

TELEMETRY SYSTEM OF DYNAMITRON ACCELERATOR

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Introduction

In the Dynamitron Accelerator, ion source and pulsing system are contained on the high voltage terminal (4.5 MV maximum) in the pressurized vessel, and the full performance test of these devices can not be made in the open air when the vessel is opened. Moreover, it is difficult to obtain a certain informations at high speed of the terminal when it is running.

For the purpose of reading out the working conditions and of controlling the devices on the terminal, a telemetry system has been designed and developed. Most parts of the system have already been fabricated, and some are now in progress towards the completion. In this report, we like to mention of the present stage of developing our telemetry system.

Telemetry system

Schematic diagram of the telemetry system is shown in Fig. 1. Analog or digital informations on the ion source, vacuum, lens system, etc., from various devices in the form of analog signals of $\pm 10V$ at the maximum are fed into multiplexer which is connected to the LED transmitter through a photo-isolator, due to the high electro-static potential of the terminal.

The photomultiplier located outside the main vessel detects the frequency-modulated pulse light signals passing through a focussing lens. The PFM signals are decoded with the MPU6800 micro-computer (by Motorola) which also

generates the controlling signals for the multiplexer and other devices on the high voltage terminal.

It turned out to be evident through our experiences of running the system under the operation of the accelerator that the complete electrostatic shielding ¹⁾⁴⁾ and surge absorbers ³⁾ with very fast speed had to be provided to reduce noise and surge. The X-ray intensity ²⁾ was measured at several locations Fig. 2 around the telemetry circuit on the HV terminal, and was found that this was not so serious as the cause of electric surge. As the telemetry circuit has to be evacuated and pressurized occasionally, some capacitors change it's capacitance at defferent gass pressure, and a certain type of capasitor is almost impossible to be used.

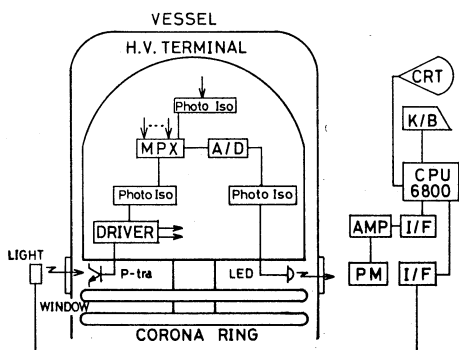


Fig. 1. Schematic diagram of Dynamitron Telemetry systems

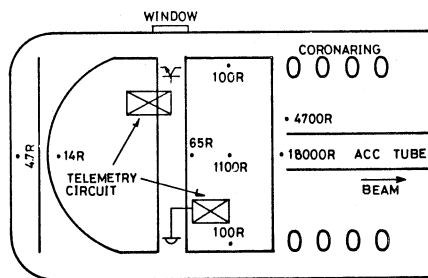


Fig. 2. X-ray dose distribution measured by TLD for about 280hr operation

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