453.53	-152.28	-534.41	-222.22	-434.94
0.33	-457.29	-197.60	-505.51	-253.81	-472.84
0.34	-453.40	-241.04	-478.02	-291.55	-493.13
0.35	-442.38	-282.21	-454.82	-333.29	-494.76
0.36	-424.48	-319.87	-435.37	-370.28	-481.78
0.37	-400.11	-352.12	-418.45	-393.74	-459.10
0.38	-370.32	-377.34	-403.54	-400.37	-430.29
0.39	-336.87	-394.81	-389.11	-388.60	-398.80
0.40	-300.89	-404.70	-372.58	-359.12	-366.50
0.41	-260.94	-407.77	-350.51	-317.87	-331.59
0.42	-215.20	-404.58	-319.22	-270.70	-291.60
0.43	-163.65	-395.32	-276.03	-219.21	-246.12
0.44	-107.07	-380.99	-220.40	-164.83	-196.67

TABLE 9 CONTINUED

RIGHT KNEE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	-46.30	-363.67	-154.55	-110.26	-145.39
0.46	17.59	-346.35	-83.49	-58.61	-93.41
0.47	83.23	-331.17	-11.68	-11.40	-40.43
0.48	149.02	-317.73	59.53	32.38	14.85
0.49	213.21	-303.08	128.58	73.75	73.70
0.50	274.17	-283.34	193.33	113.94	136.08
0.51	330.35	-255.94	254.17	156.69	199.05
0.52	379.93	-219.91	313.28	203.25	257.64
0.53	421.20	-175.28	372.51	249.41	307.38
0.54	453.88	-123.00	433.43	289.14	344.79
0.55	479.03	-64.36	494.51	320.32	368.44
0.56	497.06	-0.46	546.09	347.55	380.04
0.57	507.52	67.74	578.40	371.96	384.89
0.58	510.18	138.85	591.72	384.44	389.97
0.59	505.53	210.64	589.41	380.02	397.85
0.60	494.72	280.28	574.24	363.27	405.00
0.61	479.00	345.05	553.92	341.54	405.77
0.62	458.50	401.79	536.54	320.35	396.16
0.63	431.75	446.95	522.45	301.44	376.69
0.64	397.08	479.00	507.98	283.19	350.74
0.65	354.20	499.53	488.96	262.20	321.10
0.66	305.36	511.63	460.21	235.02	287.92
0.67	254.81	517.59	416.77	201.65	250.42
0.68	207.38	518.75	356.28	167.24	208.80
0.69	167.31	515.85	280.96	139.06	163.37
0.70	137.06	508.23	196.88	122.74	115.19
0.71	116.81	493.14	111.48	119.47	68.51
0.72	105.32	467.85	33.14	124.81	29.64
0.73	100.66	431.67	-30.13	131.04	3.66
0.74	*	385.36	-74.24	*	-8.76
0.75	*	330.56	-100.18	*	*
0.76	*	269.83	-111.88	*	*
0.77	*	206.06	*	*	*
0.78	*	141.91	*	*	*
0.79	*	79.97	*	*	*
0.80	*	22.92	*	*	*
0.81	*	-26.25	*	*	*
0.82	*	-65.16	*	*	*
0.83	*	-93.26	*	*	*
0.84	*	-111.86	*	*	*
0.85	*	-123.53	*	*	*
0.86	*	-131.26	*	*	*
0.87	*	-136.94	*	*	*
0.88	*	-140.87	*	*	*

*END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

TIME	RIGHT KNEE VELOCITIES BRACED				
	6	7	8	9	10
0.00	-244.06	-80.67	-313.47	-256.76	-256.99
0.01	-252.15	-78.46	-307.31	-259.01	-242.92
0.02	-261.70	-73.18	-291.32	-257.19	-218.02
0.03	-269.27	-63.50	-265.74	-250.91	-184.50
0.04	-271.01	-49.50	-232.64	-239.30	-146.04
0.05	-264.57	-32.52	-194.60	-221.44	-105.68
0.06	-249.40	-14.16	-154.45	-198.17	-65.88
0.07	-225.50	4.62	-122.64	-170.69	-27.89
0.08	-192.62	23.94	-66.47	-139.35	8.32
0.09	-152.59	44.42	-14.48	-104.77	43.08
0.10	-109.75	66.72	41.83	-67.61	76.29
0.11	-69.83	91.29	98.91	-27.40	107.10
0.12	-35.84	117.34	152.94	16.18	135.06
0.13	-6.07	142.62	201.15	61.98	160.56
0.14	-21.87	164.93	240.89	108.25	183.01
0.15	-50.21	182.30	269.81	152.85	200.65
0.16	82.81	191.98	286.46	192.71	211.96
0.17	122.21	191.19	290.53	224.29	214.44
0.18	167.03	178.26	282.92	244.18	204.18
0.19	213.33	153.02	265.51	248.98	179.52
0.20	255.70	116.39	241.07	236.66	141.96
0.21	287.73	69.50	213.08	208.49	94.33
0.22	304.31	13.67	184.45	168.05	39.72
0.23	303.34	-49.14	156.06	119.45	-18.78
0.24	283.66	-115.96	127.29	67.06	-78.29
0.25	244.74	-183.02	96.27	15.08	-137.15
0.26	187.81	-246.16	59.60	-32.79	-195.80
0.27	116.85	-302.00	13.62	-74.30	-254.34
0.28	37.99	-348.62	-43.72	-109.11	-310.96
0.29	-43.34	-384.68	-111.41	-137.72	-364.35
0.30	-123.33	-409.47	-184.79	-161.25	-413.79
0.31	-198.63	-423.17	-255.72	-181.60	-457.49
0.32	-265.83	-426.80	-316.75	-200.96	-492.25
0.33	-321.82	-422.19	-364.93	-220.77	-514.49
0.34	-364.49	-412.06	-401.24	-241.14	-522.07
0.35	-393.58	-399.15	-428.80	-260.82	-515.55
0.36	-411.08	-385.12	-450.76	-277.67	-498.42
0.37	-420.14	-370.19	-467.99	-290.49	-475.24
0.38	-423.63	-353.57	-478.41	-299.95	-449.59
0.39	-423.32	-334.05	-478.86	-306.96	-422.78
0.40	-419.23	-310.60	-467.30	-311.33	-394.07
0.41	-409.70	-283.02	-444.22	-311.17	-362.13
0.42	-392.46	-251.45	-411.58	-304.05	-326.00
0.43	-366.30	-215.77	-371.71	-288.08	-285.37
0.44	-332.97	-175.17	-327.32	-261.69	-239.63

TABLE 9 CONTINUED

RIGHT KNEE VELOCITIES BRACED					
TIME	6	7	8	9	10
0.45	-295.99	-128.81	-281.20	-224.35	-188.11
0.46	-257.50	-76.96	-236.09	-177.39	-130.80
0.47	-218.08	-21.29	-193.89	-123.89	-69.22
0.48	-177.80	35.62	-154.97	-67.89	-6.22
0.49	-136.98	91.52	-118.37	-12.81	56.11
0.50	-96.16	144.93	-82.53	39.48	116.56
0.51	-55.53	194.47	-46.12	88.48	173.15
0.52	-14.71	238.85	-9.33	134.40	224.09
0.53	25.79	277.16	25.86	177.29	268.98
0.54	65.61	308.96	58.13	217.18	309.30
0.55	104.38	335.13	87.94	254.25	347.44
0.56	141.83	358.50	116.30	288.39	384.18
0.57	179.49	381.88	143.87	319.56	417.96
0.58	221.43	416.23	170.98	348.31	446.28
0.59	269.62	430.91	199.04	375.94	467.40
0.60	321.82	453.57	230.92	403.17	480.88
0.61	374.03	468.71	269.54	427.53	486.14
0.62	422.45	471.06	315.02	445.28	483.38
0.63	465.13	460.09	362.90	453.95	473.99
0.64	502.15	437.94	407.13	451.44	458.17
0.65	533.34	407.06	442.77	436.31	435.02
0.66	554.98	369.58	466.84	409.02	404.53
0.67	561.09	327.96	477.97	372.01	368.79
0.68	546.91	285.39	475.97	328.84	331.50
0.69	511.62	244.22	462.63	282.71	295.59
0.70	458.72	206.12	439.78	236.07	262.21
0.71	394.04	173.89	406.18	191.43	231.71
0.72	322.91	150.16	361.16	151.50	204.65
0.73	248.49	135.46	308.23	118.92	182.17
0.74	173.42	128.00	252.72	95.34	165.67
0.75	100.53	*	200.35	80.88	155.67
0.76	33.05	*	157.87	74.25	150.84
0.77	-25.40	*	130.17	*	*
0.78	-71.41	*	116.84	*	*
0.79	-103.19	*	*	*	*
0.80	-121.52	*	*	*	*
0.81	-129.52	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

*END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

TIME	LEFT KNEE VELOCITIES NONBRACED				
	1	2	3	4	5
0.00	-289.05	-323.53	-59.54	-281.10	-260.76
0.01	-289.91	-319.71	-62.60	-282.49	-259.90
0.02	-290.20	-311.94	-63.67	-281.36	-255.95
0.03	-287.45	-299.00	-59.58	-276.35	-247.78
0.04	-277.67	-280.07	-45.89	-266.88	-234.74
0.05	-257.46	-254.97	-20.67	-252.67	-216.54
0.06	-226.77	-224.34	10.61	-232.73	-192.74
0.07	-187.83	-189.24	40.46	-205.86	-162.92
0.08	-143.18	-150.55	65.94	-171.58	-126.94
0.09	-95.13	-108.78	87.46	-130.25	-84.86
0.10	-46.11	-64.34	107.63	-82.82	-37.25
0.11	0.65	-17.90	130.48	-30.44	14.41
0.12	43.71	29.64	161.51	25.79	68.21
0.13	84.92	77.81	205.80	84.85	122.62
0.14	126.33	126.45	263.29	145.12	176.70
0.15	168.19	175.24	327.26	204.67	230.00
0.16	207.94	223.10	385.78	262.06	281.89
0.17	244.13	268.22	430.08	315.95	331.24
0.18	280.73	308.68	459.61	364.86	376.20
0.19	322.58	344.45	478.10	407.97	414.34
0.20	370.39	377.46	491.29	444.65	442.80
0.21	415.64	409.17	505.38	472.85	458.31
0.22	448.99	440.18	521.27	490.61	458.75
0.23	470.51	470.71	532.49	498.30	444.63
0.24	484.27	500.18	532.53	494.87	418.57
0.25	492.83	526.30	517.23	477.59	383.80
0.26	493.79	543.79	482.06	445.28	342.88
0.27	483.98	547.03	426.31	399.19	297.39
0.28	464.46	533.93	355.95	342.30	248.40
0.29	436.82	505.65	277.78	278.15	196.99
0.30	401.32	465.41	196.08	209.81	144.38
0.31	358.07	417.24	113.23	139.52	91.84
0.32	305.45	363.37	31.00	69.45	40.69
0.33	240.18	303.09	-48.55	2.39	-7.75
0.34	162.10	234.98	-124.06	-58.82	-51.97
0.35	74.54	159.37	-193.42	-112.13	-91.08
0.36	-18.30	79.90	-250.56	-156.96	-125.81
0.37	-109.63	0.49	-286.91	-194.03	-157.05
0.38	-189.84	-77.10	-295.45	-224.40	-184.19
0.39	-252.05	-150.82	-274.00	-248.45	-205.17
0.40	-293.38	-217.77	-226.23	-265.48	-217.44
0.41	-311.36	-275.31	-159.82	-274.18	-219.05
0.42	-303.99	-321.18	-84.20	-272.96	-209.22
0.43	-272.26	-353.32	-8.58	-260.20	-188.38
0.44	-223.27	-370.42	59.14	-234.64	-157.58

TABLE 9 CONTINUED

LEFT KNEE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.45	-167.13	-372.41	112.48	-196.51	-119.03
0.46	-110.86	-360.30	145.54	-148.96	-77.45
0.47	-58.35	-336.49	156.41	-95.86	-36.90
0.48	-11.01	-304.31	150.27	-40.02	1.79
0.49	33.76	-266.03	137.89	15.30	39.02
0.50	79.50	-222.27	129.85	66.56	74.89
0.51	125.09	-172.91	130.09	111.19	108.53
0.52	168.09	-118.56	138.66	147.97	138.27
0.53	208.29	-60.71	154.63	176.81	162.23
0.54	244.64	0.21	171.33	197.55	179.09
0.55	273.83	64.07	177.25	209.59	188.49
0.56	290.57	128.63	161.23	212.45	190.85
0.57	289.56	190.27	118.87	206.44	186.65
0.58	268.09	245.44	55.00	193.02	175.99
0.59	227.71	290.39	-21.84	173.90	159.41
0.60	173.57	322.82	-103.04	150.14	137.96
0.61	111.92	343.83	-180.71	121.44	112.65
0.62	46.60	355.02	-250.01	87.65	84.37
0.63	-22.27	356.19	-310.35	50.00	53.96
0.64	-94.68	347.25	-363.10	10.52	22.65
0.65	-166.38	328.60	-408.80	-29.01	-8.28
0.66	-225.48	300.12	-444.40	-67.82	-38.17
0.67	-261.84	262.20	-467.04	-105.30	-66.05
0.68	-276.60	216.85	-477.70	-140.33	-90.16
0.69	-281.97	167.46	-479.36	-171.94	-109.17
0.70	-291.95	117.05	-475.05	-199.40	-122.77
0.71	-309.31	66.12	-466.45	-221.89	-131.36
0.72	-332.20	14.05	-455.32	-238.70	-135.83
0.73	-362.52	-39.09	-444.66	-249.71	-137.26
0.74	-401.50	-92.79	-436.40	-255.26	-136.74
0.75	-445.77	-146.19	-429.96	-256.21	*
0.76	-486.26	-197.93	-422.79	-253.93	*
0.77	-512.75	-246.68	*	*	*
0.78	-520.70	-291.79	*	*	*
0.79	*	-332.85	*	*	*
0.80	*	-369.49	*	*	*
0.81	*	-401.47	*	*	*
0.82	*	-428.48	*	*	*
0.83	*	-450.23	*	*	*
0.84	*	-466.00	*	*	*
0.85	*	-475.02	*	*	*
0.86	*	-477.22	*	*	*
0.87	*	-473.71	*	*	*
0.88	*	-466.34	*	*	*

