

ON-LINE GLOW CURVE RECORDING WITH A COMPUTERIZED TLD SYSTEM

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A computerized TLD system consisting of a TLD reader, a personal computer and an interface was developed for on-line glow curve recording. A BASIC program, equipped with machine code subroutines, was developed to control the reader and perform on-line evaluation. The glow curve is digitized and recorded in 256 channels. It can be displayed on a high resolution screen, stored on discs or retrieved from there for later analysis. On-line evaluation allows the user to select four temperature intervals in which the areas under the glow curve are integrated thereby enabling separation of the different glow peaks.

Introduction

The Central Research Institute for Physics /KFKI/, Budapest, has been involved in the development of laboratory and portable TLD readers since 1968 [1, 2]. These readers have been used in TL research, in space dosimetry for measuring the dose burden of cosmonauts [3], and also in environmental monitoring [4]. In many situations but mainly in space dosimetry [5], where the information from a TL dosimeter is important and the experiments cannot easily be repeated, it is vital to use a computerized TLD system which is able to record and store the glow curve in a digital form. In this way, one of the longstanding drawbacks of TLD measurements can be eliminated, viz. that of losing the information after the read out of the dosimeter.

The TLD system

The microcomputer based TLD system /Fig. 1/ consists of an NHZ-203 TLD reader, developed earlier in KFKI [1], and a Commodore 64 /C64/ microcomputer. The connection between them is maintained by a parallel interface of IEEE-488 type. This enables rapid communication between the TLD reader and the C64, without losing useful information because of the time needed for data transfer.

The block diagram of the TLD system is shown in Fig. 2.

The main feature of the system is that both the TLD reader and the C64 can work independently even if they are connected and switched on; alternatively, the reader can be controlled by the computer.

The X-Y plotter is directly connected to the TLD reader and can thus draw glow curves independently of the computer during dosimeter evaluation; however, printing out of a glow curve stored on a disc can be performed only via the computer by a graphic printer.

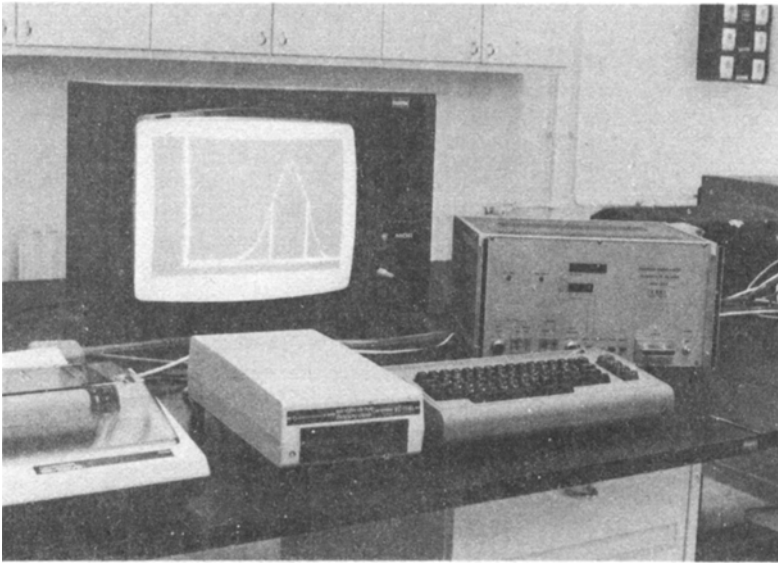


Fig. 1. An illustration of the TLD system

The operator may select the task of the computer from the menu presented in Fig. 3. The frame of the program system is written in BASIC /and occupies about 15 Kbytes from the memory/, and machine code subroutines /of about 1 Kbyte/ handle the graphics in an efficient way on the high resolution screen /320 x 200 pixels/ of a TV or of a video display unit /VDU/.

To perform computer controlled TLD measurements the user must initially choose and set the appropriate parameters of the measurement on the TLD reader unit itself then task No. 7 from the menu is selected to define the four integration intervals /which must be in accordance with the temperature limits already set on the reader/. This is followed by selecting task No. 1. The start signal is then generated by the computer and the heating cycle begins. The TL light sum - summed up by the counter of the reader - is sampled by the computer 256 times during the heating cycle and these values are stored in the RAM and considered to be the digitized glow curve. After the heating cycle has terminated a second readout can be started /if chosen when setting the necessary parameters by task No. 1/ then the measured values of this 2nd read-out in each channel are subtracted from the content of the corresponding channel /RAM location/ of the first read-out.

