STUDY THE OPERATION OF THE CD-PICKUP HEAD

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INTRODUCTION:

In the present, there is an increase in development and use of computer technology in everyday life. In the most computer today, one of the “must-have” components is a compact-disc (CD) read-only-memory (CD-ROM) drive. Besides, the entertainment equipment such as a video CD and a digital versatile disc (DVD) is becoming part of living style in most people. When the CD-ROM drive has low performance or its components are malfunctioned, people often throw it away and buy a new one with a higher performance. This causes the increase in electronic garbage which is hard to eliminate. However, realizing that some components inside the CD-ROM drive might be still operational, it could be a very good idea to investigate the CD-ROM drive for the useable parts and then modify for use in any desired applications.

The CD pickup head is the main part in the CD-ROM drive, it is used to directly read data from the disc by spotting laser beams on it. The focusing beam associated with the binary data is reflected back for processing. This data reading process is based on confocal microscopy. As it basically contains a laser diode, a photodetector, an imaging system and a two-dimensional voltage-driven actuator, this part may have more useful compared with other parts. For examples, it can be used to measure surface roughness or profile of a sample. It can also be deployed in the field of medicine for Parkinson’s and Alzheimer’s disease research

Hence, in this report, the author study the operation of the CD-ROM drive. In particular, he find a proper drive the laser diode, to control the 2-D actuator, and to determine the behavior of the received signal.

TECHNICAL BACKGROUND:

The fundamental job of the CD pickup head is to focus the laser beam on the track of bumps (i.e.,spiral). The laser beam passes through the surface layer called polycarbonate layer, reflects off the second layer called aluminum layer and hits an opto-electronic device that detects changes in light intensity. When the laser hits the bump, it is reflected to the optical pickup implying a digital logic signal of “1” as shown in Figure 1. On the other hand, the digital logic signal “0” is obtained when the laser beam does not strike on the bump.

Figure 1 Data retrieving process of CD pickup head

There are two types of tracking systems: single-beam (or one-beam) and there-beam schemes. Single-beam approach is simpler to engineer and is more compact while three-beam technique has more optical components and requires precise adjustments. For the three-beam pickup configuration, the laser beam first passes through the diffraction grating, generating three diffracted order beams at different angles. The three beams reflect off from a beam

splitter and then pass through an objective lens, which focus them on the disc. Then, these three optical beams are reflected from the track surface back to the beam splitter again and go through the photodiode array (PDA) as shown in Figure 2.

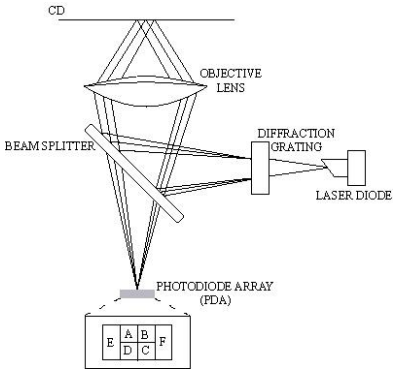

Figure 2 Three-beam pickup configuration.

CONCLUSION:

The author have studied how the CD pickup head works. In this report, the he describe a simple way to check the status of the CD pickup head by looking at the motion of the objective lens and observing the red laser beam emanating through the objective lens. The author also observe the motion of the objective lens in both horizontal and vertical directions via applying the appropriate voltage on the tracking and focusing coil, respectively. In addition, there are additional 10 pins on the CD pickup head. Pins connected to the laser diode and the monitoring diode are also specified. Roughly determined, one photodiode is used for controlling the tracking error and four photodiodes are used for controlling the focusing error. Future work relates to study the motion of the objective lens with respect to the applied voltage and to process the signal received from photodetectors.