December 10th Cooling Towers and Control Logic Homework:

1) Q: What are the functions of the different terminal types in the control panel?

***A: Warrick Relay: Terminals 1-2: To Line, Terminals 3-4: NO Switch, Terminals 5-6 / 7-8: NC Switches, Terminals 9-10: to electrode***

***Lower terminal blocks: To designate where the wire is attached on the other end.***

***DDC: To the Monitoring System for alarm notification***

***7: To “Blue” electrode (low alarm).***

***6: To “Purple” electrode (high alarm).***

***V2: To make-up valve actuator neutral in.***

***V1: To make-up valve actuator power line in.***

***5: To “Orange” electrode (make-up level complete)***

***4: To “Red” electrode (make-up initialization).***

***1: To “Yellow” electrode (common)***

***N: 115v AC neutral line in.***

***Fuse block in (black): 115v AC power (hot) line in.***

**Warrick Relay Logic:**

***Low Alarm: Will stay energized until water level is below the “Blue Electrode”, then 5-6 switch will open, triggering a Low-Water alarm on the monitoring system utilizing “NOT” logic.***

***High Alarm: Will energized when water level reaches the “Purple Electrode”, then 5-6 switch will close, triggering a High-Water alarm on the monitoring system.***

***Level Control: Will stay energized until the water level is lower than the “Red Electrode” then the relay will de-energized, open 7-8 switch allowing the actuator to open the make-up valve with a spring return and fill the tower. Upon water level reaching the “Orange Electrode”, the relay will energize, close 7-8 switch, closing the make-up valve, allowing 5-6 switch to close and latch the relay until water level is again lower than the “Red Electrode” to repeat the process.***

2) Q: How much does the Warrick control relay cost?

***A: Warrick P/N: 1G1D0 After researching online I found this item has been discontinued. However, I did find an estimated value of $559.64 (Radwell International), with used on eBay for $200-$300.***

3) Q: Why did Ellis seal the electrode fitting conduit entry with caulk?

***A: To seal the conduit.***

4) Q: How would you figure out the maximum fuse rating you could safely install in the fuse holders?

***A: Take the total load amp draw of the circuit, and size the fuse no larger than 125% of total load (rule of thumb)***

5) Q: How would you figure out the minimum water level in the tower (the level that would open the make-up valve)?

***A: I am unsure of the correct answer to this question; you would not want the basin to go dry. I know that if you have basin heaters installed, that the water level would need to be kept above them***

6) Q: What sets the level at which you would close the make-up valve?

***A: The length of the “Orange Electrode”, set by the high-water level you would like to maintain.***

7) Q: What sets the maximum water level in the tower (the level that would cause water to run out the overflow)?

***A: If the question is referring to the level in which the High Alarm is activated, it would be the length of the “Purple Electrode”.***