* END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

TIME	LEFT KNEE VELOCITIES NONBRACED				
	6	7	8	9	10
0.00	-134.65	-251.69	-325.40	-226.11	-290.31
0.01	-134.59	-251.84	-324.88	-224.73	-287.92
0.02	-130.65	-250.03	-320.95	-218.64	-279.56
0.03	-121.27	-246.14	-312.45	-207.08	-263.54
0.04	-106.11	-239.23	-298.96	-190.26	-239.09
0.05	-85.79	-227.47	-280.65	-168.53	-206.34
0.06	-60.78	-209.15	-257.66	-141.49	-166.41
0.07	31.38	-183.18	-230.14	-109.05	-120.34
0.08	2.12	-149.50	-198.50	-72.12	-68.43
0.09	39.46	-108.85	-163.44	-31.56	-11.30
0.10	80.03	-62.46	-125.84	12.23	49.78
0.11	122.14	-11.88	-86.76	58.90	113.06
0.12	163.83	41.14	-46.92	107.58	176.44
0.13	203.70	94.73	-6.27	156.58	237.79
0.14	240.26	146.75	35.37	203.98	294.91
0.15	272.38	195.47	78.05	248.25	346.06
0.16	300.45	240.14	121.77	288.27	390.78
0.17	325.74	281.14	166.29	323.88	429.19
0.18	348.94	320.12	211.13	355.55	461.07
0.19	370.05	359.01	255.58	382.83	485.99
0.20	388.68	399.05	298.85	404.82	503.60
0.21	404.59	440.33	340.25	422.01	514.25
0.22	417.41	481.36	379.42	434.87	519.39
0.23	426.11	518.85	416.04	442.65	520.77
0.24	428.69	547.92	448.60	444.41	518.87
0.25	423.15	563.36	474.35	439.22	512.35
0.26	409.29	561.20	490.50	425.46	498.60
0.27	388.18	539.98	494.63	401.94	474.99
0.28	360.94	501.19	484.99	368.90	439.95
0.29	328.30	448.93	460.97	326.96	393.40
0.30	290.34	387.90	423.37	276.83	336.51
0.31	246.74	321.32	374.09	220.11	270.96
0.32	197.41	250.60	315.63	159.48	199.60
0.33	142.96	176.14	250.62	97.91	126.79
0.34	84.65	98.75	181.41	37.48	56.69
0.35	24.28	20.43	109.99	-20.56	-8.14
0.36	-35.82	-54.89	38.52	-74.40	-67.16
0.37	-92.26	-123.73	-30.83	-122.22	-120.88
0.38	-140.97	-184.73	-96.09	-163.15	-169.46
0.39	-179.20	-236.14	-155.15	-196.85	-212.07
0.40	-205.86	-274.64	-205.58	-223.09	-246.77
0.41	-219.89	-295.64	-244.32	-241.43	-271.24
0.42	-220.76	-296.77	-268.45	-251.50	-283.21
0.43	-208.93	-280.09	-276.34	-253.43	-281.21
0.44	-185.16	-249.45	-268.32	-247.63	-266.25

TABLE 9 CONTINUED

LEFT KNEE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.45	-150.93	-208.93	-246.44	-234.59	-241.25
0.46	-109.22	-163.00	-213.71	-214.45	-208.91
0.47	-63.88	-114.93	-173.51	-188.32	-171.37
0.48	-18.50	-65.94	-129.20	-158.66	-130.28
0.49	25.01	-16.88	-83.95	-128.11	-86.43
0.50	66.10	31.67	-40.11	-98.39	-40.07
0.51	104.09	80.40	1.69	-69.95	8.29
0.52	137.52	129.37	41.53	-42.62	56.78
0.53	164.47	176.47	79.22	-16.23	102.20
0.54	183.43	218.47	114.59	10.02	142.07
0.55	193.78	252.30	147.63	36.92	175.01
0.56	195.60	275.87	178.54	64.03	199.41
0.57	188.90	287.51	206.84	89.96	213.81
0.58	173.19	285.53	231.06	113.03	217.79
0.59	148.04	269.18	249.84	131.35	211.90
0.60	113.59	239.05	262.25	143.38	197.14
0.61	70.70	196.56	267.06	148.54	174.15
0.62	21.21	143.58	263.38	147.05	143.33
0.63	-32.02	82.17	250.88	139.33	105.06
0.64	-85.57	14.75	228.90	125.71	59.59
0.65	-136.24	-54.95	196.76	106.50	7.29
0.66	-181.89	-120.88	155.09	82.44	-50.68
0.67	-221.31	-178.00	105.75	54.47	-111.98
0.68	-254.03	-224.97	51.21	23.44	-173.12
0.69	-280.41	-262.12	-5.81	-10.12	-230.37
0.70	-301.20	-290.06	-62.76	-45.62	-280.61
0.71	-316.90	-309.34	-117.67	-81.75	-321.85
0.72	-328.50	-320.49	-168.41	-117.03	-352.79
0.73	-337.57	-324.54	-212.12	-150.25	-372.86
0.74	-344.66	-323.43	-245.67	-179.90	-382.85
0.75	-349.25	-319.30	-267.09	-204.52	-385.10
0.76	-350.81	-313.36	-277.22	-223.41	-383.27
0.77	-349.58	*	-279.00	-236.49	-379.80
0.78	-346.51	*	-275.83	-244.13	-374.66
0.79	-342.07	*	*	-247.49	-367.24
0.80	*	*	*	-248.03	*
0.81	*	*	*	-246.65	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

LEFT KNEE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.00	-117.71	-309.68	-56.32	-185.96	-229.19
0.01	-118.22	-313.00	-55.93	-185.90	-229.58
0.02	-114.22	-313.91	-52.71	-182.93	-226.65
0.03	-103.90	-311.27	-45.15	-176.20	-218.85
0.04	-86.57	-304.16	-32.30	-164.95	-205.12
0.05	-62.75	-292.07	-14.45	-148.63	-185.00
0.06	-33.59	-275.19	6.42	-127.64	-158.43
0.07	-0.35	-253.71	28.00	-103.01	-125.56
0.08	35.84	-227.44	48.94	-75.69	-86.66
0.09	73.82	-196.36	69.08	-45.96	-42.67
0.10	112.38	-160.88	89.21	-13.41	4.82
0.11	150.67	-121.81	110.35	22.26	53.96
0.12	188.99	-80.03	133.91	60.80	103.44
0.13	228.65	-35.99	162.27	101.45	152.88
0.14	269.70	10.07	197.95	143.60	202.34
0.15	310.60	57.96	242.17	187.07	251.99
0.16	350.01	106.83	294.35	231.99	301.45
0.17	386.47	155.70	352.84	278.13	349.48
0.18	417.82	203.99	414.83	324.24	394.10
0.19	442.62	251.34	474.98	368.24	433.43
0.20	459.93	297.61	526.41	406.93	465.87
0.21	467.62	343.02	563.86	435.22	489.11
0.22	463.51	387.65	585.16	448.42	500.43
0.23	447.04	430.65	590.77	444.86	498.18
0.24	418.95	470.48	582.11	424.92	482.02
0.25	380.21	505.34	560.22	390.22	452.28
0.26	331.02	533.28	526.03	343.78	409.24
0.27	272.33	552.35	480.13	289.29	354.30
0.28	207.31	560.87	422.73	230.33	290.53
0.29	140.22	557.66	354.15	169.95	221.04
0.30	74.83	542.05	275.49	110.29	148.51
0.31	13.10	513.74	189.99	52.43	76.31
0.32	-43.88	472.65	102.55	-2.74	7.72
0.33	-94.52	419.20	18.22	-53.79	-55.26
0.34	-136.18	355.18	-58.97	-98.92	-111.88
0.35	-165.85	283.33	-126.45	-136.17	-162.08
0.36	-181.51	205.91	-182.40	-163.26	-205.42
0.37	-182.77	125.59	-225.22	-179.05	-241.04
0.38	-170.96	46.17	-253.44	-184.60	-267.68
0.39	-148.87	-28.41	-265.97	-181.87	-282.88
0.40	-119.51	-95.59	-262.11	-172.76	-283.88
0.41	-84.68	-155.17	-241.29	-158.89	-269.89
0.42	-46.06	-207.24	-204.28	-140.78	-242.56
0.43	-6.12	-250.22	-154.18	-117.98	-205.10
0.44	33.14	-281.74	-95.59	-90.77	-160.96

TABLE 9 CONTINUED

LEFT KNEE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	70.53	-299.85	-33.41	-60.75	-112.86
0.46	104.93	-303.97	28.11	-30.06	-62.38
0.47	135.16	-295.27	84.95	-0.93	-10.70
0.48	160.09	-276.33	133.35	25.11	40.51
0.49	178.74	-250.00	170.91	48.81	88.69
0.50	190.49	-218.73	196.52	71.66	130.99
0.51	195.18	-184.31	208.88	92.51	165.40
0.52	192.55	-147.98	208.39	109.09	190.71
0.53	181.99	-110.71	198.33	120.38	206.34
0.54	163.15	-73.41	181.51	126.29	212.88
0.55	136.03	-36.93	158.34	127.20	211.67
0.56	100.60	-1.67	126.92	123.42	203.71
0.57	57.63	32.84	85.38	115.16	189.98
0.58	9.20	67.75	34.30	102.58	171.82
0.59	-42.20	103.36	-23.10	85.68	150.25
0.60	-94.17	139.01	-82.55	64.65	125.50
0.61	-144.21	173.80	-141.15	40.29	96.68
0.62	-190.58	206.53	-198.26	13.62	63.05
0.63	-232.65	235.29	-254.20	-14.64	24.96
0.64	-270.13	257.34	-306.83	-43.70	-16.95
0.65	-303.12	270.37	-351.54	-72.94	-61.60
0.66	-332.82	274.48	-384.00	-102.33	-106.60
0.67	-360.08	270.20	-403.26	-131.18	-148.86
0.68	-384.23	256.63	-412.23	-157.41	-185.68
0.69	-403.94	233.26	-414.85	-179.23	-215.50
0.70	-417.90	200.81	-414.45	-195.75	-238.11
0.71	-425.12	161.13	-413.98	-206.45	-254.39
0.72	-425.35	116.05	-415.59	-211.35	-265.02
0.73	-419.45	66.60	-419.75	-211.45	-269.99
0.74	*	13.64	-425.13	*	-270.04
0.75	*	-42.28	-429.38	*	*
0.76	*	-101.24	-430.41	*	*
0.77	*	-162.04	*	*	*
0.78	*	-221.23	*	*	*
0.79	*	-275.79	*	*	*
0.80	*	-324.15	*	*	*
0.81	*	-365.27	*	*	*
0.82	*	-398.25	*	*	*
0.83	*	-422.32	*	*	*
0.84	*	-437.24	*	*	*
0.85	*	-443.62	*	*	*
0.86	*	-442.81	*	*	*
0.87	*	-436.60	*	*	*
0.88	*	-426.69	*	*	*

* END OF SUBJECT'S GAIT

TABLE 9 CONTINUED

LEFT KNEE VELOCITIES BRACED					
TIME	6	7	8	9	10
0.00	-186.21	-284.11	-369.07	-244.11	-222.65
0.01	-189.65	-282.23	-369.59	-245.02	-223.96
0.02	-194.37	-273.47	-366.73	-241.71	-222.13
0.03	-199.12	-257.11	-357.87	-232.82	-215.39
0.04	-202.05	-233.50	-341.46	-217.68	-202.66
0.05	-201.38	-203.11	-317.56	-196.07	-183.73
0.06	-195.68	-165.98	-287.05	-167.70	-159.11
0.07	-184.22	-122.20	-251.02	-132.97	-129.11
0.08	-167.10	-72.43	-210.16	-93.19	-93.20
0.09	-144.78	-18.27	-164.64	-49.17	-50.90
0.10	-117.76	38.25	-114.75	-0.99	-2.49
0.11	-86.39	95.34	-61.88	50.82	50.56
0.12	-50.69	151.88	-8.09	105.62	106.25
0.13	-10.72	207.29	44.67	162.65	162.89
0.14	32.67	261.18	94.85	219.86	219.20
0.15	77.78	312.59	141.54	274.23	274.14
0.16	122.98	359.66	184.40	323.55	326.66
0.17	167.03	400.13	223.95	366.31	376.41
0.18	209.08	432.55	261.74	400.97	423.91
0.19	248.29	456.77	299.28	426.85	469.15
0.20	284.04	473.71	337.04	444.36	511.30
0.21	316.50	484.81	373.75	454.42	549.58
0.22	345.89	491.49	406.63	457.77	581.14
0.23	371.55	494.66	432.62	454.41	599.60
0.24	391.99	493.72	449.99	443.39	599.60
0.25	405.34	486.60	458.70	423.36	580.21
0.26	409.83	470.77	459.00	393.70	544.70
0.27	404.20	444.18	450.78	355.25	497.84
0.28	388.16	405.90	433.17	310.01	443.21
0.29	362.51	356.58	404.64	259.69	383.46
0.30	328.65	297.72	364.01	205.22	320.59
0.31	287.88	230.74	311.65	147.33	256.20
0.32	241.50	157.53	249.15	87.17	191.76
0.33	190.97	81.15	178.72	26.64	128.50
0.34	137.51	5.44	103.63	-32.08	66.26
0.35	82.44	-65.77	27.73	-86.91	4.31
0.36	27.98	-129.54	-45.34	-136.08	-56.45
0.37	-23.82	-183.37	-112.20	-178.15	-114.50
0.38	-72.19	-224.93	-169.67	-212.13	-169.18
0.39	-117.31	-252.63	-215.33	-236.97	-219.95
0.40	-159.13	-265.97	-247.81	-251.89	-265.42
0.41	-195.82	-265.20	-266.42	-257.09	-302.40
0.42	-224.74	-251.38	-271.22	-253.23	-327.08
0.43	-243.81	-226.34	-263.20	-240.84	-336.44
0.44	-251.35	-191.87	-244.25	-221.36	-328.27

TABLE 9 CONTINUED

TIME	LEFT KNEE VELOCITIES BRACED				
	6	7	8	9	10
0.45	-246.80	-149.30	-216.79	-197.36	-301.53
0.46	-231.77	-99.73	-183.10	-171.67	-256.98
0.47	-209.05	-44.50	-145.55	-145.35	-199.14
0.48	-181.00	14.08	-106.79	-116.90	-136.05
0.49	-149.27	72.15	-68.85	-85.35	-74.28
0.50	-114.76	125.65	-32.66	-51.90	-17.13
0.51	-77.94	172.27	1.48	-19.72	34.00
0.52	-38.92	210.47	33.76	8.36	79.42
0.53	2.01	238.18	64.55	31.76	120.18
0.54	43.69	253.68	93.57	51.23	154.77
0.55	84.21	256.47	120.29	68.08	180.05
0.56	121.78	247.47	145.01	83.70	195.05
0.57	154.97	227.97	167.97	98.60	199.97
0.58	182.63	198.78	188.68	111.84	194.51
0.59	203.04	160.66	206.70	121.76	179.27
0.60	214.28	114.94	21.61	126.75	155.74
0.61	215.23	64.19	232.23	125.86	124.81
0.62	206.24	10.96	237.30	118.71	86.25
0.63	188.88	-43.38	236.07	105.21	38.74
0.64	164.39	-98.05	227.71	85.66	-18.98
0.65	133.39	-151.68	211.39	60.44	-85.72
0.66	96.83	-201.40	187.04	29.76	-155.05
0.67	56.33	-244.37	155.06	-5.52	-219.74
0.68	13.93	-279.60	116.08	-43.20	-275.98
0.69	-28.68	-307.39	71.55	-80.33	-321.63
0.70	-70.15	-328.40	23.69	-114.18	-355.89
0.71	-108.94	-342.98	-24.63	-143.32	-379.86
0.72	-144.60	-350.62	-70.87	-166.94	-395.25
0.73	-178.26	-350.56	-113.07	-184.19	-403.18
0.74	-210.11	-343.76	-148.92	-195.16	-404.47
0.75	-238.78	*	-176.09	-200.66	-400.47
0.76	-262.16	*	-193.22	-201.42	-393.50
0.77	-278.93	*	-201.01	*	*
0.78	-289.47	*	-202.27	*	*
0.79	-294.94	*	*	*	*
0.80	-296.62	*	*	*	*
0.81	-295.61	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

