BEAM DIAGNOSTIC INSTRUMENTATION OF THE TRISTAN ACCUMULATION RING

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Introduction

Beam diagnostic instrumentation in the TRISTAN Accumulation Ring consists of position monitors, optical monitors, screen monitors, beam scrapers, a current monitor (DCCT), transverse oscillation detectors and oscillation dampers. In this note outlines of some of these equipments are described.

Position monitors

Detail of position measurement is described in a separate report in this conference. The configuration of the monitor system is shown in Fig. 1. In the closed orbit measurement during storage operation, a single electronics in each local control building serially receives the signals from 21 or 22 monitors (each with 4 electrodes) and transfers the data to a control computer. The connection of the monitors and coaxial switches in a series is shown in Fig. 2. When required, as in the case of commissioning, we can send signals to the center control building to observe beam pulse on an oscilloscope to make sure the arrival of beam at the location of each monitor.

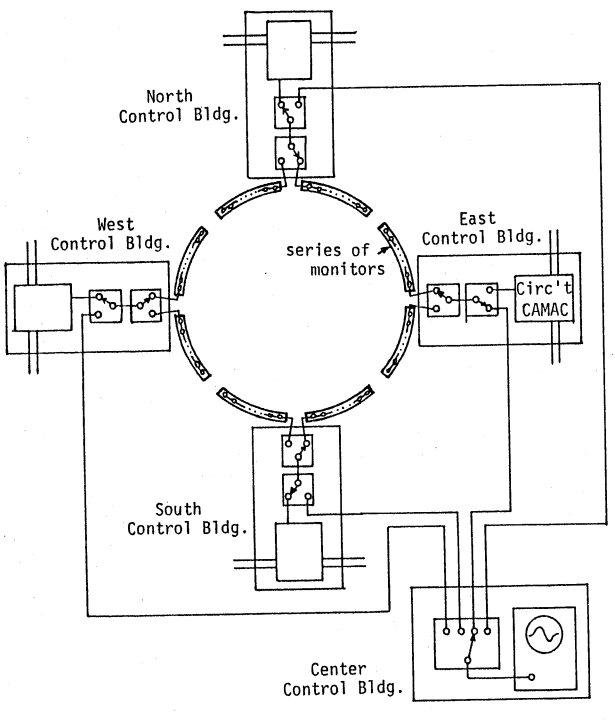

Fig. 1
Layout of position monitor system

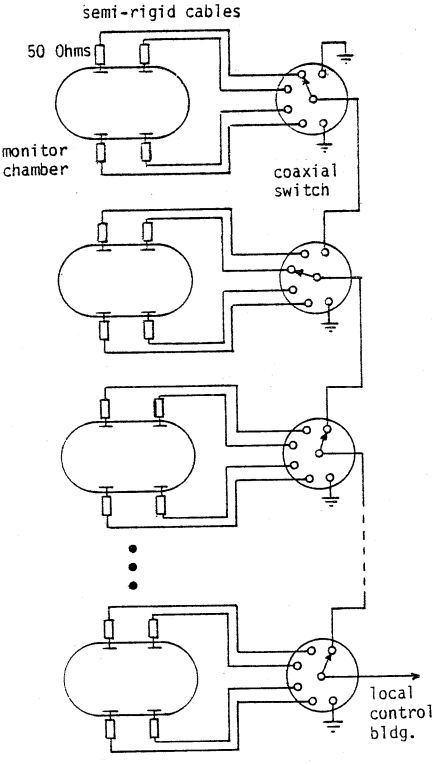

Fig.2
Cable connection in a series of position monitors

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Optical monitors

Beam diagnosis by synchrotron radiation is made in the visible region and in the x-ray region. Visible radiation is guided to a surface building and will be used for the general observation of beam behaviors, beam current measurement and bunch shape observation. X-ray is used for the accurate vertical profile measurement. The sketch of the proposed optical apparatus is shown in Fig. 3.

Transverse oscillation system

The configuraton of transverse oscillation detection and damping system is shown in Fig. 4. The pick up electrode forms a 50 Ω stripline and has directivity with respect to the beam direction; we pick up electron signals from one end and positron signals from the other end.

Coherent oscillation gives rise to amplitude modulation in the beam pulse. Therefore, we make the spectrum analysis of the envelope signal of beam pulse and get the betatron numbers. The signal is amplified and applied to the deflection plates for the damping of oscillations.

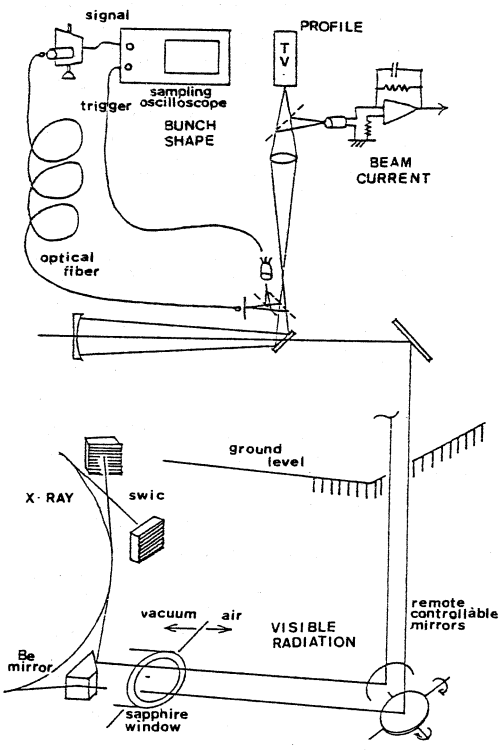

Fig. 3
Outline of optical monitoring

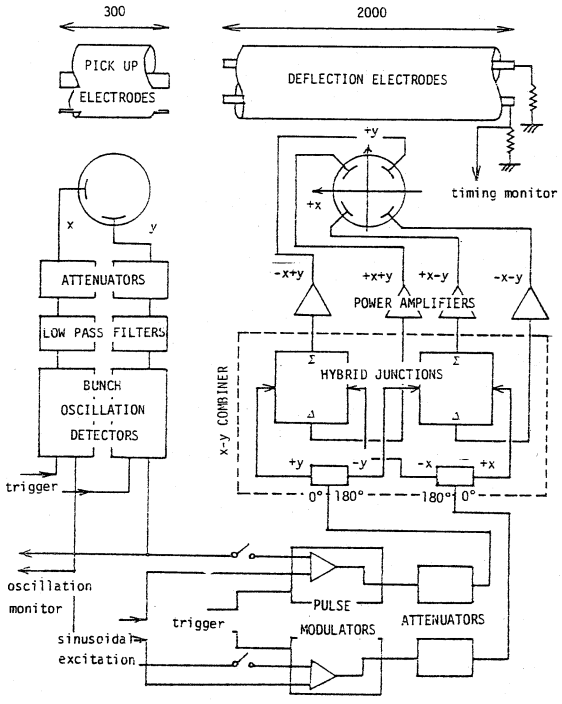

Fig. 4
Block diagram of transverse oscillation detection and feedback damping