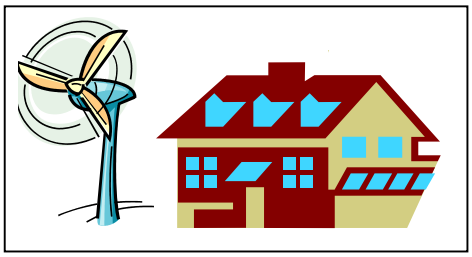
1234 Research Parkway
Technology, MI 98765
"State-of-the-Art Power"

M E M O R A N D U M

TO: *WindDrive* ™ Development Group
FROM: C. Radcliffe, Controls Group Supervisor
DATE: February 22, 2010
SUBJ: Modeling and Experimental validation of the *WindDrive* ™ transmission system for a periodic input.



1. This week the group will obtain the system response of a first-order, linear, time-invariant, dynamical system to a periodic input (sinusoidal input).

2. You will operate an armature controlled DC servomotor, which behaves as a first-order system when the armature voltage 'e_a' is the input and the angular speed 'ω' is the output. You will observe the change in system response as the system parameters (amplifier gain 'K_a' and moment of inertia of the motor shaft 'J') are varied.

3. This experiment will help you understand the response of a first order model to sinusoidal input. This would thereby enable you to predict the response of a first order system for any arbitrary periodic input.

4. Many real life arbitrary non-periodic inputs can be approximated as a combination (superimposition) of individual periodic inputs. The response thus can be found as the superimposition of the responses to the individual component inputs. An example of practical application is in speed dynamics of drivetrain systems like used in the *WindDrive* ™ system.

5. In reporting the results of your investigation this week, you should specifically focus on a discussion of where this modeling technology could be applied to the analytical design of our new standard in residential wind powered electric generator performance and efficiency for the 21st century.