APPENDIX XII TABLE 10 HIP VELOCITIES - RAW DATA

RIGHT HIP VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.00	13.31	-18.82	-24.65	13.26	74.93
0.01	16.16	-15.56	-16.43	14.86	74.74
0.02	22.79	-8.11	1.10	18.56	75.57
0.03	34.89	3.36	28.65	24.81	78.24
0.04	52.77	17.29	64.81	33.12	83.25
0.05	75.23	31.89	107.45	42.80	90.62
0.06	100.25	46.64	154.44	54.34	99.99
0.07	125.28	62.02	201.68	68.89	110.88
0.08	147.99	78.79	242.27	87.14	122.83
0.09	167.47	97.96	270.08	108.76	135.39
0.10	184.04	120.10	282.80	132.46	148.11
0.11	198.02	144.48	282.80	156.51	160.57
0.12	209.52	169.48	274.32	178.96	172.30
0.13	218.62	193.68	260.35	197.85	182.91
0.14	225.03	215.85	242.63	210.97	191.99
0.15	228.19	235.01	221.84	216.73	199.25
0.16	227.58	250.13	197.95	215.64	204.53
0.17	222.52	260.21	169.91	208.99	207.76
0.18	212.20	264.42	136.31	197.21	208.87
0.19	196.39	262.41	97.60	180.62	207.24
0.20	176.11	254.37	56.24	159.85	202.17
0.21	153.41	240.59	15.48	135.97	193.58
0.22	130.01	221.89	-22.05	110.70	181.47
0.23	106.14	200.02	-55.16	86.10	165.65
0.24	81.52	177.14	-82.91	63.75	146.45
0.25	56.23	154.80	-104.43	44.13	124.62
0.26	30.98	133.39	-119.32	26.54	100.59
0.27	6.59	112.18	-127.43	10.03	74.85
0.28	-16.46	89.96	-128.49	-5.66	48.37
0.29	-37.51	66.47	-121.99	-20.37	22.09
0.30	-55.84	42.62	-108.22	-33.96	-3.31
0.31	-71.19	19.70	-90.03	-46.59	-27.34
0.32	-83.76	-1.51	-73.21	-58.92	-49.73
0.33	-94.13	-21.03	-64.28	-71.85	-70.39
0.34	-103.25	-38.39	-65.03	-85.96	-89.09
0.35	-112.22	-52.71	-72.64	-101.03	-105.59
0.36	-121.73	-63.75	-84.36	-115.89	-120.09
0.37	-132.17	-71.55	-98.01	-129.85	-133.18
0.38	-143.84	-76.10	-111.35	-143.49	-145.50
0.39	-156.95	-78.02	-122.65	-157.01	-157.38
0.40	-171.34	-78.72	-129.93	-169.66	-168.75
0.41	-186.10	-80.09	-129.59	-180.22	-179.49
0.42	-200.27	-84.08	-120.04	-187.81	-189.19
0.43	-213.46	-92.08	-104.80	-192.08	-197.11
0.44	-225.19	-104.01	-90.04	-192.41	-202.56

TABLE 10 CONTINUED

TIME	RIGHT HIP VELOCITIES NONBRACED				
	1	2	3	4	5
0.45	-234.46	-118.62	-80.53	-188.00	-205.08
0.46	-239.77	-134.58	-75.83	-178.75	-204.24
0.47	-239.85	-151.10	-73.78	-166.33	-199.93
0.48	-234.49	-167.79	-74.36	-154.02	-192.63
0.49	-224.75	-183.94	-78.16	-144.20	-183.40
0.50	-212.20	-198.55	-84.17	-136.97	-173.31
0.51	-197.17	-211.23	-88.10	-130.43	-162.62
0.52	-179.63	-220.48	-85.82	-122.66	-151.12
0.53	-160.51	-222.87	-76.47	-113.09	-138.65
0.54	-140.23	-215.76	-60.37	-101.30	-125.34
0.55	-118.15	-199.24	-38.74	-86.40	-111.39
0.56	-93.46	-176.42	-14.93	-67.37	-96.80
0.57	-66.43	-151.51	5.65	-44.24	-81.47
0.58	-38.98	-127.64	18.19	-19.16	-65.43
0.59	-13.11	-105.75	24.09	3.89	-48.90
0.60	10.11	-85.25	29.63	21.08	-32.12
0.61	30.59	-65.96	39.37	31.39	-14.99
0.62	48.71	-47.96	53.79	36.25	2.46
0.63	64.80	-31.21	69.27	38.01	19.66
0.64	78.97	-16.03	78.85	38.37	35.71
0.65	91.42	-3.23	76.82	37.89	49.77
0.66	102.66	6.14	64.62	36.39	61.27
0.67	113.08	13.00	46.65	33.54	69.80
0.68	122.43	20.43	25.34	29.18	75.09
0.69	129.56	28.93	4.05	23.51	77.58
0.70	133.20	35.74	-13.41	16.95	78.24
0.71	133.00	38.16	-25.53	9.89	77.86
0.72	129.64	34.77	-33.04	3.17	76.88
0.73	124.45	25.71	-37.39	-1.98	75.66
0.74	119.11	12.53	-39.25	-5.17	74.65
0.75	115.08	-2.45	-38.77	-6.96	*
0.76	113.18	-16.89	-37.52	-7.80	*
0.77	113.21	-28.86	*	*	*
0.78	114.20	-37.25	*	*	*
0.79	*	-42.02	*	*	*
0.80	*	-43.84	*	*	*
0.81	*	-43.28	*	*	*
0.82	*	-40.41	*	*	*
0.83	*	-34.91	*	*	*
0.84	*	-27.32	*	*	*
0.85	*	-18.96	*	*	*
0.86	*	-11.05	*	*	*
0.87	*	-4.81	*	*	*
0.88	*	-1.28	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

TIME	RIGHT HIP VELOCITIES NONBRACED				
	6	7	8	9	10
0.00	-1.94	35.68	56.87	-26.88	-51.16
0.01	3.22	37.47	58.29	-24.94	-48.70
0.02	13.99	41.73	61.85	-20.98	-41.76
0.03	30.99	49.14	68.10	-14.89	-28.68
0.04	54.75	59.54	76.63	-6.71	-10.44
0.05	85.40	72.22	86.61	3.48	10.66
0.06	120.46	86.53	98.08	15.32	34.00
0.07	154.63	102.02	111.38	28.28	60.02
0.08	182.03	118.42	126.39	42.00	88.74
0.09	201.18	135.22	142.64	56.43	119.82
0.10	215.72	151.66	159.55	71.65	152.07
0.11	230.73	167.00	176.57	87.32	182.36
0.12	249.67	180.55	193.05	102.76	207.50
0.13	271.54	191.60	208.17	117.39	226.46
0.14	288.83	199.55	221.11	130.92	240.15
0.15	292.91	204.09	231.08	143.30	249.93
0.16	283.08	205.18	237.43	154.49	255.57
0.17	263.47	202.93	239.78	164.30	255.69
0.18	237.35	197.28	237.84	172.49	249.10
0.19	207.20	188.02	231.70	178.65	235.90
0.20	175.37	175.08	221.59	182.17	217.20
0.21	145.22	159.07	207.81	182.16	194.18
0.22	118.48	141.09	190.97	178.27	168.11
0.23	93.51	122.11	171.79	171.19	140.33
0.24	68.18	102.83	150.85	161.59	111.46
0.25	41.84	83.64	128.35	149.67	81.73
0.26	15.90	64.63	104.48	135.47	52.42
0.27	-6.66	45.73	79.57	119.05	25.65
0.28	-22.91	27.00	54.19	100.72	3.49
0.29	-32.46	8.71	29.07	80.95	-13.31
0.30	-37.84	-8.90	4.89	60.32	-25.45
0.31	-42.65	-25.83	-17.69	39.39	-34.40
0.32	-50.27	-42.25	-38.30	18.48	-41.59
0.33	-63.06	-58.24	-57.00	-2.39	-47.96
0.34	-81.90	-73.53	-74.32	-23.14	-54.35
0.35	-105.60	-87.64	-90.78	-43.48	-61.73
0.36	-130.27	-100.00	-106.17	-62.93	-71.24
0.37	-151.68	-110.20	-120.07	-81.10	-83.10
0.38	-167.81	-118.16	-132.42	-97.70	-96.25
0.39	-178.08	-124.18	-143.31	-112.04	-110.86
0.40	-182.85	-128.83	-152.69	-123.31	-128.37
0.41	-183.05	-132.79	-160.35	-131.24	-149.41
0.42	-181.52	-136.37	-166.29	-136.25	-171.92
0.43	-182.68	-139.23	-170.88	-139.23	-191.38
0.44	-188.07	-140.73	-174.47	-141.27	-204.31

TABLE 10 CONTINUED

TIME	RIGHT HIP VELOCITIES NONBRACED				
	6	7	8	9	10
0.45	-194.33	-140.44	-177.17	-143.29	-209.53
0.46	-194.39	-138.63	-178.85	-145.63	-207.27
0.47	-185.25	-135.85	-179.33	-148.22	-199.38
0.48	-171.74	-132.47	-178.57	-150.74	-189.04
0.49	-185.27	-128.62	-176.38	-152.21	-178.42
0.50	-144.82	-124.16	-172.53	-151.48	-168.17
0.51	-128.34	-118.58	-166.93	-148.35	-158.95
0.52	-106.37	-111.39	-159.65	-143.35	-150.36
0.53	-80.27	-102.48	-150.89	-137.31	-140.49
0.54	-55.80	-92.02	-140.90	-130.90	-128.41
0.55	-39.60	-80.32	-129.84	-124.42	-114.56
0.56	-33.59	-67.73	-117.73	-117.70	-99.17
0.57	-35.32	-54.65	-104.56	-110.33	-83.11
0.58	-41.04	-41.57	-90.49	-102.01	-68.05
0.59	-48.11	-28.78	-75.96	-92.76	-53.53
0.60	-54.18	-16.75	-61.49	-82.80	-37.19
0.61	-54.09	-6.61	-47.28	-71.97	-17.28
0.62	-44.26	0.64	-33.22	-60.08	5.38
0.63	-26.43	5.05	-19.20	-47.23	27.49
0.64	-3.96	7.20	-5.40	-33.78	46.43
0.65	20.17	7.81	7.72	-20.12	61.56
0.66	42.92	7.49	19.78	-6.58	73.24
0.67	61.89	6.79	30.52	6.46	81.44
0.68	75.85	6.13	39.68	18.31	85.25
0.69	83.85	5.86	47.03	27.94	84.56
0.70	84.88	6.13	52.43	34.50	80.36
0.71	77.84	6.76	55.84	38.20	73.88
0.72	62.21	7.40	57.46	39.83	66.65
0.73	39.13	7.62	57.69	40.11	60.28
0.74	12.55	7.38	56.90	39.62	55.82
0.75	-12.11	7.00	55.43	38.75	53.23
0.76	-30.40	6.73	53.83	37.71	51.30
0.77	-40.48	*	52.58	36.59	49.21
0.78	-43.66	*	51.85	35.38	47.44
0.79	-43.65	*	*	34.29	46.40
0.80	*	*	*	33.59	*
0.81	*	*	*	33.21	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

TIME	RIGHT HIP VELOCITIES BRACED				
	1	2	3	4	5
0.00	194.01	-21.02	-44.12	-0.74	40.60
0.01	195.02	-18.95	-38.46	-2.76	42.96
0.02	195.11	-14.42	-27.19	-3.93	48.29
0.03	194.73	-7.25	-10.84	-0.50	56.33
0.04	194.29	2.39	9.98	10.35	66.58
0.05	194.00	14.29	34.90	28.35	78.77
0.06	194.06	28.12	62.09	49.51	92.86
0.07	194.68	43.49	89.55	70.08	108.99
0.08	196.04	60.02	116.78	89.85	127.26
0.09	198.09	77.51	144.69	109.74	147.46
0.10	200.58	95.84	174.39	130.42	168.94
0.11	203.00	114.72	205.33	152.26	190.70
0.12	204.48	133.67	234.03	175.70	211.36
0.13	203.73	152.14	255.20	201.19	229.44
0.14	199.46	169.65	266.37	227.53	243.85
0.15	190.81	185.79	268.38	251.02	253.85
0.16	177.68	199.97	262.04	265.42	258.64
0.17	160.71	211.27	248.52	264.63	257.76
0.18	141.10	218.64	229.60	246.46	251.53
0.19	120.15	221.68	204.64	214.47	240.47
0.20	98.98	220.70	172.45	175.88	225.17
0.21	78.39	215.92	136.40	137.50	206.41
0.22	58.68	207.49	100.81	104.01	184.90
0.23	39.44	195.76	67.15	77.54	161.19
0.24	20.17	181.63	36.40	58.23	135.77
0.25	0.75	166.18	9.81	44.66	109.09
0.26	-18.07	149.75	-11.48	34.37	81.52
0.27	-35.34	132.37	-27.93	25.22	53.40
0.28	-50.73	114.30	-41.99	16.08	25.29
0.29	-64.51	95.87	-54.99	5.85	-1.88
0.30	-77.37	77.44	-66.19	-6.64	-27.01
0.31	-90.15	59.35	-73.89	-21.79	-49.64
0.32	-103.32	41.87	-77.82	-39.69	-69.84
0.33	-116.85	25.07	-80.37	-60.75	-87.86
0.34	-130.36	8.75	-84.12	-85.67	-103.67
0.35	-143.32	-7.34	-90.41	-114.21	-117.21
0.36	-154.91	-23.19	-99.79	-143.22	-129.10
0.37	-164.57	-38.46	-113.20	-168.77	-139.75
0.38	-172.37	-52.76	-132.19	-188.51	-148.56
0.39	-179.11	-66.22	-155.94	-200.31	-154.85
0.40	-185.20	-79.60	-181.19	-203.01	-158.28
0.41	-189.23	-93.77	-204.85	-199.00	-158.67
0.42	-189.46	-109.06	-223.55	-191.39	-155.34
0.43	-185.45	-124.94	-233.31	-181.08	-147.44
0.44	-177.38	-140.82	-232.60	-169.05	-136.11

TABLE 10 CONTINUED

RIGHT HIP VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	-165.68	-156.60	-223.47	-157.18	-124.01
0.46	-151.04	-172.61	-210.35	-147.58	-112.60
0.47	-134.51	-189.27	-195.83	-141.20	-102.44
0.48	-117.46	-206.51	-178.96	-137.11	-94.21
0.49	-101.12	-223.08	-160.05	-133.92	-88.14
0.50	-86.26	-237.07	-140.75	-129.98	-84.03
0.51	-73.00	-247.27	-120.46	-122.85	-81.78
0.52	-60.99	-252.91	-97.80	-111.67	-81.25
0.53	-49.62	-253.11	-72.44	-98.56	-82.01
0.54	-38.04	-247.35	-43.91	-86.14	-83.70
0.55	-25.44	-235.79	-13.86	-75.19	-85.70
0.56	-11.54	-219.27	9.87	-63.44	-86.67
0.57	3.41	-198.97	21.41	-50.29	-85.51
0.58	18.76	-176.19	23.50	-39.35	-82.11
0.59	33.68	-152.38	20.95	-32.37	-76.68
0.60	47.37	-128.79	17.90	-27.71	-69.41
0.61	59.36	-105.85	19.34	-22.88	-60.55
0.62	69.02	-83.72	27.69	-16.12	-50.27
0.63	75.40	-62.75	40.72	-7.20	-38.67
0.64	77.90	-43.09	55.22	2.62	-26.26
0.65	76.74	-24.60	68.75	11.36	-13.94
0.66	73.04	-7.04	78.88	17.41	-2.67
0.67	68.30	9.80	83.46	20.56	6.84
0.68	63.75	26.00	81.53	22.35	14.18
0.69	60.05	41.45	73.92	25.00	18.93
0.70	57.37	55.73	62.66	30.13	20.80
0.71	55.68	68.05	49.54	37.75	20.17
0.72	54.84	77.44	36.26	45.84	18.09
0.73	54.58	83.03	24.66	51.46	15.88
0.74	*	84.30	16.08	*	14.48
0.75	*	81.28	10.98	*	*
0.76	*	74.62	8.84	*	*
0.77	*	65.40	*	*	*
0.78	*	54.91	*	*	*
0.79	*	44.38	*	*	*
0.80	*	34.87	*	*	*
0.81	*	27.20	*	*	*
0.82	*	21.91	*	*	*
0.83	*	19.03	*	*	*
0.84	*	17.97	*	*	*
0.85	*	17.74	*	*	*
0.86	*	17.45	*	*	*
0.87	*	16.86	*	*	*
0.88	*	16.36	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

