Safety Gear

**Hazardous Material**
- Beryllium (Be), lead (Pb), polychlorinated biphenyl (PCB)

**Key components/parts:**
- Capacitor, transformer, magnetron, circuit board, fan and cavity.

**Primary materials:**
- Copper, glass, steel.

**Types:**
- Commercial, convection and built-in microwave ovens

**Weight Composition:**
- 12% Cu, 1% glass, 1% plastic, 49% steel

### Microwave Overview
- **Common brands:** Emerson, general electronic (GE), LG, Magic chef, Panasonic, Sanyo, Samsung, and Whirlpool.

### Urban Mining
Copper can be extracted from various parts of the microwave such as the cables and the anodes in the magnetron. The main body is made up of stainless steel and the microwave door has a glass window which keeps the waves in the chamber and prevents them from escaping, since they can be harmful to humans. In some microwaves, the turning plate is made up of glass, which offers various opportunities for extraction. There is also a fan which blows out the hot air from the chamber. This is made up of plastic. The market for scrap parts include metalwork industries and local community makers. The steel outer covers are perforated and used in Agbogbloshie to make cooker grills.

### Health

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<th>A</th>
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<th>C</th>
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<tbody>
<tr>
<td>Nervous System</td>
<td>Respiratory system</td>
<td>Immune system</td>
<td>Urinary system</td>
<td>Reproductive system</td>
<td>Bone</td>
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### Beryllium (Be)
- Pneumonia, lung damage, increased cancer risk and DNA damage.

### Lead (Pb)

### Polychlorinated biphenyl (PCB)
- Liver & immune system damage, cancer, damage to the nervous system, and infertility.

### Tools For Disassembly
The tools required for processing are: chisel, hammer, pliers, screw drivers, wire cutters.

### Tools Are a Potential Source of Injury
The risk can drastically be minimised by using the right tool for the right job. In the process of disassembling microwaves, the highest risk to workers especially in Agbogbloshie is the relatively lower risk of swallowing screws.

### Step by Step Disassembly
1. The take out the housing, by detaching all the screws at the joints.
2. All the interior components can be removed by cutting off the connecting wires.
3. The transformer, capacitor, diode, magnetron can be taken out separately. Be careful of the ceramic beryllium oxide layer (pink colour).
4. The circuit board which consists of resistor, fuse, and inductors can also be taken out by cutting off some connecting wires.
5. Unscrew the other joints to take out the timer and the small motor under the food tray.
6. After disassembly, components should be documented via labelling and photography.

### Scrap Value In Agbogbloshie

### Material Composition
- Steel: 49%
- Copper: 36%
- Plastics: 5%
- Others: 1%

### Microwave

### Weight Composition
- Copper (Cu): 12%
- Glass: 1%
- Plastic: 1%
- Steel: 49%

### Hazardous Materials
- Beryllium (Be): Pneumonia, lung damage, increased cancer risk and DNA damage.
- Polychlorinated biphenyl (PCB): Liver & immune system damage, cancer, damage to the nervous system, and infertility.

### Safety Gear
The disassembly process exposes the worker to various levels of potential harm. Disassembling a microwave requires protective gear to reduce risks of electrocution, inhalation of toxic chemicals such as beryllium oxide. Depending on scale and/or volume, hazmat suits, which are full garments with footwear and masks, may have to be worn to protect e-waste workers from dangerous chemicals.
What is a Microwave

A microwave oven is an electronic household appliance that provides the features for cooking, and reheating food by using high frequency electromagnetic (EM) radiation.

How it works

A microwave has three main parts: the chamber, the wave-guide and the magnetron. It works when the magnetron generates electromagnetic (EM) radiation, which the wave-guide directs to the food in the chamber. The food heats because the wave absorbs the water molecules, oils, and certain other molecules from it. The chamber where the food is placed helps to hold the high energy produced and prevents it from causing harm to the user.
Copper, aluminium, steel, gold and palladium are found in computers. In the motherboard, the random access memory (RAM), central processing unit (CPU) and peripheral component interconnects (PCIs) consists of some amount of precious metals. The random access memory (RAM) is for data storage and it is a valuable part because its connectors are gold plated (Au) and coated with palladium (Pd). The hard drive comprises of aluminium (Al). The heat sink is a covering on central processing unit (CPU) which is made of aluminium (Al) and its alloys. The case of a computer is made of steel and the power supply box with stainless steel. In Agbogbloshie, the printed circuit board industry is worth tens of thousands of dollars and is controlled mostly by Nigerian Migrants.

