

EXP-26 Open Frame CD Player

Topics: Diode Laser, Detection of Light, CD Control System, CD Structure, Computer Control



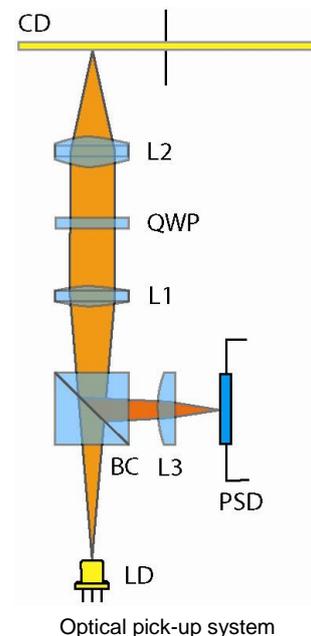
The most widespread laser applications are unambiguously the optical data storage systems such as CD, DVD and nowadays Blue-Ray disc (BD). The CD was originally designed for storage and playing back music and was later extended to the CD-ROM for computer storage. Most optical drives operate on the principle of detecting changes in the intensity of light that is reflected by the media surface. The data information is printed as so-called pits onto the reflective surface of the media. The limitation of the storage capacity is the wave length of the laser light. Light of a shorter wavelength can be focused better thus allowing higher storage density. Within this course the data detection, the control loop for the reading laser head and other components of an optical drive will be demonstrated using the open frame CD player. The optical technique to read data remains the same regardless of whether a CD, a DVD or a BD is used.

Examples of Investigations:

Reading assembly: A laser beam of 780 nm wavelength is focused on the CD by means of lenses L1 and L2. The spot size on the reflective layer is about $0.6 \mu\text{m}$. The light returning from the CD is reflected by the polarizing beam splitter cube (BC) due to the action of the quarter wave plate (QWP) and is imaged on the position sensitive sensor (PSD).

Detection of pits: Once the laser beam hits a pit, a change in reflected light intensity occurs due to partial scattering and destructive interference between the incoming and outgoing laser beam. The pit length or the time duration within the light level determines whether the data is interpreted as 0's and 1's of binary data. The analogue intensity variations can be observed by means of an oscilloscope.

Laser beam positioning: To keep the beam focus on the rotating disc the focusing lens (L2) can be moved vertically by means of a coil in response to an error signal. A cylindrical lens (L3) projects a round spot only when the beam is correctly focussed. A position sensitive detector (PSD) can determine whether the image of the focus is round. If it is not the case it generates an appropriate focusing error signal. An additional control loop ensures that the reading head follows the data track on the CD. All error signals can be displayed by means of an oscilloscope.



Equipment

Object Cat. No.	Qty.	Description	Object Cat. No.	Qty.	Description
-	07.0228	1	Interface for CD-reader CDI-01		
A	09.0262	1	Open frame CD-player on base plate		
B	09.0264	1	Set of connection cables for EXP-26		
-	10.0260	1	EXP-26 manual		
Required Options:					
	-	19.0140	1	Dual trace oscilloscope, 100 MHz	
	-	19.1000	1	IBM compatible PC, monitor, keyboard, mouse	
Options:					
	-	09.0269	1	Set of spare parts for EXP-26	