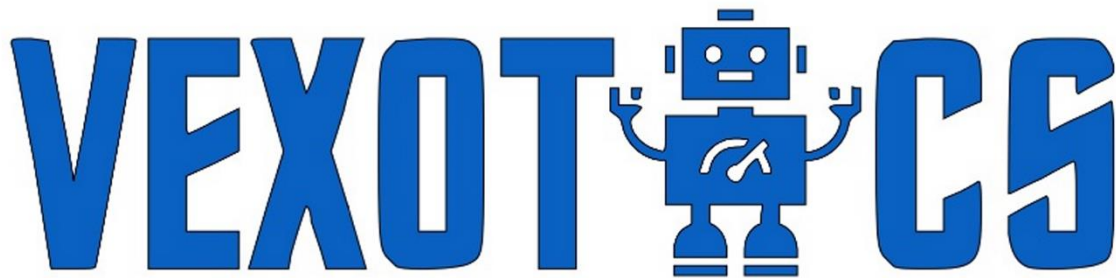




Reverse Engineering Online Challenge

Toshiba Satellite M45-S355



94568Z

Vexotics

San Ramon, California, USA

By: Adya and Adih Datta

Table of Contents

	Page
Final Summary Report	3
Pre-Disassembly (Figure 1.1-1.3)	5
Disassembly (Figure 2.1-2.7)	5
List of Parts (Figure 3.1)	6
Table 1 – Components Found in Laptop	7
Citations	8

Final Summary Report

The decision to take part in this challenge started with our curiosity about how a laptop worked. We had an old Toshiba Satellite M45-S355 from 2005, and we decided to take it apart to see what components were inside, and what their functions were.

Scientific Question:

What components are inside a laptop?

Before we started the disassembly process, we decided to look at the laptop in action so we could see how it worked (Figure 1.1-1.3). Then, we started to disassemble the laptop with safety glasses and a screwdriver. First, we took out the battery (Figure 2.1), then we took off all the covers (Figure 2.2). After that we took out the DVD player, Hard Drive, Heat Sync Coil, RAM, and Wireless Adapter (Figure 2.3-2.7). We knew that underneath all these components, there was a Motherboard, but we could not get a good look at it or take apart the laptop further because that may break the laptop screen.

After we had disassembled the laptop, we found the parts list for this laptop, (Figure 3.1) [1], and tried to find out the functions of all the disassembled parts. Through our research, we found out that the **DVD player** (Digital Video Disc player) [2] plays DVD's that you insert into it, the **Hard Drive** is for data storage, the **Heat Sync Coil** helps keep the laptop cool [3], the **RAM** (Random-Access Memory) stores machine code and working data [4], and the **Wireless Adapter** connects the laptop to Wi-Fi. We also researched the **Motherboard** [5], which can include, the **CPU** (Central Processing Unit) that executes the code on the laptop [6], and the **GPU** (Graphics

Processing Unit) that helps create the images that appear on the laptop screen [7], among other parts.

Through this project, we have discovered some key components in a laptop, and their functions. This challenge also provided us with an opportunity to gain experience identifying electronic components in the real world. Referring to the scientific question, we have concluded that components of a laptop can include but are not limited to a DVD player, Hard Drive, Heat Sync Coil, RAM, Wireless Adapter, Motherboard, CPU, and GPU. Without all these components, the laptop may not be able to function the way it is supposed to.

Pre-Disassembly

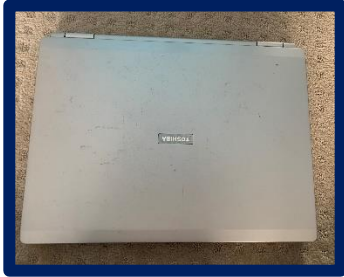


Figure 1.1 Laptop Front



Figure 1.2 Open Laptop

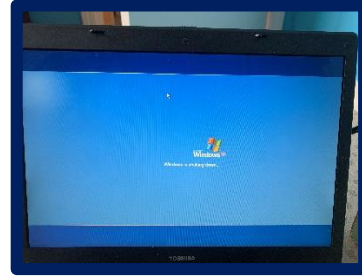


Figure 1.3 Laptop turned on

Disassembly



Figure 2.1 Battery

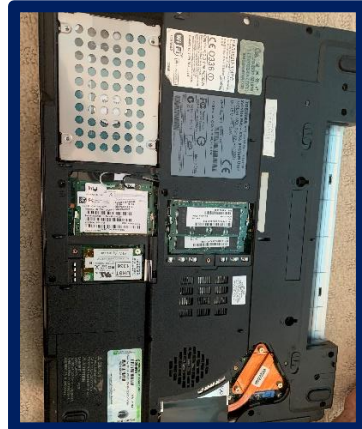


Figure 2.2 Laptop Partially



Figure 2.3 DVD Player

Disassembled

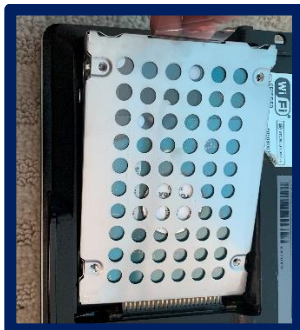


Figure 2.4 Hard Drive



Figure 2.5 Heat Sync Coil



Figure 2.6 RAM



Figure 2.7 Wireless Adapter

List Of Parts

System Characteristics¹

Operating System

- Microsoft® Windows® XP Home (SP2) (S355)
- Microsoft Windows XP Professional (SP2) (S3551)
- TOSHIBA® Express Media Player for quick access to CD, DVD playback

CPU²

Intel® Centrino™ Mobile Technology featuring

- Intel Pentium® M processor 750 [1.86GHz, 2MB L2 cache, 533MHz FSB]
- Mobile Intel 915GM Express Chipset
- Intel PRO/Wireless 2200BG (802.11b/g)³

Memory⁴

- 1024MB (Min)/2048MB (Max with two slots occupied) PC2700 DDR333 SDRAM 2.5V SODIMM Memory modules
- 2 memory slots (both memory slots may be occupied at the time of purchase); 2 user upgradeable SODIMM slots.