TIME	RIGHT HIP VELOCITIES BRACED				
	6	7	8	9	10
0.00	-42.48	39.39	-38.91	-44.98	18.89
0.01	-42.74	41.99	-36.19	-42.87	23.28
0.02	-41.73	47.66	-29.53	-38.23	31.96
0.03	-37.64	57.54	-17.90	-30.99	44.53
0.04	-29.01	71.53	-1.32	-21.10	60.08
0.05	-15.42	88.35	19.43	-8.46	77.70
0.06	2.43	106.17	43.10	6.35	96.16
0.07	23.50	123.53	68.55	22.66	114.62
0.08	47.11	139.70	95.09	40.25	133.19
0.09	72.54	154.34	121.93	58.97	152.03
0.10	98.54	167.27	148.16	78.78	170.72
0.11	122.98	178.42	172.90	100.00	188.29
0.12	144.39	187.63	195.55	122.58	203.72
0.13	163.04	194.60	215.67	145.60	216.46
0.14	179.34	198.81	232.38	168.19	226.08
0.15	193.57	199.51	244.50	189.73	232.07
0.16	206.64	195.83	251.18	209.15	234.08
0.17	219.42	187.36	252.31	224.87	231.48
0.18	231.68	174.62	248.54	235.10	223.02
0.19	242.51	158.71	240.65	237.94	208.06
0.20	250.52	140.62	229.23	232.32	187.25
0.21	254.01	120.78	214.78	218.83	162.19
0.22	251.77	99.55	197.80	199.23	134.71
0.23	243.51	77.61	178.74	175.47	106.29
0.24	228.99	55.70	158.11	149.56	78.29
0.25	208.02	34.58	136.32	123.35	51.63
0.26	181.14	15.32	113.56	98.45	26.25
0.27	150.21	-1.64	89.76	75.98	1.90
0.28	118.04	-17.07	64.74	56.34	-21.26
0.29	86.77	-31.88	38.55	39.33	-43.22
0.30	57.38	-46.51	11.46	24.27	-64.21
0.31	30.33	-60.78	-16.11	10.08	-84.06
0.32	5.86	-74.09	-43.69	-4.51	-102.14
0.33	-15.89	-85.72	-70.79	-20.45	-117.60
0.34	-35.03	-95.04	-96.96	-38.01	-129.56
0.35	-52.11	-101.71	-121.76	-56.66	-137.73
0.36	-68.29	-105.71	-144.57	-75.47	-143.11
0.37	-84.82	-107.53	-164.66	-93.97	-147.18
0.38	-102.27	-108.17	-181.32	-112.70	-150.79
0.39	-120.50	-108.72	-193.85	-132.31	-153.94
0.40	-138.61	-109.83	-201.84	-152.72	-156.26
0.41	-155.33	-111.38	-205.46	-172.55	-157.48
0.42	-169.04	-113.01	-205.29	-189.55	-158.15
0.43	-178.34	-114.65	-202.09	-201.49	-159.48
0.44	-183.45	-115.78	-196.87	-207.04	-161.68

TABLE 10 CONTINUED

RIGHT HIP VELOCITIES BRACED					
TIME	6	7	8	9	10
0.45	-185.85	-115.35	-190.77	-206.00	-163.54
0.46	-186.63	-112.47	-184.73	-198.66	-163.43
0.47	-186.41	-107.23	-179.35	-186.33	-160.56
0.48	-185.62	-100.75	-174.78	-171.73	-155.47
0.49	-184.04	-93.93	-170.66	-157.19	-148.84
0.50	-180.97	-87.01	-166.54	-143.77	-140.95
0.51	-175.97	-80.17	-162.52	-131.70	-131.82
0.52	-169.33	-73.87	-158.97	-120.71	-121.08
0.53	-161.90	-68.67	-156.05	-110.25	-107.99
0.54	-154.47	-64.46	-153.57	-99.63	-91.62
0.55	-147.42	-60.26	-150.85	-88.11	-71.43
0.56	-140.69	-54.83	-146.87	-75.09	-48.06
0.57	-133.28	-47.42	-140.79	-60.25	-23.20
0.58	-123.44	-38.11	-132.38	-43.63	1.05
0.59	-110.42	-27.29	-121.45	-25.06	23.00
0.60	-94.74	-15.62	-107.88	-4.59	41.66
0.61	-77.00	-4.22	-92.01	16.40	56.35
0.62	-57.72	5.97	-74.33	35.99	66.97
0.63	-37.47	14.70	-55.24	52.86	74.04
0.64	-16.44	21.76	-35.33	66.16	78.00
0.65	5.16	26.69	-15.39	75.45	79.13
0.66	26.23	28.83	3.95	80.61	78.12
0.67	45.19	28.05	22.03	82.04	76.08
0.68	60.62	25.16	38.02	80.72	74.22
0.69	71.50	21.13	51.26	77.51	73.16
0.70	77.53	16.79	61.39	72.89	72.85
0.71	79.25	13.09	68.33	67.18	72.79
0.72	77.46	10.68	72.32	60.98	72.47
0.73	72.69	9.48	73.94	55.29	71.79
0.74	65.45	9.06	73.81	50.89	70.93
0.75	56.38	*	72.46	48.00	70.13
0.76	46.26	*	70.39	46.49	69.61
0.77	36.18	*	68.23	*	*
0.78	27.49	*	66.58	*	*
0.79	21.21	*	*	*	*
0.80	17.58	*	*	*	*
0.81	16.08	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

LEFT HIP VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.00	-142.41	-167.46	-180.28	-149.01	-205.85
0.01	-144.65	-167.67	-189.75	-153.40	-209.05
0.02	-147.29	-167.45	-202.96	-157.97	-212.01
0.03	-148.14	-166.33	-216.14	-162.59	-213.97
0.04	-145.82	-163.89	-221.78	-166.93	-213.99
0.05	-142.16	-160.10	-215.47	-170.32	-210.91
0.06	-143.65	-155.49	-205.25	-171.50	-203.15
0.07	-154.37	-150.44	-202.60	-169.33	-189.21
0.08	-169.84	-144.76	-211.45	-163.45	-168.44
0.09	-180.92	-138.02	-230.54	-154.02	-141.27
0.10	-180.44	-129.83	-255.07	-141.46	-109.38
0.11	-168.83	-120.09	-276.96	-126.34	-75.71
0.12	-149.80	-108.81	-284.59	-109.23	-43.84
0.13	-125.09	-95.98	-265.72	-90.81	-17.06
0.14	-95.97	-81.67	-215.65	-72.11	2.27
0.15	-66.31	-66.26	-142.81	-54.20	13.40
0.16	-46.33	-50.47	-70.05	-37.42	17.36
0.17	-47.82	-35.54	-16.74	-22.02	16.38
0.18	-73.31	-22.71	14.83	-8.42	12.86
0.19	-103.34	-11.73	29.47	3.80	8.83
0.20	-110.81	-1.15	34.83	15.59	5.63
0.21	-92.66	9.91	42.64	27.10	4.13
0.22	-63.25	21.55	58.60	37.78	4.86
0.23	-35.93	33.57	76.88	46.78	8.16
0.24	-16.22	45.37	91.64	52.91	13.94
0.25	-2.83	56.00	99.78	55.05	21.52
0.26	5.02	63.95	95.35	52.95	29.36
0.27	8.42	68.19	76.53	47.28	35.24
0.28	10.90	68.82	50.80	39.28	36.73
0.29	16.58	66.36	25.29	30.25	32.35
0.30	27.43	61.39	3.18	21.19	22.33
0.31	40.71	54.39	-12.76	12.62	8.94
0.32	51.57	45.62	-20.70	4.58	-5.17
0.33	56.82	34.91	-21.48	-3.11	-18.43
0.34	56.35	21.92	-19.68	-10.51	-29.81
0.35	50.78	6.65	-20.01	-17.42	-38.96
0.36	36.37	-9.89	-21.07	-23.71	-46.90
0.37	9.75	-26.81	-16.39	-29.45	-54.94
0.38	-26.01	-44.24	0.75	-34.72	-63.43
0.39	-63.09	-61.97	32.64	-38.92	-71.52
0.40	-91.43	-78.99	76.38	-40.89	-77.55
0.41	-100.40	-93.85	126.64	-39.67	-79.63
0.42	-85.45	-105.09	176.37	-34.66	-76.26
0.43	-52.65	-111.61	217.07	-25.54	-66.64
0.44	-14.28	-112.70	240.52	-12.00	-50.45

TABLE 10 CONTINUED
LEFT HIP VELOCITIES NONBRACED

TIME	1	2	3	4	5
0.45	19.18	-108.05	240.42	5.92	-28.36
0.46	47.12	-97.94	213.35	27.25	-2.79
0.47	72.09	-83.18	162.88	50.58	23.80
0.48	93.86	-64.72	102.28	74.77	50.49
0.49	117.04	-43.33	51.57	98.57	76.74
0.50	147.94	-19.40	27.76	120.68	102.09
0.51	183.03	6.89	34.44	140.06	126.41
0.52	214.52	35.04	68.02	155.94	149.18
0.53	237.95	64.15	124.00	167.87	168.90
0.54	249.70	93.72	190.16	175.67	183.86
0.55	247.92	123.44	248.52	179.17	192.52
0.56	236.22	152.06	283.20	178.11	193.42
0.57	220.81	177.77	287.48	172.53	185.57
0.58	205.56	198.88	265.95	163.18	169.32
0.59	189.12	213.98	227.71	151.31	147.37
0.60	167.31	222.96	181.47	138.03	123.56
0.61	139.04	227.77	134.29	123.70	100.47
0.62	105.78	229.82	88.32	108.60	79.79
0.63	69.84	228.51	40.52	93.48	63.36
0.64	35.23	223.36	-11.76	78.98	53.56
0.65	7.54	214.50	-65.70	65.28	52.02
0.66	-6.31	202.04	-109.74	52.24	57.87
0.67	-2.35	186.30	-133.77	39.74	68.05
0.68	16.39	168.12	-138.46	27.95	78.84
0.69	40.63	148.71	-129.84	17.13	87.66
0.70	58.68	129.03	-113.85	7.58	93.78
0.71	61.35	108.99	-93.10	-0.38	97.63
0.72	47.07	88.26	-70.84	-6.50	100.26
0.73	22.31	67.05	-53.69	-10.87	102.55
0.74	-8.15	45.75	-45.31	-13.65	104.18
0.75	-42.75	24.76	-44.08	-15.10	*
0.76	-75.86	4.73	-45.72	-15.60	*
0.77	-100.08	-13.95	*	*	*
0.78	-111.88	-31.55	*	*	*
0.79	*	-48.16	*	*	*
0.80	*	-63.55	*	*	*
0.81	*	-77.51	*	*	*
0.82	*	-89.98	*	*	*
0.83	*	-100.91	*	*	*
0.84	*	-110.10	*	*	*
0.85	*	-117.20	*	*	*
0.86	*	-121.94	*	*	*
0.87	*	-124.40	*	*	*
0.88	*	-125.15	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

LEFT HIP VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.00	-90.21	-92.10	-140.75	**	-283.48
0.01	-90.86	-96.66	-144.23	**	-239.16
0.02	-90.97	-103.43	-147.53	**	-237.59
0.03	-91.82	-112.84	-150.44	**	-233.55
0.04	-95.26	-123.71	-152.79	**	-227.53
0.05	-102.27	-133.77	-154.44	**	-220.13
0.06	-111.32	-141.30	-155.02	**	-211.23
0.07	-120.06	-145.97	-154.17	**	-199.69
0.08	-127.02	-148.52	-151.90	**	-184.10
0.09	-130.35	-149.15	-148.41	**	-165.02
0.10	-128.99	-147.24	-143.93	**	-144.96
0.11	-125.41	-142.37	-138.65	**	-126.55
0.12	-122.24	-134.12	-132.40	**	-109.85
0.13	-119.01	-121.77	-124.60	**	-91.78
0.14	-114.69	-105.35	-115.02	**	-69.97
0.15	-109.11	-85.92	-103.84	**	-44.66
0.16	-102.78	-65.29	-91.35	**	-18.27
0.17	-95.02	-45.45	-77.96	**	6.60
0.18	-83.47	-27.95	-64.16	**	29.07
0.19	-67.69	-13.36	-50.33	**	49.71
0.20	-49.42	-1.06	-36.74	**	69.54
0.21	-29.87	10.83	-23.60	**	88.64
0.22	-10.25	23.93	-10.95	**	105.74
0.23	7.60	38.22	1.36	**	118.67
0.24	22.54	52.19	13.26	**	125.62
0.25	35.06	63.72	24.38	**	126.17
0.26	47.36	71.26	34.15	**	121.67
0.27	60.83	74.28	41.88	**	114.18
0.28	73.76	73.12	46.96	**	105.27
0.29	82.05	68.13	48.92	**	95.67
0.30	81.26	59.34	47.59	**	85.49
0.31	68.92	46.80	42.94	**	74.78
0.32	45.51	30.58	35.26	**	63.81
0.33	14.65	11.34	25.13	**	52.89
0.34	-17.35	-8.72	13.16	**	42.08
0.35	-43.86	-26.97	-0.03	**	31.07
0.36	-60.78	-42.85	-13.65	**	19.31
0.37	-66.79	-56.93	-26.82	**	5.71
0.38	-62.53	-69.01	-38.78	**	-11.36
0.39	-50.45	-78.05	-48.61	**	-33.32
0.40	-33.79	-82.62	-55.29	**	-59.55
0.41	-15.36	-81.58	-57.99	**	-85.20
0.42	2.84	-74.47	-56.18	**	-103.75
0.43	19.68	-61.82	-49.67	**	-110.64
0.44	34.77	-45.34	-38.75	**	-104.48

TABLE 10 CONTINUED
LEFT HIP VELOCITIES NONBRACED

TIME	6	7	8	9	10
0.45	48.21	-27.22	-24.27	**	-87.25
0.46	60.29	-8.99	-7.59	**	-63.80
0.47	71.28	9.35	9.85	**	-39.72
0.48	81.45	29.34	27.01	**	-18.58
0.49	91.43	52.42	43.30	**	-1.06
0.50	102.12	78.81	58.59	**	14.88
0.51	114.18	106.99	73.13	**	32.73
0.52	127.99	134.20	87.33	**	54.44
0.53	143.21	157.81	101.54	**	78.35
0.54	157.57	176.97	115.89	**	101.20
0.55	167.62	192.55	130.30	**	119.95
0.56	170.94	205.49	144.71	**	132.82
0.57	167.13	215.89	158.80	**	140.11
0.58	157.89	222.61	171.88	**	144.20
0.59	145.63	223.90	183.35	**	148.30
0.60	132.34	218.23	192.75	**	154.63
0.61	118.79	205.19	199.23	**	162.99
0.62	104.30	185.69	201.98	**	171.16
0.63	87.51	161.72	200.56	**	176.37
0.64	68.32	136.09	194.49	**	176.19
0.65	48.09	111.50	183.41	**	169.00
0.66	28.20	89.76	167.72	**	153.66
0.67	9.89	72.09	148.52	**	127.48
0.68	-5.59	59.64	127.27	**	87.14
0.69	-17.18	53.16	105.37	**	35.63
0.70	-24.34	52.28	83.92	**	-16.89
0.71	-27.48	54.57	63.60	**	-57.77
0.72	-28.12	57.48	45.07	**	-79.83
0.73	-28.31	60.08	29.26	**	-85.52
0.74	-28.94	61.88	17.03	**	-81.26
0.75	-29.65	62.54	8.81	**	-73.05
0.76	-30.23	62.49	4.27	**	-65.16
0.77	-30.75	*	2.46	**	-59.92
0.78	-31.30	*	2.11	**	-57.74
0.79	-31.87	*	*	**	-57.29
0.80	*	*	*	**	*
0.81	*	*	*	**	*
0.82	*	*	*	**	*
0.83	*	*	*	**	*
0.84	*	*	*	**	*
0.85	*	*	*	**	*
0.86	*	*	*	**	*
0.87	*	*	*	**	*
0.88	*	*	*	**	*

