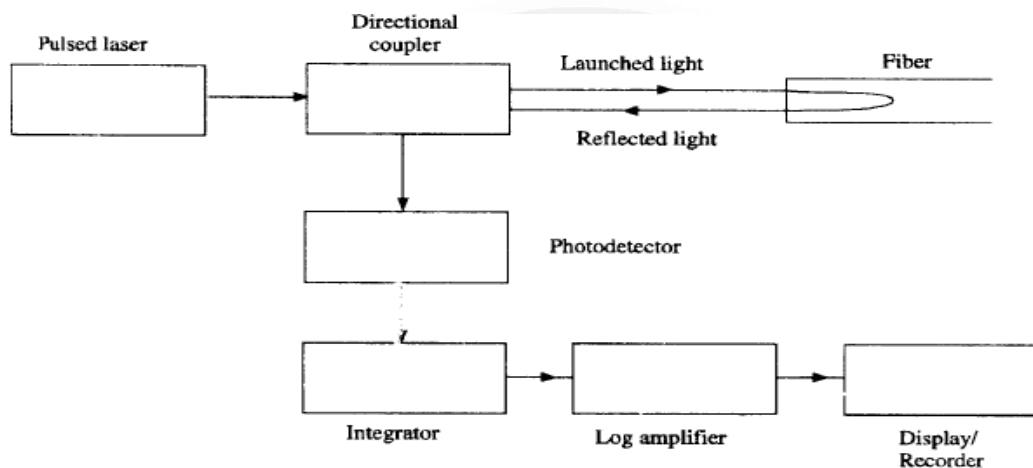


## 2.5 OPTICAL DOMAIN REFLECTOMETERS

The OTDR is the instrument which is used both in laboratory and field measurements for determining fiber attenuation, joint losses and detecting fault losses. When the fiber attenuation varies with distance, then the OTDR is the only instrument which can measure the fiber attenuation along the fiber optics link. The OTDR measurement is a non-destructive measurement.



**Figure 2.5.1 Block Diagram of Optical Domain Reflectometer**

[Source: "Optical Fibre Communications" by J.M.Senior, Page:246]

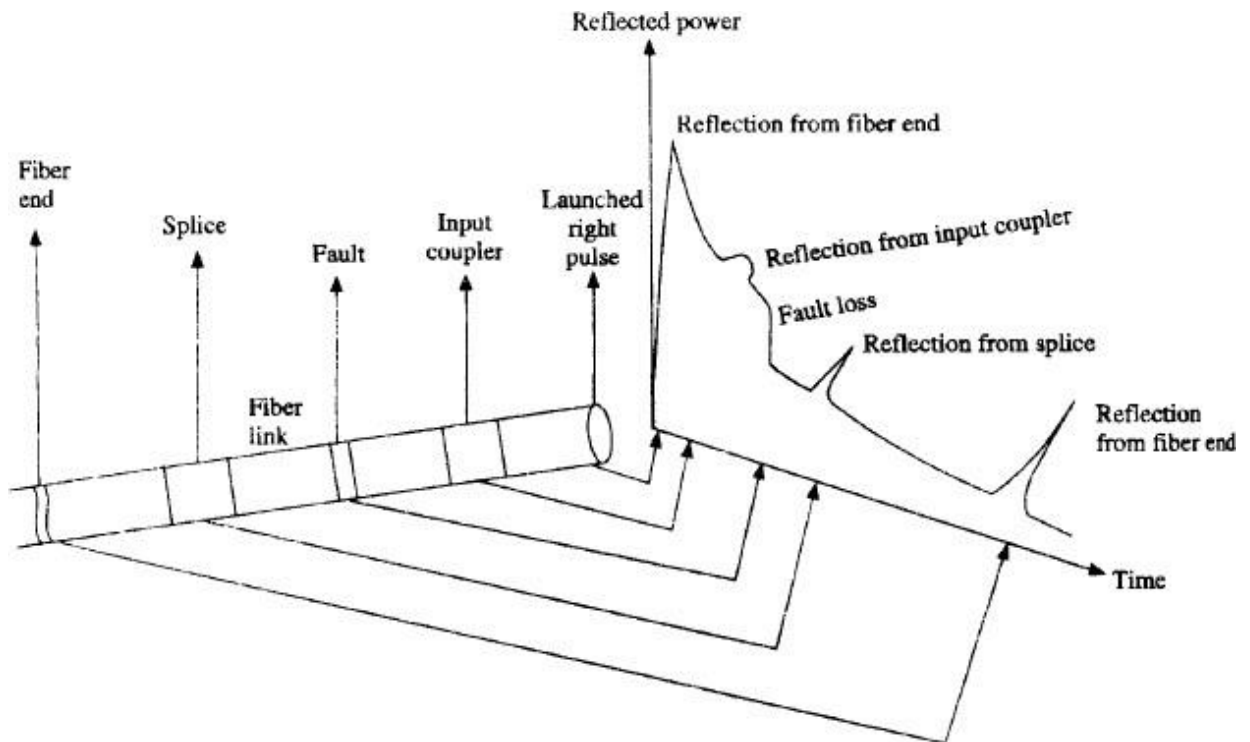
### Principle:

This method is often called the back scatter method. It is based on the measurement and analysis of the fraction of light which is reflected back within the numerical aperture of the fiber due to Rayleigh scattering.

### Construction and working:

A light pulse from a pulsed laser is launched into the fiber through a directional coupler. The back scattered light from the fiber is received by a photo detector like APD, through the directional coupler. A box car integrator is mainly used to improve S/N ratio by taking arithmetic average over a number of measurements taken at one point within the fiber. The signal from the integrator is fed to the logarithmic amplifier and its output is given to the recorder in DB.

The recorder will display the averaged measurements for successive points



**Figure 2.5.2 Optical Domain Reflectometer**

[Source: "Optical Fibre Communications" by J.M.Senior, Page:246]

within the fiber. The initial peak is caused by the reflection at the fiber end. The reflection from the input coupler is as small increase in the reflected power. There is a long tail caused by Rayleigh scattering of the input pulse as it travels through the fiber link in the forward direction. Due to presence of a fault in the fiber link. There is a sudden decrease of reflected power. Next peak is caused by splice or joint. Finally there is a peak due to Fresnel reflection of the fiber end where the reflected power is more than that of splice.