Once the glow curve has been fed into the RAM /either as the result of a measurement or from the disc/ evaluation may begin. The program, which is segmented and highly versatile, calculates the areas below the glow curve within the limits entered earlier. One important function is the automatic main glow peak search followed by computation of the glow peak area.

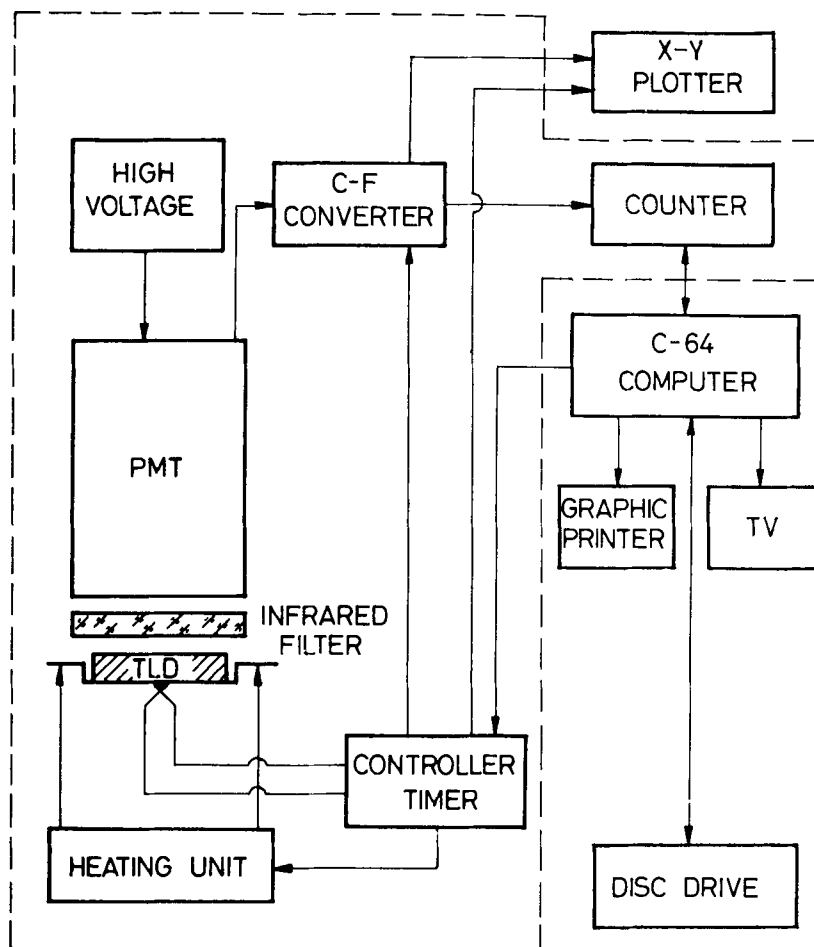


Fig. 2. Block diagram of the TLD system

The calculated results - along with a 6 character long identification code, given by the operator - are printed out and can be stored on disc together with the glow curve, if required.

Conclusion

The NHZ-203 TLD reader controlled by a C64 personal computer makes it possible to handle glow curves easily /to display, store on or retrieve from magnetic discs/ and to compute integrated values at five independent temperature intervals /under the main glow peak and also four different preselectable intervals/. In this way glow peaks can be separated, and the fading effect can be decreased considerably. Glow curve analysis can be carried out at any time after the TL measurements, as the whole information obtained from the TL evaluations can be stored.

- M E N U
- 1 - TLD evaluation controlled by the computer
 - 2 - To write a glow curve onto a magnetic disc from a RAM area
 - 3 - To read a glow curve back from a disc into the RAM
 - 4 - To display a glow curve from the RAM on the high resolution screen
 - 5 - To print out the values integrated in four preselected intervals of the glow curve and under the main glow peak
 - 6 - To clear from the high resolution screen the glow curve which is currently in the RAM /many glow curves can be displayed on the VDU at the same time/
 - 7 - To select /or change/ the integration limits for the four different intervals where the integration is to be carried out during the TLD evaluation
 - 8 - To clear the entire high resolution screen
 - 9 - To switch the VDU from the alphanumeric display to the high resolution screen

Fig. 3. The tasks to be selected from the menu of the software

References

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