* END OF SUBJECT'S GAIT

** COMPUTER SYSTEM WAS UNABLE TO GENERATE DATA

TABLE 10 CONTINUED

LEFT HIP VELOCITIES BRACED					
TIME	1	2	3	4	5
0.00	-193.41	-167.32	-77.13	-115.45	-173.06
0.01	-195.61	-173.34	-79.90	-117.76	-175.56
0.02	-197.36	-178.99	-83.58	-119.97	-178.27
0.03	-198.10	-184.05	-88.23	-121.87	-180.60
0.04	-197.48	-188.08	-93.76	-123.00	-181.71
0.05	-195.50	-190.71	-100.25	-122.88	-180.78
0.06	-191.97	-192.07	-108.38	-121.37	-177.23
0.07	-186.57	-192.41	-118.70	-118.67	-170.57
0.08	-179.13	-191.53	-130.83	-115.20	-160.41
0.09	-169.75	-188.90	-143.62	-111.15	-146.73
0.10	-158.83	-184.05	-155.51	-106.23	-130.00
0.11	-146.87	-176.87	-164.79	-99.74	-110.88
0.12	-133.89	-167.31	-169.67	-91.32	-90.01
0.13	-119.37	-155.07	-168.32	-81.49	-67.91
0.14	-103.46	-139.96	-158.96	-70.83	-45.16
0.15	-86.95	-122.17	-140.70	-59.62	-22.35
0.16	-70.36	-102.43	-114.69	-48.10	0.28
0.17	-54.25	-81.45	-83.07	-36.50	22.53
0.18	-39.39	-59.58	-47.98	-25.09	43.93
0.19	-25.89	-37.15	-12.04	-14.23	63.51
0.20	-13.43	-14.61	21.83	-4.47	79.99
0.21	-2.29	7.61	50.90	3.55	92.12
0.22	6.99	29.04	72.97	9.55	98.97
0.23	14.09	49.03	86.67	13.79	99.98
0.24	18.91	66.95	91.87	16.42	95.06
0.25	21.32	82.51	89.74	17.32	84.58
0.26	20.95	96.06	82.41	16.54	69.61
0.27	17.66	107.91	71.54	14.18	51.72
0.28	11.97	117.68	57.37	10.39	32.64
0.29	4.97	124.89	39.58	5.50	13.48
0.30	-2.08	129.27	18.06	-0.02	-5.16
0.31	-8.27	130.68	-6.79	-5.90	-22.56
0.32	-12.97	128.81	-34.15	-11.92	-37.98
0.33	-15.67	123.09	-62.97	-17.70	-50.85
0.34	-15.72	113.25	-91.23	-22.78	-60.38
0.35	-12.29	99.54	-115.97	-26.64	-65.74
0.36	-4.38	82.54	-133.82	-28.68	-66.90
0.37	8.63	63.17	-142.12	-28.34	-64.31
0.38	26.48	42.59	-139.59	-25.14	-58.51
0.39	48.05	21.85	-126.24	-18.90	-50.48
0.40	71.77	1.50	-102.91	-9.70	-41.33
0.41	96.20	-18.52	-70.88	2.23	-31.61
0.42	119.89	-38.04	-32.07	16.56	-21.31
0.43	141.37	-55.82	10.65	32.87	-10.19
0.44	159.81	-70.04	54.00	50.50	2.26

TABLE 10 CONTINUED

LEFT HIP VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	175.16	-79.12	94.60	68.58	16.74
0.46	187.78	-82.70	129.22	86.18	33.87
0.47	198.08	-81.26	155.73	102.43	53.76
0.48	206.16	-75.62	174.07	116.65	75.73
0.49	211.88	-67.02	186.63	128.84	98.40
0.50	214.97	-56.78	196.15	139.18	120.17
0.51	215.08	-45.95	202.58	147.29	139.62
0.52	211.88	-35.17	204.92	152.61	155.61
0.53	205.07	-24.61	203.63	154.95	167.23
0.54	194.20	-14.07	198.89	154.23	174.21
0.55	178.97	-2.94	190.25	150.36	176.80
0.56	159.82	9.80	177.24	143.47	175.32
0.57	137.89	25.07	160.30	134.08	170.30
0.58	114.54	43.07	141.04	122.99	162.62
0.59	90.83	63.11	121.35	110.73	153.09
0.60	67.46	84.09	102.37	97.52	142.38
0.61	45.01	104.93	84.20	83.62	131.13
0.62	23.66	124.52	66.26	69.29	119.80
0.63	3.19	141.36	48.04	54.72	108.58
0.64	-16.41	153.70	29.92	40.19	97.37
0.65	-34.86	160.47	12.96	26.14	86.14
0.66	-52.17	162.41	-1.72	13.00	75.31
0.67	-68.32	160.77	-13.52	1.14	65.56
0.68	-82.97	155.84	-22.54	-9.21	57.39
0.69	-95.76	147.82	-29.02	-17.94	50.85
0.70	-106.43	137.25	-33.28	-25.01	45.69
0.71	-114.65	125.16	-36.02	-30.19	41.52
0.72	-120.14	112.29	-37.98	-33.34	38.16
0.73	-123.04	98.54	-39.51	-34.72	35.67
0.74	*	83.37	-40.55	*	34.16
0.75	*	66.41	-40.99	*	*
0.76	*	48.02	-41.13	*	*
0.77	*	29.35	*	*	*
0.78	*	11.80	*	*	*
0.79	*	-3.70	*	*	*
0.80	*	-16.82	*	*	*
0.81	*	-27.36	*	*	*
0.82	*	-35.37	*	*	*
0.83	*	-41.20	*	*	*
0.84	*	-45.29	*	*	*
0.85	*	-47.94	*	*	*
0.86	*	-49.22	*	*	*
0.87	*	-49.27	*	*	*
0.88	*	-48.60	*	*	*

* END OF SUBJECT'S GAIT

TABLE 10 CONTINUED

TIME	LEFT HIP VELOCITIES BRACED				
	6	7	8	9	10
0.00	-79.96	-171.02	-136.12	-180.09	-139.59
0.01	-82.82	-172.49	-138.83	-183.09	-143.48
0.02	-87.52	-171.61	-141.52	-185.18	-149.38
0.03	-94.25	-168.99	-143.80	-185.73	-157.38
0.04	-102.73	-165.63	-145.35	-184.71	-167.48
0.05	-112.31	-162.06	-146.07	-182.41	-179.58
0.06	-122.17	-158.09	-146.07	-178.54	-192.61
0.07	-131.58	-153.00	-145.52	-172.74	-204.29
0.08	-140.13	-146.11	-144.43	-164.96	-211.78
0.09	-147.49	-137.72	-142.35	-154.88	-213.26
0.10	-153.08	-129.02	-138.50	-141.93	-208.52
0.11	-155.75	-121.29	-132.02	-125.80	-198.39
0.12	-154.47	-114.86	-122.46	-106.55	-184.08
0.13	-149.21	-108.65	-110.33	-84.53	-166.64
0.14	-141.03	-100.98	-96.72	-60.89	-146.38
0.15	-131.30	-90.52	-82.73	-37.07	-123.10
0.16	-120.60	-76.78	-69.18	-13.79	-96.78
0.17	-108.97	-60.09	-56.10	8.30	-67.47
0.18	-96.56	-41.29	-42.66	28.02	-35.10
0.19	-83.66	-21.50	-28.03	44.67	-0.33
0.20	-70.54	-1.73	-12.07	58.40	35.63
0.21	-57.20	17.40	4.57	69.97	71.59
0.22	-43.74	35.47	20.54	80.03	105.43
0.23	-30.61	52.11	34.36	88.50	133.84
0.24	-18.37	66.49	45.56	94.67	154.65
0.25	-7.56	77.83	54.67	97.61	167.73
0.26	1.30	86.18	62.17	96.75	174.34
0.27	7.87	91.89	68.02	91.94	175.96
0.28	12.06	94.67	71.44	83.49	173.41
0.29	13.82	93.83	71.24	71.95	166.76
0.30	13.21	88.40	66.37	57.86	155.72
0.31	10.56	77.13	56.46	41.45	140.21
0.32	6.17	59.44	41.82	23.05	120.57
0.33	0.20	36.08	23.31	3.65	97.34
0.34	-7.19	8.59	2.36	-15.40	70.72
0.35	-15.60	-21.04	-19.38	-33.07	40.86
0.36	-24.39	-50.38	-40.30	-49.18	8.71
0.37	-32.89	-76.07	-59.03	-63.69	-24.17
0.38	-40.66	-94.36	-74.55	-75.91	-56.03
0.39	-47.46	-103.43	-86.33	-84.80	-84.90
0.40	-52.98	-103.38	-94.15	-89.41	-108.91
0.41	-56.43	-94.28	-97.81	-89.39	-126.83
0.42	-56.92	-76.66	-97.23	-84.73	-138.03
0.43	-53.93	-52.40	-92.58	-75.50	-142.01
0.44	-46.98	-24.00	-84.31	-62.56	-137.91

TABLE 10 CONTINUED

LEFT HIP VELOCITIES BRACED					
TIME	6	7	8	9	10
0.45	-35.84	6.11	-72.87	-47.42	-124.55
0.46	-20.90	35.67	-58.63	-31.64	-101.17
0.47	-2.94	63.21	-42.21	-15.93	-68.47
0.48	17.18	88.47	-24.66	0.23	-29.03
0.49	38.64	111.91	-6.76	17.22	14.22
0.50	60.68	134.47	11.26	34.73	58.25
0.51	82.58	157.35	29.59	51.77	99.07
0.52	103.96	180.57	48.39	67.47	134.17
0.53	124.78	202.16	67.42	81.72	163.89
0.54	144.66	219.43	86.21	95.07	187.69
0.55	162.82	230.15	104.36	108.08	203.89
0.56	178.51	232.94	121.74	120.63	212.61
0.57	191.16	227.81	138.23	131.97	214.93
0.58	200.34	216.63	153.53	140.98	211.38
0.59	205.47	202.75	167.41	146.51	202.73
0.60	205.95	189.46	179.62	147.88	190.04
0.61	201.60	178.01	189.40	145.28	174.20
0.62	192.96	168.25	196.02	139.38	155.58
0.63	181.05	159.61	198.98	130.74	134.08
0.64	166.68	150.45	197.69	119.85	109.54
0.65	150.25	138.59	191.67	107.12	82.79
0.66	132.25	122.34	181.17	92.96	56.95
0.67	113.36	101.17	166.81	77.98	34.72
0.68	94.42	76.06	149.11	63.14	16.22
0.69	76.00	49.55	128.98	49.31	1.03
0.70	58.45	24.52	107.63	36.92	-10.98
0.71	42.29	2.51	86.35	25.74	-20.15
0.72	27.65	-15.03	66.29	15.61	-26.46
0.73	14.00	-26.02	48.51	6.93	-29.50
0.74	1.23	-30.72	33.88	0.09	-29.72
0.75	-10.08	*	22.83	-4.79	-28.55
0.76	-19.08	*	15.31	-7.47	-27.23
0.77	-25.30	*	10.90	*	*
0.78	-29.01	*	8.94	*	*
0.79	-30.84	*	*	*	*
0.80	-31.48	*	*	*	*
0.81	-31.52	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

APPENDIX XIII TABLE 11 ANKLE VELOCITIES - RAW DATA

RIGHT ANKLE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.00	-123.43	-102.89	-287.28	-330.38	-23.40
0.01	-120.89	-99.22	-284.01	-328.56	-31.63
0.02	-128.79	-90.42	-270.77	-317.69	-46.47
0.03	-147.46	-78.91	-237.98	-293.55	-61.96
0.04	-168.52	-69.81	-183.85	-258.59	-78.81
0.05	-180.61	-67.24	-115.20	-219.81	-104.28
0.06	-180.34	-68.72	-41.13	-181.73	-137.02
0.07	-170.21	-68.45	29.87	-145.55	-168.37
0.08	-152.68	-62.43	92.39	-111.78	-189.48
0.09	-130.99	-46.51	147.49	-80.52	-191.07
0.10	-106.67	-17.47	202.09	-50.42	-169.11
0.11	-75.04	23.90	264.37	-17.31	-131.42
0.12	-31.09	73.86	337.38	23.67	-85.67
0.13	26.21	128.31	415.72	73.94	-29.87
0.14	99.77	185.14	490.34	127.81	42.28
0.15	190.87	244.54	552.49	176.79	135.70
0.16	288.37	306.94	593.87	219.04	249.94
0.17	377.99	369.21	601.19	256.61	382.80
0.18	452.09	423.57	557.93	289.90	529.66
0.19	502.19	463.21	463.65	318.00	667.10
0.20	518.82	484.00	335.01	340.07	750.63
0.21	499.86	481.79	190.63	357.20	749.38
0.22	452.89	455.72	49.20	370.46	671.21
0.23	391.08	410.61	-69.61	378.24	551.11
0.24	326.38	352.44	-148.32	377.21	425.05
0.25	263.53	286.52	-179.12	364.74	311.63
0.26	198.45	219.32	-169.15	341.06	213.85
0.27	122.68	153.50	-132.30	308.81	126.00
0.28	33.11	86.00	-80.90	270.08	41.05
0.29	-57.62	16.65	-25.42	222.74	-42.74
0.30	-129.85	-49.24	24.89	163.71	-119.25
0.31	-175.61	-103.76	61.22	96.46	-176.03
0.32	-195.04	-141.62	74.70	27.70	-207.65
0.33	-190.31	-162.60	62.16	-37.44	-219.56
0.34	-170.10	-167.10	37.71	-94.14	-210.40
0.35	-145.44	-155.06	19.47	-138.76	-173.21
0.36	-121.54	-127.98	10.50	-170.89	-109.56
0.37	-99.12	-90.09	5.77	-191.84	-32.63
0.38	-77.66	-48.52	0.40	-202.79	37.14
0.39	-55.85	-12.70	-10.43	-205.43	80.39
0.40	-30.10	11.13	-28.85	-202.34	89.12
0.41	6.45	25.52	-51.29	-196.62	73.14
0.42	52.59	34.92	-72.68	-191.09	46.77
0.43	93.95	39.69	-90.02	-187.29	17.53
0.44	114.11	38.24	-99.56	-185.38	-7.88

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.45	104.52	30.31	-97.94	-184.89	-22.97
0.46	68.55	19.18	-85.28	-185.69	-24.54
0.47	16.72	7.43	-63.18	-188.64	-17.14
0.48	-39.39	-5.47	-33.61	-195.77	-13.89
0.49	-91.75	-20.34	-2.39	-208.43	-29.48
0.50	-138.94	-37.62	18.84	-225.34	-74.90
0.51	-186.35	-57.87	15.25	-241.60	-153.84
0.52	-237.22	-81.09	-23.63	-252.88	-257.34
0.53	-284.46	-105.97	-98.45	-259.35	-360.34
0.54	-317.38	-130.64	-200.09	-260.97	-432.39
0.55	-328.28	-154.63	-306.45	-254.43	-452.32
0.56	-316.91	-181.12	-381.38	-233.83	-413.67
0.57	-291.93	-214.66	-391.58	-193.60	-336.86
0.58	-262.20	-256.72	-332.16	-133.39	-258.80
0.59	-225.11	-304.50	-239.92	-60.43	-194.81
0.60	-172.35	-350.42	-156.52	12.64	-139.91
0.61	-104.54	-385.20	-82.93	73.76	-92.79
0.62	-29.79	-399.69	-5.98	116.57	-54.76
0.63	41.49	-384.54	69.86	141.00	-21.88
0.64	94.98	-333.65	126.29	151.00	13.20
0.65	121.61	-251.92	145.53	151.00	54.04
0.66	130.75	-158.34	126.74	144.08	96.24
0.67	136.92	-73.39	82.69	132.26	132.93
0.68	143.31	-6.30	29.50	116.92	160.07
0.69	141.85	43.66	-17.79	99.61	179.38
0.70	123.37	78.65	-50.40	82.42	196.27
0.71	92.22	98.19	-68.62	68.36	214.28
0.72	57.61	101.30	-78.53	59.93	234.23
0.73	22.29	89.49	-87.01	57.28	256.08
0.74	-13.70	68.68	-98.46	58.10	281.48
0.75	-49.42	46.20	-112.52	59.46	*
0.76	-80.61	27.99	-123.30	61.15	*
0.77	-101.58	16.89	*	*	*
0.78	-109.55	12.36	*	*	*
0.79	*	13.76	*	*	*
0.80	*	21.38	*	*	*
0.81	*	36.10	*	*	*
0.82	*	59.88	*	*	*
0.83	*	95.33	*	*	*
0.84	*	142.44	*	*	*
0.85	*	197.62	*	*	*
0.86	*	257.12	*	*	*
0.87	*	316.95	*	*	*
0.88	*	372.63	*	*	*

