

To/ Mr. Terry Badger

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from - Thornton

Dear Terry

Apropos our last telecon, I have enclosed some copies of the analysis of your & my F_z recordings. Looking first at the basic wave forms P-59, 1 is a force ~~foot~~ ground ~~foot~~ (FGF) of walking related to an idealized F_z waveform. There are two major components - the "M" complex whose freq. components are estimated to be 7-12 Hz and a slower ~~componen~~ complex which will ~~range~~ be the same as step rate say 60-120 min or 1 to 2 Hz. I labelled these b and a respectively in the data reduction. Jogging-running produces a totally different waveform but again with two components, a spike ^{of amplitude B} (monophasic) that has components of 10-15 Hz (estimated) and a distorted sinusoid ^{of amplitude A} at the step rate, say 130 to 180 or ~ 2 to 3 Hz.

The data ~~to~~ which cannot be extrapolated to the population at large was reduced on Pgs. 58, 9 and plotted P-61 means & S.D.s plotted on P-61. In walking the low frequency component a is unreliable while the M complex increases nicely with freq. speed. The reverse is true in jogging for while there was no amplitude relation in B, the fast component, A behaved nicely and will relate ~~well~~ to FGF. B however has a very large amplitude.

Lets now skip to what we want as readout -

1. Step count ~~to~~
2. Mode (Walk - Run)
3. Estimated Force

we can produce this as follows - Record:

1. step rate
2. slow component amplitude -

On replay and analysis (by P.C.)

Step Count can simply be summed from beginning T_1 to end T_2 of desired epoch with day, hour or any selected interval -

As you can see from the plots ^{in the L.F. signal,} there is an almost $1\frac{1}{2}$ G difference between walking and ~~jigging~~ ^{jigging on the in} ~~the L.F.~~ ^(population) If this holds up, then it will simply be a matter of level detection. There is a similar albeit smaller difference in step rate.

Finally we need F_z (vertical foot ground force). Since walking forces have an absolute minimum of T_g 1 Body Weight (BW) and a max. of just over 1.3 BW we can use a look up table ^{mean peak} when based on step rate when we are in the SOG mode. For jigging forces we can use the measured θZ ~~tex~~ multiplied by a constant.

I thought we would have to use the high frequency signals ^{from} ~~for~~ a filter for the trigger but it appears that you will be able to do it

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from the low frequency signal. ^{recordings from} * You need a variety of people to insure your parameters, and the ones I have used, will cover them. You may ~~wo~~ have to go to a multi pole filter however if we can keep as clean as these were, ~~a~~ a simple filter may be adequate.

Think you would do better to use ~~peak detect~~ peak detection on the signal and then sample several times / min. and use the mean. R.C.

chts. + single samples will be messy. ~~What happens~~

~~courses~~ The big thing now is to get a population sample at various rates of walk/jog so to ~~see if~~ verify that they are covered by our limits -

Looks good

Bill