



Reverse Engineering

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Table of Contents



Capello Alarm Clock Model: CR15



Summary



Parts List



Links



Capello Alarm Clock
Model: CR15

For the Reverse Engineering VEX Robotics Online Challenge 2022 we chose to take apart a Model CR15 Capello Alarm Clock.

Summary

When we decided to do the reverse engineering online challenge, we first had to decide what to dismantle. After some research we decided on an old alarm clock that one of our teammates didn't use anymore, Capello Model CR15 Alarm Clock. We decided on this because we thought that it would be fun to take apart and would be a good learning experience for everyone on the team. First thing we had to do was find the right set of tools to take the alarm clock apart, once we did that, we started with unscrewing the bottom cover panel/stand of the alarm clock.

Inside the alarm clock we found the circuit board that used copper wiring to connect to the speaker, battery, etc. The copper wiring stemmed from a cylinder of copper wiring hot glued to the side of inside the alarm clock, the other two wires of the alarm clock were connecting the circuit board to the speaker and the battery as well though instead of stemming from the cylinder of copper wiring they connected directly to the circuit board. Other than wiring we found that there was also another circuit board that controlled the on/off controls of the clock and the timer. The alarm clock was not only battery powered it had a plug so that it could work off a normal electrical current coming from an outlet.

After taking apart the alarm clock as far as we could we did some research on all the parts that we found. One part that we found was the LCD (Liquid Crystal Display) screen, an LCD screen is a thin layer of liquid crystal material between two electrodes on glass substrate with two polarizers on each side, usually lit by an LED (Light Emitting Diode) light. The way that an LCD works is that when an electrical field is not applied to the liquid crystal molecules, the molecules twist 90 degrees inside the LCD cell. When light travels through the first polarizer it is twisted with the liquid crystal molecule layer, when it reaches the second polarizer though it is blocked, and the viewer only sees a black screen.

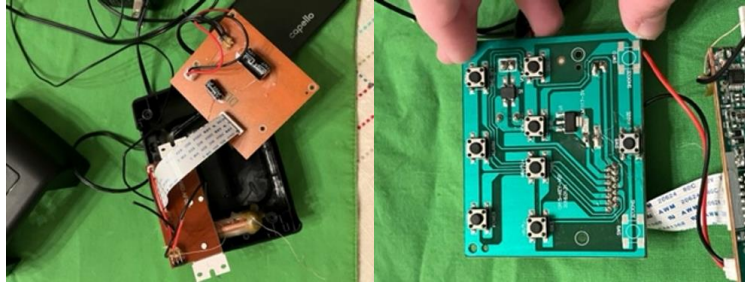
When there is an electrical field being applied to the liquid crystal molecules they are untwisted, and the light will pass straight through without being twisted. The light will then pass through the second polarizer and the viewer will see the bright screen. Because an LCD uses electrical fields instead of electrical currents it has a lower energy consumption. LCD screens are not only used in alarm clocks but also used in TVs, phones, and laptops.

In conclusion this project taught us a lot about dismantling and what it takes to create something like this. We also learned some things that we didn't know before that will come in handy in the future. Deconstructing the alarm clock was a lot more difficult than we thought it would be and we were glad to have the challenge.

PARTS LIST



SCREWS



CIRCUIT BOARD



TOP COVER

BATTERY/ALARM
STAND



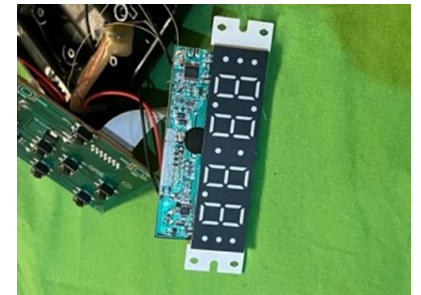
PLUG



SPEAKER



SCREEN COVER



NUMBER DISPLAY
PLATE/CIRCUIT
BOARD

Links

[Capello Alarm Clock Manual](#)

<https://youtu.be/yU9mN9PU4-o>

(Dismantling Video)

[What is an LCD? LCD technology & Types of Display | Orient Display](#)