* END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.00	-229.66	-275.69	-133.85	-95.48	-170.94
0.01	-209.98	-265.83	-137.19	-90.32	-165.01
0.02	-176.18	-241.11	-139.34	-82.14	-159.82
0.03	-137.20	-201.25	-138.07	-74.10	-156.87
0.04	-97.90	-151.29	-132.73	-68.60	-155.63
0.05	-56.69	-99.45	-124.51	-66.02	-152.79
0.06	-15.18	-54.64	-114.89	-66.65	-144.91
0.07	18.97	-21.86	-103.94	-70.52	-130.46
0.08	35.38	0.40	-89.58	-76.51	-109.44
0.09	30.69	15.20	-68.93	-82.85	-81.78
0.10	13.49	24.80	-40.19	-87.95	-48.52
0.11	2.62	31.98	-4.22	-90.06	-14.75
0.12	14.45	41.27	36.62	-86.91	14.58
0.13	52.46	57.98	79.96	-76.57	39.20
0.14	111.32	83.70	123.21	-60.18	62.50
0.15	183.61	116.16	164.57	-41.00	88.70
0.16	265.83	152.82	205.00	-20.81	119.66
0.17	355.48	192.98	245.21	1.18	154.92
0.18	443.66	238.58	283.03	27.47	192.73
0.19	509.63	293.33	316.45	60.39	230.39
0.20	531.66	358.49	344.00	100.21	265.21
0.21	509.90	425.14	361.54	143.25	295.42
0.22	456.16	478.06	364.97	183.84	317.09
0.23	377.78	503.29	353.96	218.13	322.35
0.24	286.21	487.19	329.23	247.08	303.88
0.25	196.39	420.87	291.31	273.80	260.76
0.26	118.89	308.43	242.74	295.27	203.81
0.27	55.03	168.58	188.09	306.97	148.61
0.28	-1.02	27.52	132.88	309.30	104.84
0.29	-51.66	-91.73	82.85	302.42	76.68
0.30	-90.86	-174.17	42.54	285.55	64.32
0.31	-105.89	-211.33	14.10	261.38	64.72
0.32	-88.42	-202.02	-2.30	234.68	70.91
0.33	-44.05	-152.82	-8.15	208.21	73.40
0.34	8.85	-77.22	-8.02	180.78	67.47
0.35	48.27	7.35	-6.23	149.45	53.34
0.36	60.59	83.05	-2.12	114.72	30.61
0.37	46.23	136.14	3.85	79.12	1.05
0.38	17.59	160.15	5.94	43.96	-30.40
0.39	-7.73	155.90	0.16	10.13	-59.54
0.40	-18.71	130.16	-13.40	-21.59	-83.61
0.41	-17.16	92.31	-32.00	-50.65	-101.13
0.42	-10.56	51.24	-51.77	-77.76	-110.69
0.43	-5.10	13.63	-68.70	-104.54	-111.47
0.44	-3.93	-16.03	-79.56	-129.31	-105.95

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.45	-8.33	-34.86	-83.41	-148.39	-98.21
0.46	-19.67	-40.67	-82.70	-161.79	-90.72
0.47	-37.87	-34.06	-81.53	-172.74	-82.48
0.48	-59.98	-19.88	-83.25	-185.61	-70.06
0.49	-81.06	-6.04	-89.19	-205.41	-53.16
0.50	-95.59	-1.77	-98.63	-235.25	-36.23
0.51	-99.01	-15.28	-109.77	-272.23	-25.50
0.52	-87.46	-50.65	-121.91	-310.21	-25.95
0.53	-59.62	-104.17	-136.67	-343.92	-38.35
0.54	-25.95	-162.55	-154.35	-364.84	-58.78
0.55	-8.34	-207.31	-172.13	-361.03	-81.40
0.56	-22.75	-226.96	-185.42	-324.10	-103.47
0.57	-73.23	-218.80	-190.87	-257.39	-123.88
0.58	-152.05	-184.70	-187.92	-176.00	-140.33
0.59	-229.89	-133.47	-176.97	-98.59	-150.12
0.60	-270.76	-77.83	-159.05	-38.41	-150.04
0.61	-270.83	-30.11	-136.72	1.49	-137.24
0.62	-246.57	0.36	-113.00	21.87	-112.05
0.63	-203.84	9.36	-90.04	25.31	-80.43
0.64	-147.71	-2.46	-68.75	21.57	-51.91
0.65	-88.07	-31.11	-49.64	23.22	-32.36
0.66	-35.83	-71.41	-33.92	35.24	-19.38
0.67	4.38	-116.25	-22.92	56.15	-9.96
0.68	36.66	-156.32	-17.14	81.78	-4.17
0.69	63.62	-182.83	-15.31	104.68	-4.73
0.70	79.49	-191.36	-15.49	117.79	-11.50
0.71	69.06	-183.74	-17.18	119.15	-23.52
0.72	23.08	-166.81	-20.54	110.08	-37.99
0.73	-51.30	-148.35	-25.61	92.50	-50.90
0.74	-139.37	-132.79	-32.06	70.04	-59.71
0.75	-228.27	-121.03	-39.12	46.75	-64.39
0.76	-312.45	-111.98	-45.97	24.49	-67.26
0.77	-380.73	*	-52.06	3.65	-69.62
0.78	-415.55	*	-57.19	-15.19	-70.33
0.79	-416.68	*	*	-30.35	-69.71
0.80	*	*	*	-40.00	*
0.81	*	*	*	-44.03	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

TIME	RIGHT ANKLE VELOCITIES BRACED				
	1	2	3	4	5
0.00	-60.93	-157.36	-134.99	-301.37	-112.68
0.01	-57.68	-165.67	-122.39	-303.04	-118.47
0.02	-47.59	-177.54	-106.41	-301.41	-133.14
0.03	-30.87	-189.68	-89.34	-292.36	-163.08
0.04	-8.42	-196.82	-75.68	-273.35	-205.17
0.05	19.67	-194.32	-68.19	-246.56	-246.95
0.06	54.07	-180.06	-60.99	-221.06	-275.70
0.07	94.17	-156.08	-45.33	-203.49	-280.41
0.08	136.77	-127.72	-17.21	-190.90	-253.99
0.09	178.59	-99.07	26.20	-176.61	-199.37
0.10	218.35	-70.11	87.47	-154.67	-127.79
0.11	256.43	-36.57	166.36	-121.64	-52.66
0.12	291.91	4.34	258.88	-76.74	17.62
0.13	320.92	50.17	358.08	-21.17	83.77
0.14	338.12	98.67	454.82	42.50	152.40
0.15	341.01	150.42	538.51	110.61	230.40
0.16	333.98	207.54	598.69	177.95	318.71
0.17	321.85	267.80	626.65	240.73	411.52
0.18	304.45	322.65	616.54	298.28	497.67
0.19	282.78	366.68	566.92	348.31	561.05
0.20	259.54	399.75	482.19	385.13	582.89
0.21	233.76	421.07	373.80	402.41	552.46
0.22	202.71	428.33	256.68	398.61	479.91
0.23	166.21	418.38	143.20	380.94	391.74
0.24	127.74	389.38	39.66	360.64	312.54
0.25	92.55	344.30	-52.25	345.67	250.75
0.26	63.78	292.96	-131.29	336.06	195.37
0.27	43.10	245.12	-192.09	325.63	132.67
0.28	30.65	203.83	-224.84	308.03	61.09
0.29	22.47	166.28	-222.96	282.22	-9.16
0.30	12.68	127.30	-187.15	251.98	-68.68
0.31	-2.11	83.65	-124.56	221.15	-124.11
0.32	-20.75	36.05	-49.22	189.45	-179.76
0.33	-39.28	-11.48	21.60	152.54	-223.05
0.34	-56.37	-54.22	73.00	106.78	-238.88
0.35	-73.36	-88.87	96.60	53.00	-218.26
0.36	-90.18	-114.49	94.94	-2.22	-156.86
0.37	-106.33	-132.79	77.42	-52.35	-62.21
0.38	-121.88	-146.89	52.71	-94.88	40.41
0.39	-135.52	-156.84	26.37	-127.24	119.67
0.40	-145.47	-159.37	0.76	-147.79	156.70
0.41	-152.51	-151.53	-21.73	-159.27	158.09
0.42	-158.44	-131.79	-39.70	-165.23	139.95
0.43	-163.84	-100.99	-54.50	-167.21	110.81
0.44	-169.38	-64.42	-66.66	-167.16	75.65

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	-176.68	-30.95	-75.09	-168.08	38.11
0.46	-187.62	-10.89	-79.00	-172.95	-0.60
0.47	-203.74	-9.80	-79.63	-183.75	-40.23
0.48	-224.88	-24.46	-80.28	-201.48	-79.86
0.49	-245.81	-46.72	-85.64	-228.93	-117.60
0.50	-256.63	-68.60	-100.96	-266.73	-151.71
0.51	-249.81	-86.21	-128.37	-303.73	-182.75
0.52	-224.59	-99.41	-165.01	-327.33	-213.47
0.53	-185.13	-109.44	-203.59	-335.39	-246.66
0.54	-137.84	-116.80	-237.58	-325.46	-281.50
0.55	-90.25	-120.15	-263.30	-293.19	-313.39
0.56	-49.98	-116.70	-272.38	-241.37	-341.16
0.57	-21.80	-107.12	-257.01	-181.20	-353.15
0.58	-4.52	-98.79	-219.92	-126.56	-324.89
0.59	8.70	-99.19	-180.98	-83.41	-257.03
0.60	24.35	-111.62	-161.67	-48.98	-177.10
0.61	42.70	-135.18	-157.98	-18.82	-113.85
0.62	60.60	-169.22	-151.26	10.32	-76.81
0.63	75.58	-215.14	-130.49	40.06	-53.91
0.64	86.02	-266.89	-93.95	70.21	-29.63
0.65	91.43	-308.35	-46.86	98.69	1.14
0.66	93.12	-323.36	0.64	122.29	30.73
0.67	93.74	-306.01	37.75	139.64	50.56
0.68	95.93	-260.37	56.99	152.76	58.30
0.69	100.46	-196.77	57.20	165.57	54.25
0.70	106.44	-128.43	42.05	181.04	40.55
0.71	112.89	-67.81	15.90	198.28	22.57
0.72	119.10	-21.52	-16.00	213.65	6.70
0.73	124.85	9.93	-46.71	224.08	-2.98
0.74	*	27.97	-70.52	*	-6.55
0.75	*	35.31	-85.16	*	*
0.76	*	36.97	-91.83	*	*
0.77	*	38.60	*	*	*
0.78	*	44.56	*	*	*
0.79	*	57.71	*	*	*
0.80	*	79.35	*	*	*
0.81	*	109.00	*	*	*
0.82	*	145.03	*	*	*
0.83	*	184.98	*	*	*
0.84	*	223.67	*	*	*
0.85	*	254.23	*	*	*
0.86	*	271.98	*	*	*
0.87	*	276.61	*	*	*
0.88	*	272.87	*	*	*

*END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES BRACED					
TIME	6	7	8	9	10
0.00	-134.63	-5.41	-246.70	-197.44	-201.21
0.01	-139.34	2.33	-246.36	-202.83	-191.80
0.02	-146.57	9.62	-242.29	-205.45	-177.38
0.03	-157.10	16.17	-234.36	-204.93	-158.61
0.04	-169.66	21.00	-222.81	-199.32	-137.61
0.05	-181.44	22.68	-208.86	-186.52	-116.11
0.06	-190.42	20.14	-196.18	-168.04	-92.91
0.07	-194.07	13.16	-183.56	-146.26	-67.53
0.08	-188.92	3.46	-161.71	-121.98	-43.16
0.09	-175.23	-3.81	-124.23	-97.63	-22.28
0.10	-157.06	-1.62	-71.56	-75.78	-4.67
0.11	-137.95	15.41	-7.66	-54.09	11.19
0.12	-116.88	46.03	61.13	-28.70	28.85
0.13	-88.39	82.15	127.51	1.45	53.70
0.14	-49.44	118.42	187.34	36.53	89.71
0.15	0.34	154.75	239.68	76.99	136.67
0.16	63.85	192.05	282.88	123.48	188.82
0.17	143.52	228.95	314.41	175.41	237.91
0.18	236.94	260.81	331.86	229.79	277.02
0.19	336.72	282.85	334.05	281.73	301.58
0.20	431.59	291.19	324.15	325.25	310.81
0.21	508.72	281.54	312.37	354.39	307.80
0.22	558.44	250.75	308.29	365.05	296.83
0.23	577.33	199.58	312.32	356.65	280.64
0.24	566.07	134.21	317.21	333.42	260.77
0.25	527.71	62.36	313.47	301.75	237.06
0.26	466.68	-12.71	294.38	264.92	206.10
0.27	388.25	-86.37	256.24	224.47	166.43
0.28	298.77	-147.70	197.86	183.51	121.89
0.29	205.50	-185.00	121.18	144.63	76.25
0.30	116.10	-190.45	35.65	108.96	31.35
0.31	37.42	-161.49	-36.65	78.13	-10.22
0.32	-25.93	-100.68	-74.93	53.43	-42.76
0.33	-71.97	-16.90	-73.98	33.98	-59.09
0.34	-99.77	71.30	-42.77	15.79	-57.43
0.35	-108.82	141.24	1.43	-4.62	-41.68
0.36	-99.27	177.72	40.25	-23.76	-16.25
0.37	-73.86	178.92	61.32	-35.08	12.63
0.38	-39.09	155.98	62.78	-35.47	36.29
0.39	-3.49	126.63	51.96	-26.95	49.98
0.40	25.55	104.75	39.32	-16.70	53.35
0.41	44.51	92.77	31.04	-15.58	47.26
0.42	53.55	87.21	29.19	-32.79	34.18
0.43	54.70	85.35	33.24	-69.00	18.48
0.44	49.13	85.60	39.91	-111.76	5.27