Mass Storage

- Hard Disk Drives⁵
 - 100GB (5400RPM), Enhanced IDE (ATA-6) hard disk drive; 9.5mm height; user removable)
- Optical Disk Drive
 - Fixed Bay DVD SuperMulti Double Layer drive
 - Maximum Speed
 - CD-ROM(24x:read), CD-R(24x:write), CD-RW(10x:write), DVD-ROM(8x:read), DVD-R(8x:write), DVD-RW(4x:write), DVD+R(8x:write), DVD+R [Double Layer] (2.4x:read/write), DVD+RW(4x:write), DVD-RAM(3x:write)
 - ODD Interface – Enhanced IDE

Display⁶

- 15.4" diagonal widescreen TruBrite™ TFT active-matrix LCD display at 1280 x 800 native resolution (WXGA)
- Contrast 400:1
- Brightness Control – FN+F6/ F7
- Maximum brightness: 200 cd/m²

Graphics

- Intel® Graphics Media Accelerator 900, 10-128MB Internal (UMA) shared video memory

Input Devices

- Keyboard
 - 85 key US keyboard, 2.7mm key stroke, 6mm keyboard height, 19.05mm key pitch
 - Hot Key Functions (FN); please see electronic User's Guide for more information
 - Windows Key Function
 - Application Key Function
- TouchPad™ (scroll with help of driver)
- Internet Button
- CD Control Button
 - Express Media Player button, Skip Previous, Skip Next, Play/Pause, Stop

Expandability

- 2 available expansion memory slots (both slots may be occupied at time of purchase)
- 1 PC Card slot support 1 Type II, PCMCIA R2.01, PC Card16, CardBus
- Bridge Media Adapter (Secure Digital®, Memory Stick™, Memory Stick PRO™, Multi Media Card, SmartMedia, xD Picture Card [shared slots])

Communications

- Integrated V.92 modem
- Marvell® 10BASE-T/100BASE-TX Ethernet
- Integrated Intel® Pro/Wireless LAN 2200BG (802.11BG)

Ports and Slots

- RGB (monitor out port)
- 3 Universal Serial Bus (USB) ports
- TV-Out (S-Video)
- RJ11 modem port
- RJ45 LAN port
- i.LINK™ IEEE 1394⁷

Physical Description

- Dimensions (WxDxH[front/back]): 14.17" (360mm)x10.57" (269mm)x1.14" (29mm)/1.43" (36.2mm) without feet
- Weight⁸: starting at 6.0 lbs. (2.72kg) – 6.7 lbs (3.0kg)
- Switch: Power, Wireless Communication
- LED Indicators: Power (common with Power/System Sleep Status), DC-IN, Primary HDD access, Power Save mode (with ACPI-OS, common to Power), Caps Lock, Arrow mode, Numeric mode, Main Battery Charging Status, System Sleep/Suspend Status (common with Power/System Sleep Status), Wireless Communication (for Wireless LAN), SD Card, System sleep status (shared with Power)

Sound

- Analog Devices, Inc. AD1981B Software Sound, AC'97 Rev2.2 Compatible
- 16-bit stereo; Built-in stereo speakers
- Direct 3D Sound: DirectSound, Direct Music, MIDI (playback) Support
- Audio Ports: External Microphone (monoaural), Headphone (stereo), Sound Volume (by dial)

Power Supply




- 75W (15V x 5A) Auto sensing external AC Adapter, 100-240V / 50-60Hz frequency (Universal) input.
- Dimensions (WxHxD): 5.35" (136mm) x 2.09" (53mm) x 1.18" (30mm)
- Weight⁹: starting at .88 lbs (400g)



Battery¹⁰

- 6-cell (4300mAh) rechargeable, removable Lithium Ion (Li-Ion)
- Dimensions (WxHxD): 8.13" (206.6mm) x 0.87" (22.02mm) x 2.1" (53.8mm)
- Weight¹¹: 0.75 lbs (340g)
- Recharge Time: Main Battery Off/On – approximately 4.0 hours hrs/approximately 12 hours
- Battery Life: Up to 2 hour, 42 minutes (when using in Windows® mode) (measured by Mobilemark™ 2002)¹²

Figure 3.1 Model Specifications [1]

Table 1 – Components Found in Laptop

Component	Function/Usage
<p>DVD (Digital Video Disc) [2] Player</p> 	<p>Plays DVD's</p>
<p>Hard Drive</p> 	<p>Data storage device</p>
<p>Heat Sync Coil</p> 	<p>Helps regulate device temperature [3]</p>

<p>RAM (Random-Access Memory)</p> 	<p>Stores working data and machine code [4]</p>
<p>Wireless Adapter</p> 	<p>Connects the laptop to Wi-Fi</p>

Citations

- [1] [Laptop Parts List](#)
- [2] [DVD Full form](#)
- [3] [Heat Sync](#)
- [4] [RAM](#)
- [5] [Motherboard](#)
- [6] [CPU](#)
- [7] [GPU](#)