Energy Consumption Study for Permanently Split Capacitor Blower Motors versus Electrically Commutated Blower Motors Contained In a Water Source Heat Pump Located In Building 664, Langley Air Force Base

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September 12, 2008

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PWA Engineering participated in a pilot study with General Electric (GE) to determine the actual power usage of existing Permanently Split Capacitor (PSC) motor vs. the actual power usage of an ECM, programmable, variable speed motor located within a water source heat pump from Building 664 at Langley Air Force Base. Phase one of the study included the collection of actual energy consumption data from the current PSC blower motor for a period of twenty-five (25) hours. Voltage and current data was collected directly from the power cables supplying power to the motor with a real-time amp probe data logger at one-minute intervals. During the data collection period, the PSC motor was being controlled by the existing automatic controls. Actual operating intervals were between five (5) and ten (10) minutes with non-operating intervals between three (3) and eight (8) minutes. Real power consumption results indicated that the PSC blower motor consumed an average of 256.8 watts of power during operation. Please see Figure 1 for a graph showing power consumption for a period of one (1) hour and Appendix A for the table showing all power consumption data during the twenty-five (25) hour period.

During the second phase of the study, RPM readings were obtained from the existing PSC motor using a tachometer. The PSC RPM data was recorded so the new ECM motors could be set to the identical RPM upon replacement. It was determined that the PSC motor was operating at 700 RPM. The 1/5 horsepower (HP) PSC motor was then replaced with a 1/3 HP ECM motor programmed to match the existing RPM of the pre-existing PSC motor. Real power consumption data was again collected directly from the power cables supply power to the motor via the real-time amp probe data logger for a period of twenty four (24) hours at one-minute intervals. During the data collection period, the ECM motor was being controlled by the existing automatic controls. Actual operating intervals were between five (5) and ten (10) minutes with non-operating intervals between three (3) and eight (8) minutes. Energy consumption data indicated that the new ECM motor only consumed an average of 121.9 watts of power during operation, which is about 52.54 percent less energy consumption than that of the PSC motor. Please see Figure 2 for a graph showing power consumption for a period of one (1) hour and Appendix B for the table showing all power consumption data during the twenty-four (24) hour period.

Figure 1
PSC Real Power Consumption at 1-Minute Intervals
For a Period of One-Hour

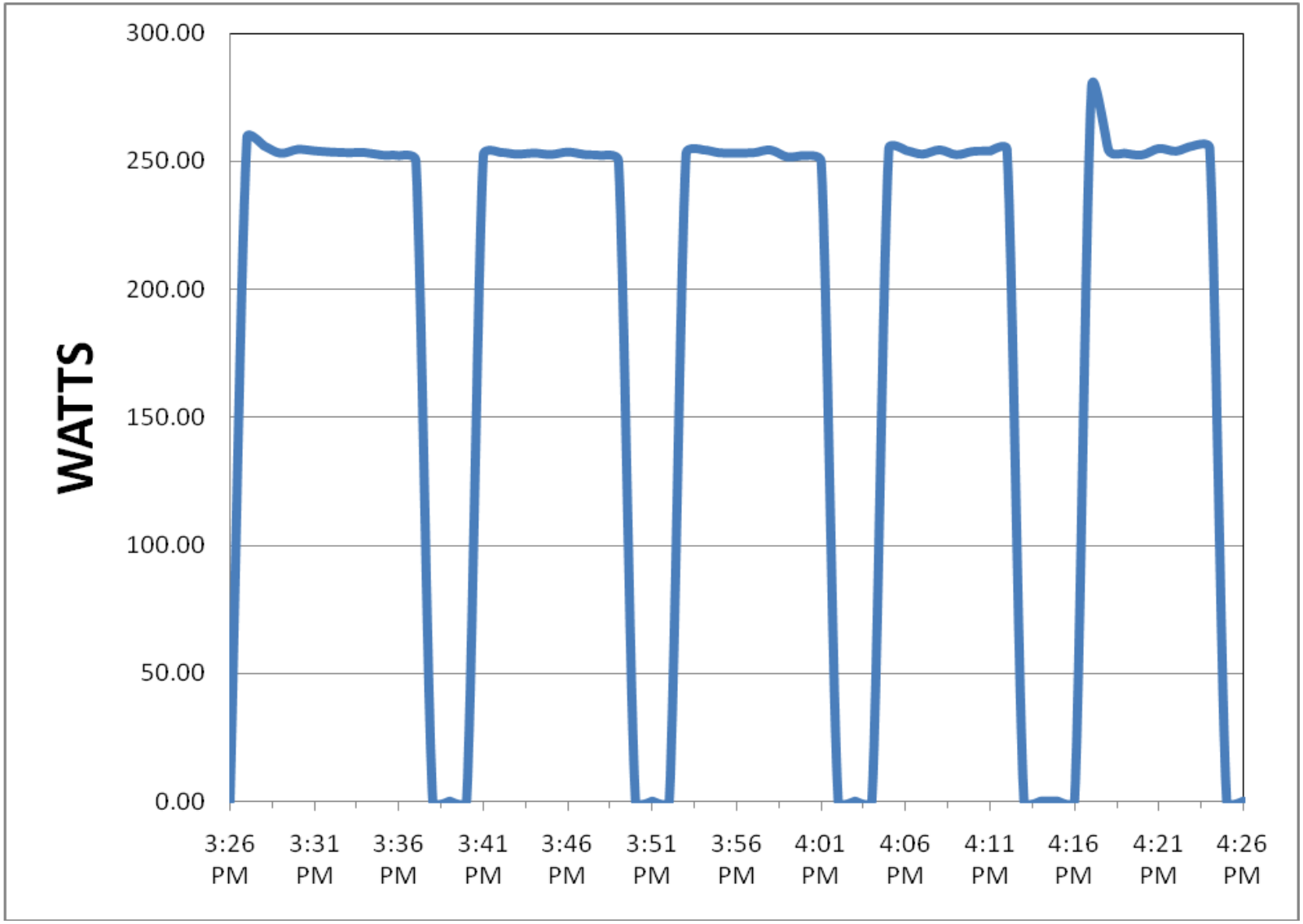

Figure 2
ECM Real Power Consumption at 1-Minute Intervals
For a Period of One-Hour