# 7700B TI Reverse Engineering Online Challenge Submission

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Hello, we are Team 7700B Rolling Robots, Palos Verdes, and we are here to present to you our project, an inkjet printer. Now it might seem like a silly decision to pick a printer for a project. The fact that we have free roam with many more projects that are also much more relevant in the world today makes our project contrary to popular opinion. For example, we could have done a gaming pc and would have had a very cool experience. Why did we pick something out of the ordinary like a printer you say? This is because we thought it would be a great surprise to crack open something that none of us had ever seen inside of before. A printer for this project would be a fascinating opportunity to learn something new about printers. In this document, we have made a very detailed description of each piece of the printer. The printer we have decided to use is the HP Officejet 4500 and was obtained by Max Babiec when he went over to his grandma's house for Thanksgiving. He later installed a new printer for her.

Our process for taking apart this printer was to separate the main components of the printer by disassembling the top part and the main body of the printer. This was done using a star screwdriver to remove the screws. This leads us to take apart the main ink belt system and motherboard off of the printer. We then moved on to taking apart the button panel on the printer and this was when we implemented the pry. This helped us take apart the press fits very easily without damaging the panel. The next step was to lay the parts out on a tray and take pictures of the pieces in order. In our process, we used many tools. A few of them are screwdrivers, heat guns(to heat knives to cut the plastic), utility knives, pliers, and tweezers.
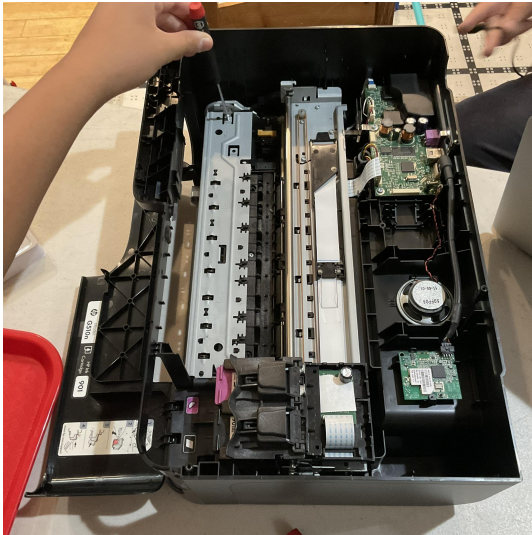
This was a broken printer given to us and we were wondering why it was broken in the first place. This question was answered when we decided to take a deep look at the circuit board that made the ink cartridges move on a belt. On this board, we found out that a chip had most likely short-circuited or blown up. This was most likely because the belt got jammed or because there was a power surge and the chip could not handle it. This was one thing that we were able to analyze about the printer.
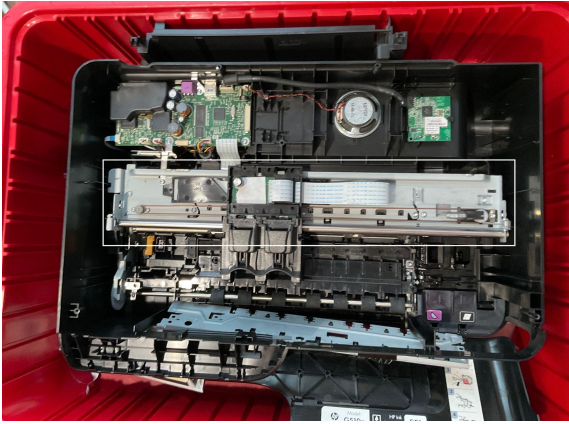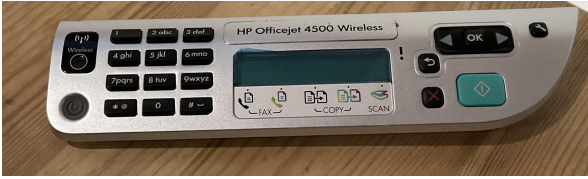
The control panel on this printer was a very large surprise to open up because it was a very different layout from other panels. This panel used touch sensors instead of electricity transferring between the part and your finger.
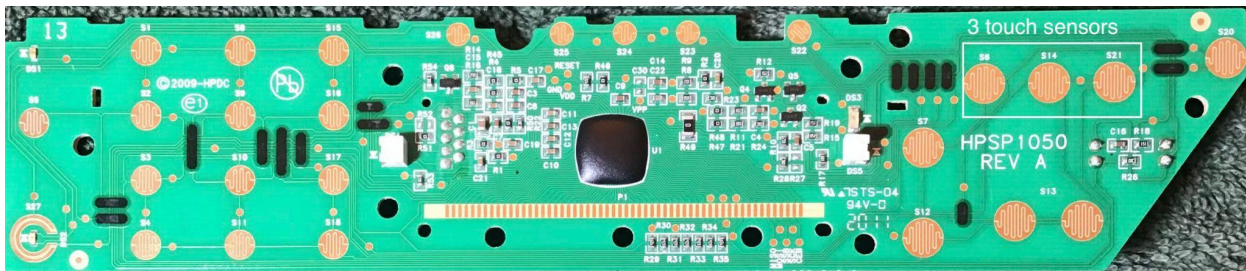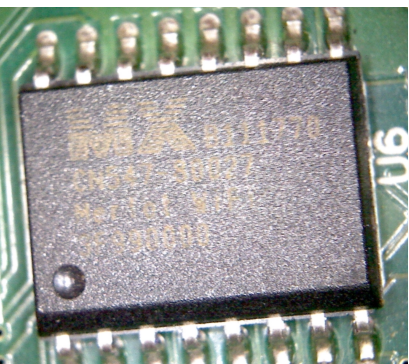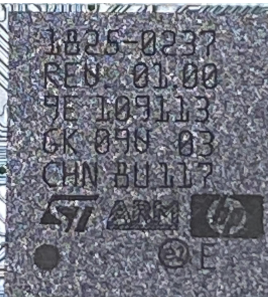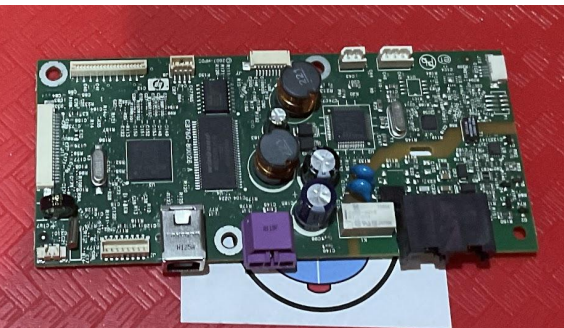
