

# Obtaining Force & Other Data

A means of continuous Locomotor Force Measurement  
Treadmill instrumentation for force & other measurements -

## Background -

Value of T.M. -

Need for: force -

velocity -

steps -

Current methodology

Photo -

## Principles -

Requirements

x Force -  $F_z$

Dist. -

Velocity -  
&  $\Delta V$  -

Methodology -

## Results -

Force -

Accuracy

Distribution

Freq. Resp.

Velocity -

Distance -

stride -

Table -

Move over table

Drop bag -  
 $\bar{c}$  &  $\bar{s}$  belt. static dynamic  
Table  
Record.

Record of C-fact

## Introduction -

In spite of recent ~~large~~ increases in the type and amount of data on human locomotion, ~~there~~ the sample size is still small and for good reason. & In the case of force measurements there are two currently used techniques; the force platform and instrumented shoes. The former allows only isolated single samples of a repetitions event while the latter are <sup>currently</sup> complex and limited in application. ~~but with the~~ Treadmills offer the usual advantage of laboratory convenience and control vs ~~field~~ difficulties of field studies and are a widely used substitute ~~for~~ for field ~~work~~ or walkways. Prior to this time it has not been possible to do <sup>foot/ground</sup> force studies on the treadmill yet this is frequently needed data.

Last year we began a program to develop the following capabilities in a tread mill.

Foot ground forces -  
vertical -  $F_z$ , horizontal  $F_x$  + lateral  $F_y$   
accuracy - 1% desired up to 5% acceptable  
frequency response - minimum of DC to 30

Tread velocity - distance and velocity  
velocity variation - 1/10.

T/M

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True Stride frequency and period  $\pm 1\%$   
and length  $1\%$  desired  $3\%$   
accepted -

Methodology -

Force: Resources available limited  
~~modification by the manufacturer~~ of an existing T.M.  
this effort to vertical force measurement.  
This is accomplished by placing four  
precision <sup>vertical</sup> axis strain gages at each corner of  
the support plate. These were supported by  
a ~~spc~~ reinforced frame which in turn is  
supported by 6 metal jack screws.