TABLE 11 CONTINUED

RIGHT ANKLE VELOCITIES BRACED					
TIME	6	7	8	9	10
0.45	36.83	86.87	43.20	-145.38	-2.68
0.46	18.42	87.97	34.31	-168.16	-7.07
0.47	-4.59	86.54	6.46	-183.99	-11.26
0.48	-30.64	78.87	-41.28	-191.14	-16.94
0.49	-58.97	61.04	-104.94	-188.58	-23.12
0.50	-89.74	30.34	-175.97	-180.25	-28.26
0.51	-123.08	-12.76	-238.87	-175.22	-34.70
0.52	-160.11	-65.41	-280.71	-180.51	-44.89
0.53	-202.86	-124.34	-302.43	-194.56	-57.94
0.54	-248.99	-185.14	-309.73	-209.82	-75.42
0.55	-291.04	-241.14	-305.49	-216.94	-102.35
0.56	-323.36	-284.54	-290.55	-208.90	-141.65
0.57	-340.66	-307.57	-267.37	-183.67	-192.84
0.58	-335.29	-302.45	-239.77	-144.64	-251.73
0.59	-305.07	-263.55	-207.40	-97.60	-308.82
0.60	-256.47	-198.02	-164.17	-47.57	-349.77
0.61	-200.32	-135.79	-101.46	2.28	-359.64
0.62	-145.98	-102.01	-23.38	48.11	-333.76
0.63	-97.92	-96.59	50.30	84.75	-281.66
0.64	-55.72	-107.94	103.75	107.23	-218.19
0.65	-17.32	-123.23	131.41	113.36	-155.42
0.66	16.59	-132.51	133.87	106.14	-100.07
0.67	40.29	-134.10	115.66	91.78	-55.11
0.68	47.16	-133.24	84.70	76.32	-21.46
0.69	38.26	-134.80	53.46	63.89	2.03
0.70	21.62	-140.06	31.23	56.32	17.60
0.71	5.34	-146.48	12.68	53.95	27.92
0.72	-6.78	-150.46	-10.50	55.88	35.35
0.73	-14.98	-150.25	-37.59	60.18	41.40
0.74	-19.99	-146.98	-64.24	64.67	45.94
0.75	-22.20	*	-86.40	67.76	47.80
0.76	-22.17	*	-100.03	69.51	46.72
0.77	-20.47	*	-103.49	*	*
0.78	-17.51	*	-98.93	*	*
0.79	-13.66	*	*	*	*
0.80	-9.58	*	*	*	*
0.81	-6.45	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

*END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.00	-93.17	199.69	-0.94	90.79	193.31
0.01	-79.71	195.18	-2.65	94.98	200.11
0.02	-59.88	185.80	-3.38	97.52	199.26
0.03	-41.43	167.62	-3.75	97.89	188.41
0.04	-33.05	139.67	-6.42	93.72	166.14
0.05	-37.56	103.93	-15.64	79.87	132.19
0.06	-48.21	63.03	-34.57	48.80	87.87
0.07	-53.24	20.03	-64.49	-3.36	34.01
0.08	-45.42	-21.17	-105.30	-73.47	-30.00
0.09	-30.44	-55.95	-154.68	-157.10	-102.90
0.10	-22.75	-81.09	-205.91	-249.75	-180.65
0.11	-31.10	-99.82	-244.48	-342.48	-258.12
0.12	-62.31	-120.40	-254.79	-423.44	-327.77
0.13	-124.39	-150.01	-234.47	-480.00	-378.05
0.14	-211.01	-192.79	-198.33	-493.11	-396.26
0.15	-299.34	-249.15	-166.38	-448.47	-373.87
0.16	-369.36	-315.60	-149.41	-357.59	-312.14
0.17	-406.02	-382.75	-149.05	-245.80	-224.25
0.18	-393.97	-431.74	-161.04	-132.50	-129.73
0.19	-331.44	-435.02	-175.16	-29.44	-45.69
0.20	-234.73	-379.52	-180.11	57.10	15.57
0.21	-133.73	-295.04	-170.66	122.87	45.14
0.22	-50.27	-223.56	-149.84	168.17	39.93
0.23	13.96	-181.80	-123.84	198.08	5.01
0.24	63.32	-166.03	-95.93	214.25	-48.62
0.25	99.66	-163.47	-67.03	214.72	-107.46
0.26	118.06	-160.25	-37.93	199.33	-159.30
0.27	116.16	-153.66	-11.65	170.56	-194.20
0.28	102.28	-151.02	8.85	132.94	-205.62
0.29	86.63	-152.15	24.07	91.91	-191.99
0.30	73.57	-149.50	35.19	51.94	-156.89
0.31	60.02	-136.31	39.66	14.99	-107.07
0.32	40.96	-112.31	33.35	-18.26	-50.84
0.33	14.50	-83.30	13.89	-47.09	2.30
0.34	-17.92	-53.40	-20.28	-70.83	41.43
0.35	-53.83	-22.97	-68.36	-89.46	57.95
0.36	-92.09	10.01	-124.05	-104.54	51.29
0.37	-131.05	45.22	-177.89	-118.17	24.67
0.38	-167.44	76.14	-221.14	-132.04	-18.39
0.39	-198.71	92.12	-246.46	-148.54	-70.43
0.40	-224.23	83.43	-250.75	-169.90	-122.17
0.41	-244.29	48.54	-237.99	-195.73	-166.89
0.42	-257.51	-3.89	-214.40	-222.30	-200.27
0.43	-260.56	-62.25	-182.87	-243.89	-218.98
0.44	-252.39	-117.37	-143.77	-254.87	-220.16

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES NONBRACED					
TIME	1	2	3	4	5
0.45	-234.21	-165.26	-96.78	-251.96	-202.63
0.46	-206.65	-205.79	-42.56	-235.46	-168.81
0.47	-170.95	-238.42	17.80	-206.17	-122.01
0.48	-129.38	-259.96	83.22	-163.89	-64.37
0.49	-81.06	-266.77	151.01	-110.76	0.49
0.50	-22.46	-257.51	216.06	-51.15	66.72
0.51	48.41	-234.23	270.80	10.59	127.77
0.52	133.05	-197.77	310.91	70.95	178.58
0.53	234.03	-145.28	339.25	127.68	216.82
0.54	352.59	-74.82	358.28	180.34	242.51
0.55	482.71	13.17	364.84	229.85	257.94
0.56	601.20	115.30	350.50	276.94	269.83
0.57	675.25	223.17	310.34	323.73	284.79
0.58	684.83	321.30	250.71	374.87	302.34
0.59	634.00	391.28	183.45	433.27	314.71
0.60	544.70	421.58	119.03	495.04	313.00
0.61	436.79	413.70	63.72	545.15	296.60
0.62	323.03	384.51	22.67	564.01	271.98
0.63	212.60	358.56	2.74	541.19	246.99
0.64	109.80	352.79	9.77	479.38	228.80
0.65	19.29	368.07	46.44	390.00	221.32
0.66	-45.08	390.02	111.16	284.22	221.32
0.67	-74.96	401.15	193.52	172.50	220.58
0.68	-77.92	393.55	272.34	66.07	212.38
0.69	-64.00	370.73	324.60	-27.41	194.69
0.70	-38.54	341.52	336.60	-104.34	172.04
0.71	-4.45	309.49	308.90	-162.41	153.32
0.72	36.74	275.28	254.20	-203.21	143.45
0.73	81.41	242.60	189.84	-232.44	139.71
0.74	114.89	218.71	128.27	-252.19	136.05
0.75	122.49	207.18	75.81	-261.24	*
0.76	109.60	197.67	36.87	-261.65	*
0.77	88.32	177.32	*	*	*
0.78	62.67	143.63	*	*	*
0.79	*	103.03	*	*	*
0.80	*	65.22	*	*	*
0.81	*	38.18	*	*	*
0.82	*	21.69	*	*	*
0.83	*	6.59	*	*	*
0.84	*	-16.00	*	*	*
0.85	*	-47.56	*	*	*
0.86	*	-80.50	*	*	*
0.87	*	-105.58	*	*	*
0.88	*	-118.26	*	*	*

* END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.00	247.51	32.38	55.85	151.61	72.95
0.01	226.03	41.64	66.59	139.40	73.81
0.02	192.22	48.85	75.72	109.30	73.59
0.03	150.05	49.63	80.86	61.45	71.90
0.04	104.65	40.95	80.20	-1.83	69.07
0.05	59.23	23.33	72.99	-77.62	65.63
0.06	15.23	0.94	58.88	-159.48	61.20
0.07	-23.40	-21.27	37.99	-241.49	54.46
0.08	-49.04	-40.20	10.84	-321.19	44.16
0.09	-60.71	-52.60	-21.97	-391.78	30.98
0.10	-69.49	-56.40	-60.06	-438.38	16.82
0.11	-88.96	-55.69	-104.30	-439.44	2.26
0.12	-125.56	-59.28	-153.42	-382.51	-13.32
0.13	-174.22	-75.60	-201.34	-278.10	-30.59
0.14	-222.78	-107.60	-241.14	-150.82	-49.03
0.15	-261.09	-152.96	-267.99	-28.02	-67.21
0.16	-288.02	-212.42	-279.42	63.90	-84.64
0.17	-309.23	-283.24	-274.61	110.22	-102.36
0.18	-325.20	-348.62	-254.43	112.91	-119.58
0.19	-329.85	-387.37	-223.06	80.69	-133.42
0.20	-318.77	-385.21	-186.10	27.93	-140.78
0.21	-296.00	-339.46	-145.69	-23.02	-138.17
0.22	-261.81	-259.80	-107.65	-50.30	-123.72
0.23	-208.48	-164.19	-73.46	-45.01	-99.00
0.24	-138.17	-73.83	-48.72	-16.33	-66.94
0.25	-65.57	-6.24	-35.83	18.52	-31.42
0.26	-9.70	28.86	-32.43	47.05	1.69
0.27	15.21	34.33	-35.11	64.27	25.85
0.28	5.89	23.90	-42.28	71.21	36.44
0.29	-23.21	12.77	-51.39	71.77	33.27
0.30	-48.44	9.26	-59.36	68.54	19.97
0.31	-54.68	12.46	-64.98	62.04	1.34
0.32	-40.98	17.41	-68.84	52.57	-16.60
0.33	-16.24	19.67	-71.25	41.57	-28.20
0.34	7.11	17.26	-70.86	31.01	-32.22
0.35	17.47	10.78	-66.33	21.72	-32.13
0.36	4.57	2.80	-59.27	11.66	-34.16
0.37	-35.23	-6.26	-53.37	-2.15	-42.94
0.38	-90.89	-20.14	-51.92	-21.15	-58.80
0.39	-142.80	-40.98	-57.12	-45.70	-80.53
0.40	-174.45	-66.56	-69.17	-74.74	-106.92
0.41	-180.22	-90.60	-85.46	-104.85	-136.96
0.42	-169.55	-107.26	-102.54	-131.48	-168.29
0.43	-161.79	-115.37	-118.35	-151.09	-196.31
0.44	-164.57	-115.92	-131.95	-162.49	-217.26

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES NONBRACED					
TIME	6	7	8	9	10
0.45	-165.94	-111.02	-141.93	-166.82	-229.36
0.46	-146.32	-105.13	-144.42	-167.53	-231.62
0.47	-100.02	-102.09	-137.26	-166.99	-223.52
0.48	-42.80	-102.00	-123.23	-164.74	-205.01
0.49	11.32	-102.00	-106.16	-164.20	-176.25
0.50	60.68	-96.42	-87.76	-170.02	-138.02
0.51	112.67	-76.09	-66.52	-175.30	-92.42
0.52	175.63	-35.44	-40.00	-169.40	-42.02
0.53	247.62	22.63	-7.11	-149.31	11.48
0.54	304.25	91.31	32.86	-114.62	67.99
0.55	314.13	163.96	80.34	-67.50	127.29
0.56	288.05	235.50	134.55	-17.49	185.55
0.57	265.23	301.02	192.79	25.34	237.48
0.58	269.85	355.12	250.49	57.61	279.19
0.59	309.50	394.63	303.18	80.61	306.27
0.60	373.95	418.45	346.85	98.74	315.36
0.61	429.98	424.23	376.44	118.29	307.86
0.62	440.91	409.68	388.96	144.37	288.57
0.63	395.29	373.67	386.21	177.71	262.61
0.64	311.41	314.53	371.90	215.27	233.52
0.65	220.38	235.24	349.63	251.15	202.18
0.66	142.48	152.79	322.96	276.91	166.68
0.67	87.21	83.96	294.75	284.14	126.47
0.68	59.29	31.71	266.14	269.08	85.18
0.69	57.20	-7.05	236.29	236.52	45.97
0.70	73.14	-35.32	202.96	197.60	10.53
0.71	94.37	-53.77	164.18	163.79	-17.73
0.72	109.52	-61.86	121.04	140.27	-34.79
0.73	113.93	-60.55	78.29	122.96	-38.53
0.74	107.13	-54.38	42.96	101.97	-29.55
0.75	87.44	-49.45	20.54	70.15	-11.05
0.76	49.06	-48.74	10.55	31.44	12.66
0.77	-0.01	*	7.61	-5.56	39.68
0.78	-37.17	*	5.85	-35.14	71.29
0.79	-51.78	*	*	-54.58	106.76
0.80	*	*	*	-64.62	*
0.81	*	*	*	-69.35	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.00	-129.94	154.30	275.08	19.28	368.25
0.01	-131.61	166.75	279.91	22.72	351.46
0.02	-136.93	177.46	279.79	25.47	321.81
0.03	-145.84	182.60	266.23	24.10	276.81
0.04	-155.45	178.89	234.14	15.68	216.89
0.05	-162.51	164.56	184.40	-1.88	145.24
0.06	-168.42	139.07	121.83	-31.36	67.28
0.07	-177.24	105.44	51.24	-72.96	-11.48
0.08	-191.37	68.66	-24.50	-121.36	-86.90
0.09	-210.73	31.02	-105.79	-169.01	-155.27
0.10	-232.65	-8.67	-196.84	-210.36	-214.15
0.11	-252.27	-53.84	-302.25	-245.28	-265.96
0.12	-264.02	-108.27	-414.43	-274.36	-313.15
0.13	-265.36	-173.27	-501.89	-293.31	-352.09
0.14	-261.02	-245.04	-528.22	-296.08	-377.88
0.15	-257.24	-315.07	-483.76	-279.06	-385.35
0.16	-250.61	-375.05	-392.00	-243.42	-365.62
0.17	-232.00	-420.25	-292.33	-194.34	-114.96
0.18	-195.68	-449.16	-208.37	-137.76	-242.39
0.19	-142.07	-458.99	-150.66	-77.21	-163.12
0.20	-77.80	-443.87	-118.30	-17.64	-92.41
0.21	-13.31	-398.84	-103.58	29.37	-44.62
0.22	42.82	-328.32	-97.78	55.48	-28.69
0.23	86.57	-247.96	-95.24	62.77	-42.44
0.24	116.60	-174.35	-91.70	56.96	-73.33
0.25	132.41	-117.74	-85.05	43.68	-102.74
0.26	132.81	-81.16	-75.25	28.79	-114.06
0.27	118.15	-63.08	-62.04	16.79	-100.57
0.28	91.56	-59.97	-44.56	8.99	-66.89
0.29	57.23	-67.64	-24.82	4.49	-25.75
0.30	18.70	-80.69	-7.10	1.73	9.24
0.31	-22.54	-92.22	5.20	-0.84	30.28
0.32	-64.86	-97.91	10.70	-4.60	36.95
0.33	-104.60	-96.31	9.63	-11.00	31.92
0.34	-137.07	-85.01	2.84	-22.26	14.39
0.35	-158.87	-63.13	-8.81	-39.77	-17.91
0.36	-170.17	-34.28	-24.98	-60.72	-60.22
0.37	-173.50	-4.59	-46.18	-80.90	-103.52
0.38	-171.01	19.70	-73.97	-98.85	-141.41
0.39	-163.38	35.50	-109.55	-114.31	-171.15
0.40	-149.39	43.00	-150.37	-127.46	-193.55
0.41	-126.26	41.95	-187.11	-139.21	-212.10
0.42	-91.74	30.04	-207.57	-149.20	-229.20
0.43	-45.74	4.67	-202.90	-154.74	-241.89
0.44	10.20	-33.01	-171.66	-153.33	-244.59