The main circuit board is the main component of the printer that controls the other components. This board has many plugs that export and import information to the board. We have the circuit board chips laid out here and all of them have a specific purpose to fill. The chip on the top left of the screen is the CPU (Central Processing Unit). This can be inferred because the other chips are all memory-based chips. Memory-based chips are very important because the printer needs lots of memory to print long documents. The only question that arose during these discoveries is why are the memory chips so variable in size? This is a question that we have no real answer to because the chip size does not matter in terms of purpose. In this process, we searched up part numbers on the internet and we found great results. The method we started by using was trying to find the company and then searching the number. This worked with the Winbond chip because they are a well-known company. Another reason why is because the chip is not a specialized chip and therefore it was available to the public. The next chip had a logo that said MX and with our strategy it would not have been possible to locate the manufacturer of the chip without a new method. This new method was to put the part number into the search box on google and try to find the manufacturer. For this chip, we would have never expected the manufacturer to be mouser electronics. This is a surprise because of the logo but never the less a great find. The final chip that we were able to find was the ST chip. This chip was

very easy to find because of the new method and this concluded our journey to find the chips. The only chip left was a specialized chip and therefore not available to the public.

This is the fax circuit board. This helps to send printer images to another printer to get printed by phone number. This was important because this printer was used to send images to someone else to access. This was very important because Max's mom's business relied on being able to access documents in hard copy. Faxing might be something of the past but it is still a very efficient way to transfer information in hard copy form.

Components:

There is the "shell" of the printer which is the outer mold of it which is made of plastic, there are motors that transport the paper, circuit boards that control the printer and its actions, wires that connect parts of the printer such as the motor to the circuit boards, Screws hold together the printer so it does not fall apart, hinges help open the printer so you can copy papers as well as faxing, the control panel and buttons for controlling the printer at your will, converters to provide electricity to the printer and rollers to help components in the printer move around.

Failure discussion:

We did have some components like clip ons or things that were welded on which cannot be taken apart via a screwdriver in which we had to use a razor for which our goal was to not cut anything on the printer but we were left with no choice.

Conclusion:

In the end, we had a lot of fun learning and taking apart the printer, it was a very interesting experience for sure. Although some of the parts were challenging to take off, we learned to work together and the effort was worth it.