

Kimberly Glasser, Qingxin “Charles” Shi, Fangxing “Fran” Li
The University of Tennessee, Knoxville

INTRODUCTION

Energy management is a significant focus in modern technological research. Household energy usage can be decreased by allowing the customer to control certain appliances with the Home Management System (HMS) testbed.

Previously, the Home Management System (HMS) testbed allowed certain appliances to be always turned on, always turned off or to be turned on and off depending on the price per kilowatt hour (\$/kWh).

PROJECT GOALS

- Continue research from previous semesters
- Improve the ability of the current available Home Management System (HMS) testbed.
- Determine how a two-state push button controls the multiple states of heating resistance.
- Prepare for the development of multi-state, remote controlled water re-heater.
- Replace external switch with a wireless option to obtain remote controllability.

METHODS

Disassemble the water re-heater and locate the relevant switches and mechanisms. Two printed circuit boards were determined to be important to our particular project.

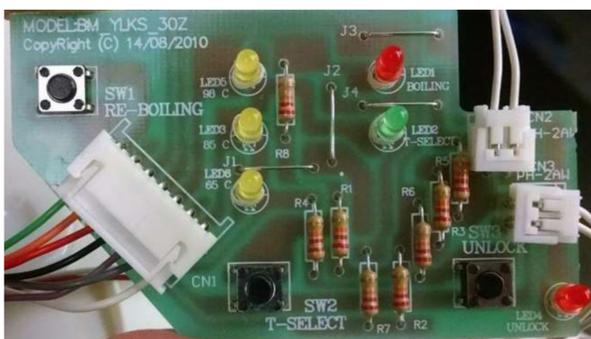


Figure 1: MODEL YLKS_30Z (top)



Figure 2: MODEL YLKS_30Z (bottom)

The push button controlling the temperature settings (SW2) on the top board was connected to a chip in a circuit board in the bottom of the that had an 8-bit programmable counter. Each time the switch was depressed a counter was activated and this counter determined the temperature selected.

Once the relevant pieces were determined the upper board was investigated further to determine how to best connect an external switch to control the temperature selection.

The upper board (MODEL: YLKS_30Z) was drawn in detail to help understand the connections and determine ground.

It was then determined that a connection could be made on the right side of SW2 to control the temperature settings.

FUTURE VISION

- Prepare for the development of multi-state, remote control of the water heater.
- Replace external switch with a wireless switch to obtain remote controllability.

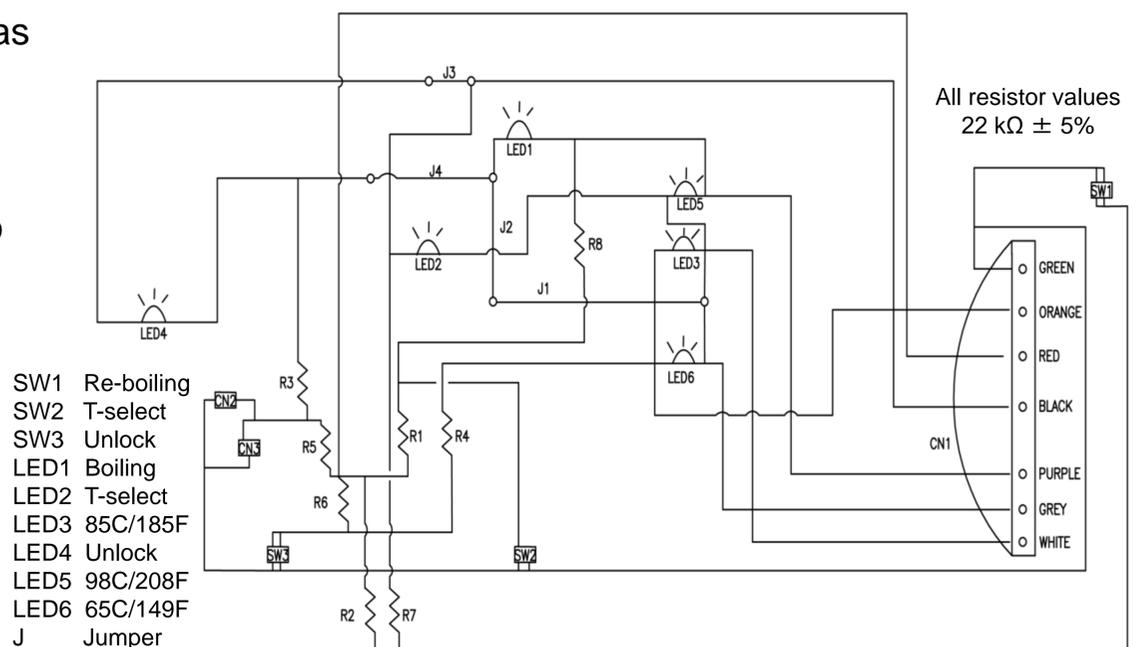


Figure 3: MODEL YLKS_30Z Diagram

CONCLUSION

This project allowed me to become more familiar with the operation and functionality of the water re-heater, as well as general electronic functions. Specifically the operation of the four pin, two state push button and how it is used to control the multiple settings. In addition, I learned about various wireless options currently available.