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES BRACED					
TIME	1	2	3	4	5
0.45	73.57	-77.13	-118.15	-144.15	-233.12
0.46	141.42	-119.45	-47.14	-127.52	-206.43
0.47	211.28	-152.76	37.36	-104.79	-166.32
0.48	281.79	-173.06	130.31	-44.50	-115.59
0.49	351.13	-179.15	221.17	-45.04	-56.25
0.50	415.23	-172.07	295.31	-6.27	9.78
0.51	467.06	-154.53	341.74	35.99	78.45
0.52	497.56	-129.69	359.32	77.94	145.48
0.53	499.44	-100.45	358.41	118.30	208.17
0.54	473.37	-70.33	351.50	156.68	263.26
0.55	427.31	-43.06	345.35	192.81	305.74
0.56	367.67	-20.97	340.19	226.50	331.51
0.57	300.29	-4.10	330.70	256.76	344.49
0.58	233.50	10.06	310.37	281.36	357.24
0.59	173.27	26.10	277.76	299.63	374.06
0.60	121.87	48.43	238.39	313.69	386.40
0.61	80.20	78.77	200.80	327.81	386.81
0.62	49.76	117.40	167.38	346.56	378.42
0.63	32.50	164.85	131.92	372.64	370.75
0.64	26.96	221.18	91.88	405.19	356.29
0.65	26.96	284.74	54.31	438.30	316.65
0.66	23.09	349.99	34.48	459.89	251.51
0.67	9.20	406.94	41.64	460.73	178.09
0.68	-13.16	444.21	68.71	443.33	116.29
0.69	-38.89	456.17	100.67	414.72	74.61
0.70	-62.37	445.72	123.69	381.36	48.76
0.71	-78.84	421.21	131.14	349.44	30.29
0.72	-86.26	391.58	121.53	323.00	13.28
0.73	-85.93	361.83	96.78	301.80	-3.19
0.74	*	332.57	63.57	*	-18.04
0.75	*	300.82	30.73	*	*
0.76	*	260.63	3.55	*	*
0.77	*	209.66	*	*	*
0.78	*	152.89	*	*	*
0.79	*	95.96	*	*	*
0.80	*	42.09	*	*	*
0.81	*	-7.08	*	*	*
0.82	*	-48.70	*	*	*
0.83	*	-77.82	*	*	*
0.84	*	-168.76	*	*	*
0.85	*	-88.47	*	*	*
0.86	*	-74.55	*	*	*
0.87	*	-55.67	*	*	*
0.88	*	-37.94	*	*	*

* END OF SUBJECT'S GAIT

TABLE 11 CONTINUED

TIME	LEFT ANKLE VELOCITIES BRACED				
	6	7	8	9	10
0.00	63.01	161.26	12.35	455.55	87.25
0.01	65.18	157.21	8.82	368.10	73.50
0.02	63.95	143.53	-1.20	226.83	54.11
0.03	58.11	116.85	-16.29	81.64	31.75
0.04	45.48	76.13	-35.27	-31.21	10.52
0.05	24.42	22.83	-57.98	-104.55	-6.60
0.06	-2.97	-38.92	-82.61	-140.21	-19.09
0.07	-33.25	-103.64	-106.45	-142.83	-27.73
0.08	-64.52	-164.96	-127.11	-120.45	-33.79
0.09	-95.37	-213.71	-141.83	-87.60	-40.41
0.10	-125.42	-240.76	-148.62	-62.67	-51.10
0.11	-156.88	-242.53	-148.74	-60.22	-64.28
0.12	-191.89	-22.29	-146.84	-85.86	-74.19
0.13	-229.25	-188.17	-148.16	-134.35	-75.90
0.14	-264.43	-150.66	-153.43	-190.18	-69.83
0.15	-291.93	-119.68	-159.75	-234.22	-63.13
0.16	-307.82	-101.02	-165.80	-251.16	-65.91
0.17	-310.27	-95.18	-172.36	-232.82	-82.71
0.18	-300.37	-97.38	-180.12	-183.02	-106.68
0.19	-281.46	-99.25	-186.57	-117.44	-124.69
0.20	-257.68	-94.26	-186.52	-53.66	-125.84
0.21	-232.18	-82.35	-174.94	-2.12	-106.28
0.22	-207.10	-68.01	-150.92	33.11	-71.98
0.23	-184.32	-56.53	-118.97	50.15	-36.88
0.24	-165.18	-51.83	-84.25	47.23	-13.74
0.25	-149.51	-54.94	-50.83	28.12	-5.53
0.26	-135.51	-62.19	-22.60	7.42	-4.94
0.27	-122.13	-66.37	-2.20	-0.31	-6.39
0.28	-109.35	-62.15	8.75	9.63	-10.80
0.29	-95.89	-48.72	9.72	33.74	-18.99
0.30	-79.75	-29.89	1.99	65.20	-29.70
0.31	-60.64	-10.84	-11.42	95.26	-40.63
0.32	-38.98	5.26	-26.92	119.65	-48.29
0.33	-15.46	18.22	-41.67	139.85	-49.29
0.34	8.34	30.19	-53.67	152.62	-43.48
0.35	30.09	41.94	-62.46	147.05	-33.71
0.36	46.78	47.84	-70.64	108.33	-25.32
0.37	56.27	41.73	-80.05	35.40	-23.67
0.38	57.85	23.54	-89.09	-47.39	-30.64
0.39	50.77	-4.95	-95.59	-117.08	-46.13
0.40	34.12	-41.82	-98.45	-165.98	-69.66
0.41	7.94	-84.92	-97.76	-191.41	-102.09
0.42	-25.95	-131.31	-94.31	-196.02	-145.88
0.43	-63.10	-176.14	-89.31	-188.94	-201.12
0.44	-96.63	-213.08	-85.03	-177.24	-261.27

TABLE 11 CONTINUED

LEFT ANKLE VELOCITIES BRACED					
TIME	6	7	8	9	10
0.45	-120.25	-235.02	-84.14	-165.18	-312.60
0.46	-132.26	-233.78	-87.63	-163.00	-339.18
0.47	-134.48	-205.90	-93.16	-177.53	-330.90
0.48	-129.44	-157.19	-96.11	-200.31	-288.96
0.49	-118.74	-98.54	-92.92	-218.14	-225.40
0.50	-102.11	-39.47	-82.20	-222.31	-154.97
0.51	-77.60	18.17	-63.51	-208.62	-88.76
0.52	-44.48	77.04	-35.35	-177.76	-31.19
0.53	-5.20	139.45	3.76	-133.12	20.13
0.54	37.26	208.19	48.83	-76.98	67.97
0.55	80.88	284.55	90.74	-12.04	113.20
0.56	124.38	363.73	126.81	50.21	156.62
0.57	167.41	436.60	158.77	97.10	198.63
0.58	209.98	492.98	187.46	131.07	239.77
0.59	250.36	520.71	214.56	169.71	283.71
0.60	285.74	509.79	242.55	230.14	334.20
0.61	314.45	458.58	272.94	299.96	386.23
0.62	336.21	375.03	305.20	357.45	429.52
0.63	351.21	274.48	337.17	407.39	455.86
0.64	359.01	174.20	367.26	460.93	457.67
0.65	258.14	87.88	392.77	508.35	430.74
0.66	346.80	22.77	404.46	501.62	379.29
0.67	324.92	-19.54	394.80	405.20	308.50
0.68	294.83	-42.52	366.93	255.14	219.04
0.69	259.56	-54.50	327.49	108.48	119.05
0.70	221.49	-64.78	281.71	-1.44	24.77
0.71	181.61	-78.11	234.74	-65.90	-49.08
0.72	138.84	-92.91	190.87	-92.27	-98.81
0.73	91.07	-103.23	151.85	-94.41	-132.18
0.74	39.03	-103.58	118.17	-86.31	-153.94
0.75	-13.06	*	91.04	-78.18	-163.65
0.76	-59.10	*	73.72	-75.08	-163.74
0.77	-93.92	*	66.16	*	*
0.78	-115.86	*	62.71	*	*
0.79	-126.68	*	*	*	*
0.80	-130.00	*	*	*	*
0.81	-129.27	*	*	*	*
0.82	*	*	*	*	*
0.83	*	*	*	*	*
0.84	*	*	*	*	*
0.85	*	*	*	*	*
0.86	*	*	*	*	*
0.87	*	*	*	*	*
0.88	*	*	*	*	*

* END OF SUBJECT'S GAIT

References

- Adams, D. G., & Peota, C. (1989). Highly regarded study supports knee braces. *Physician and Sportsmedicine*, vol 17(12), 19.
- American Academy of Orthopedic Surgeons. (1987). The use of knee braces. *American Academy of Orthopaedic Surgeons. A position Statement*, 1-3.
- Baker, B. E., VanHanswyk, E., Bogosian, S., Werner, F. W. & Murphy, D. (1987). A biomechanical study of the static stabilizing effect of knee braces on medial stability. *American Journal of Sports Medicine*, vol 15(6), 566-570.
- Baker, B. E., VanHanswyk, E., Bogosian, S. P., Werner, F. W. & Murphy, D. (1989). The effect of knee braces on lateral impact loading of the knee. *American Journal of Sports Medicine*, vol 17(2), 182-186.
- Beck, C., Drez, D., Young, J., Cannon, W. D., & Stone, M. L. (1986). Instrumented testing of functional knee braces. *American Journal of Sports Medicine*, vol 14(4), 253-256.
- Brown, T. D., Van Hoeck, J. E., & Brand, R. A. (1990). Laboratory evaluation of prophylactic knee brace performance under dynamic valgus loading using a surrogate leg model. *Clinics in Sports Medicine*, vol 9(4), 751-762.
- Cawley, P. W., France, E. P., & Paulos, L. E. (1989).

Comparison of rehabilitative knee braces: a biomechanical investigation. *American Journal of Sports Medicine*, vol 17(2), 141-146.

Devita, P., Hunter, P. B., and Skelly, W. (1992). Effect of a functional knee brace on the biomechanics of running. *Medicine and Science in Sports and Exercise*, vol 24(7), 797-806.

Dowd, R. D., Eckert, L. D., Logan, J. L., McCrory, D. A., Mears, F., Sussman, M. A., Laine, P. A., & Laking, J. D. (1992). Repeatability of lower extremity intersegmental angular velocities during the gait cycle. In, *Dynamics on human gait*. Vaughn, C., Davis, B. L., O'conner, J. C., (eds.). Champaign, IL: Human Kinetics Publishers, Inc.

France, E. P., Paulos, L. E., Jayaraman, G., & Rosenberg, T. D. (1987). The biomechanics of lateral knee bracing part II: impact response of the braced knee. *American Journal of Sportsmedicine*, vol 15, 430-438.

France, E. P., Cawley, P. W., & Paulos, L. E. (1990). Choosing functional knee braces. *Clinics in Sports Medicine*, vol 9(4), 743-750.

Fujiwara, L. M., Perrin, D. H., & Buxton, B. P. (1990). Effect of three lateral knee braces on speed and agility in experienced and non-experienced wearers. *Athletic Training*, vol 25(2), 160-161.

Garrick, J. G., & Regua, R. K. (1987). Prophylactic knee bracing. *American Journal of Sportsmedicine*, vol 15(5),

471-476.

Golding, L. A., Myers, C. R., & Sinning, W. E. (eds.).

(1989). The YMCA physical fitness test battery. *The Y's Way to Physical Fitness* (3rd ed.). Champaign, IL: Human Kinetics Publishers, Inc.

Grace, T. G., Skipper, B. J., Newberry, J. C., Nelson, M.

A., Sweetser, E. R., & Rothman, M. L. (1988).

Prophylactic knee braces and injury to the lower extremity. *Journal of Bone and Joint Surgery. American Volume*, 70(3), 422-427.

Hansen, B. L., Ward, J. C., & Diehl, R. C. (1985). The

preventive use of the Anderson knee stabler in football. *The Physician and Sportsmedicine*, vol 13(9), 75-81.

Hewson, G. F., Mendini, R. A., & Wang, J. B. (1986).

Prophylactic knee bracing in college football. *American Journal of Sports Medicine*, vol 14(4), 262-266.

Hofmann, A. A., Wyatt, R. W. B., Bourne, M. H., & Daniels,

A. U. (1984). Knee stability in orthotic knee braces. *American Journal of Sportsmedicine*, vol 12(5), 371-374.

Johnston, J. M., & Paulos, L. E. (1991). Prophylactic

lateral knee braces. *Medicine and Science in Sports and Exercise*, vol 23(7), 783-787.

Knutzen, K. M., Bates, B. T., & Hamill, J. (1983).

Electrogoniometry of post-surgical knee bracing in running. *American Journal of Physical Medicine*, vol 62(4), 172-181.

- Knutzen, K. M., Bates, B. T. & Hamill, J. (1984). Knee brace influences on the tibial rotation and torque patterns of the surgical limb. *Journal of Orthopaedic and Sports Physical Therapy*, vol 6(2), 116-122.
- Knutzen, K. M., Bates, B. T., Schot, P., & Hamill, J. (1987). A biomechanical analysis of two functional knee braces. *Medicine and Science in Sports and Exercise*, vol 19(3), 303-309.
- McCarthy, P. (1988). Prophylactic knee braces: where do they stand? *Physician and Sportsmedicine*, vol 16(12), 102-115.
- Millet, C., & Drez, D. (1987). Knee braces. *Orthopedics*, vol 10(12), 1777-1780
- Paulos, L. E., Drawbert, J. P., France, P., & Rosenberg, T.D. (1986). Lateral knee braces in football: do they prevent injury? *The Physician and Sportsmedicine*, 14(6), 119-26.
- Paulos, L. E., France, E. P., Rosenberg, T. D., Jayaraman, G., Abbot, P. J., & Jaen. J. (1987). The biomechanics of lateral knee bracing part I: response of valgus restraints to loading. *American Journal of Sports Medicine*, vol 15, 419-29.
- Potera, C. (1985). Knee braces: questions raised about performance. *Physician and Sportsmedicine*, 13(9), 153-155.
- Regalbuto, M. A., Rovick, J. S., & Walker, P. S. (1989). The forces in a knee brace as a function of hinge design

- and placement. *American Journal of Sports Medicine*, vol 17(4), 535-543.
- Requa, R. K., & Garrick, J.G. (1990). A review of Prophylactic knee braces in football. *Pediatric Clinics of North America*, vol 37(5), 1165-1173.
- Rovere, G. D., Haupt, H. A., & Yates, C. S. (1987). Prophylactic knee bracing in college football. *American Journal of Sportsmedicine*, vol 15(2), 111-116.
- Ryan, A. J., Grant, T. T., Rosenfeld, R. T., Rovere, G. D., & Schottenfeld, M. (1986). Knee braces to prevent injuries in football. *Physician and Sportsmedicine*, vol 14(4), 108-112,115-119.
- Scriber, K., & Matheny, M. (1990). Knee injuries in college football: an 18 year report. *Athletic Training*, vol 25(3), 233-236.
- Sforzo, G. A., Nih-mey, C., Gold, C. A., & Frye, P. A. (1989). The effect of prophylactic knee bracing on performance. *Medicine and Science in Sports and Exercise*, vol 21(3), 254-57.
- Sitler, M., Ryan, J., Hopkinson, W., Wheeler, J., Santomier, J., Kolb, R., & Polley, D. (1990). The efficacy of a prophylactic knee brace to reduce knee injuries in football: a prospective, randomized study at West Point. *American Journal of Sports Medicine*, vol 18(3), 310-315.
- Snyder-Mackler, L., Ladin, Z., Schepsis, A. A., & Young, J.C. (1991). Electrical stimulation of thigh muscles

after reconstruction of the anterior cruciate ligament.

Journal of Bone and Joint Surgery vol 73-A(7), 1025-1035.

Szczodrowski, D. F. (1988). A comparative study on the effectiveness of preventive knee braces. Unpublished master's thesis, Brigham Young University, Provo, UT.

Vaughan, C. L. (1984). Biomechanics of running gait. *CRC Critical Reviews in Biomedical Engineering*, vol 12(1), 1-48.

Wirth, M. A., & DeLee, J. C. (1990). The history and classification of knee braces. *Clinics in Sports Medicine*, vol 9(4), 731-741.

Zachazewski, J. E., & Geissler, G. (1992). When to prescribe a knee brace. *Physician and Sportsmedicine*, vol 20(11), 91-99.