### Health

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### Tools for Disassembly

The tools required for processing: chisel, mallet, pliers, screwdriver, and wire cutters.

1. Cut off all the wires and remove all connections between various components.
2. Discharge the capacitor and remove the circuit board.
3. Detach the motherboard by using screw drivers. Carefully pull off the CPU and the random access memory (RAM) from the motherboard.
4. The PCIs are also pulled off by hand since they have been soldered. This part is also valuable because it has some contents of gold.
5. For the monitor, remove the plastic housing, the back cover by removing all the screws.
6. Cut off all the cables to detach the various parts.
7. Disassemble the steering coils if any and carefully dispose of the leaded glasses.
8. Components in the computer such as the memory chips are delicate and should be handled with care, to avoid damage to them.
9. After disassembly, components should be documented. See example of this done during AMPQAMP workshop.

### Safety Gear

Tools are essential to the process of disassembly and are the primary means by which industrial activities are carried out. Tools have always represented societal advancement. The lack of proper tooling is a major hindrance to the industrialisation drive. In this case, knowledge of how to use them and make them represents a major cultural breakthrough.

A computer contains several hazardous materials such as mercury. These should be handled with care and precaution.

### Hazardous Material

- **Barium (Ba)** - Breathing difficulty, increased blood pressure, stomach irritation, muscle weakness, liver, kidney, heart damage and paralysis.
- **Cadmium (Cd)** - Psychological disorder, cancer, liver & kidney damage, sperm damage, birth defects and headaches.
- **Antimony (Sb)** - Lung diseases, heart problems, diarrhoea, severe vomiting and stomach ulcer.

### Material Composition

- **Personal Computer**: 27% Steel, 20% Copper, 18% Aluminum, 5% Glass, 10% Plastics, 5% PUR foam, 0% Others.
- **Desktop, Laptop, Notebook, PC**: 40% Iron (Fe), 20% Plastic, 10% Aluminum (Al), 5% Copper (Cu), 2% Glass, 1% Gold (Au), 0.1% Palladium (Pd), 0.01% Chromium (Cr VI), 0.001% Lead (Pb), 0.0001% Sulphur (S), 0.00001% Beryllium oxide (BeO), 0.000001% Cadmium (Cd), 0.0000001% Hexavalent chromium (Cr VI), 0.00000001% Hexavalent chromium (Cr VI), 0.000000001% Antimony (Sb).
- **Primary materials**: Aluminium (Al), copper (Cu), glass, gold (Au), iron (Fe), plastic.
- **Weight composition (%):** 5% Al, 20% Cu, 18% glass, 1000 ppm Au, 23% plastic, 7% steel, [1]

### Common Brands:

- Acer, Apple, Asus, Dell, Fujitsu, HP, IBM, Lenovo, Medion, Sony, Toshiba*

### Hazardous Materials:

- **Beryllium oxide (BeO)**, cadmium (Cd), hexavalent chromium (Cr VI), lead (Pb), sulphur (S).
What is a Computer

A computer is an electronic device which accepts, stores, and processes data. Data is the raw material that comes to a computer. It turns this data into information, according to the desires and commands of the user. This exchange between user and computer, occurs via an interface. External devices that provide input and outputs for a computer are known as computer peripherals.

How it works

The monitor serves as a screen which reflects what the user inputs via a keyboard, computer mouse or other input device. Such inputs serve as commands, which are processed by the system unit linked to the motherboard. Programs can be installed on the hard disk (storage unit) and be used through the above-described process. The diagram of a personal computer and its parts is as shown below.
A refrigerator contains several hazardous materials such as CFCs, PVC, and PUR foams in the body, as well as mercury in the light bulbs. These should be handled with care and

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Hazardous Material

Urban Mining

Material Composition

Scrap Value In Agbogbloshie

Step by Step Disassembly

Tools For Disassembly

Computer Overview

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