Redesigned Vacuum Control System for the Spring-8 Storage Ring

Takafumi HIGASHIURA, Kowashi WATANABE, Mitsuhiro MASAKI and Haruo OHKUMA

SPring-8, Kamigori, Ako-gun, Hyogo 678-12, Japan

1.Introduction

We redesigned the vacuum control system using the VME system with remote-input-output devices (RIO), we will abbreviate this to VME-RIO system here, and the programmable logic controller (PLC) system to standardize the storage ring control system [1]. As shown in Fig.1, the VME-RIO system composed of 4 RIO master stations and 24 RIO slave stations controls and monitors vacuum apparatus such as vacuum pumps, vacuum gauges, valves etc. As shown in Fig.2, the PLC system composed of 25 sequencers operates as an interlock system to protect vacuum system of the storage ring against the damages of vacuum components caused through the trouble.

2.VME-RIO System

The VME-RIO system is divided into 4 units and respectively connected to engineering workstation (EWS's) through a fiber distributed data interface (FDDI) network. The unit consists of a RIO master

station, 6 RIO-slave stations and a RIO network and controls a quarter of vacuum system.

The RIO master station is a VME system operated by UNIX based real-time operating system, and has a function of remote procedure call (RPC). The master station controls vacuum apparatus through RIO slave stations by the RPC that is requested from EWS's or local control terminals. Furthermore, to investigate the vacuum system when any trouble happens, the master station usually holds the status signals of the vacuum condition such as vacuum pressures and status of vacuum apparatus for 5 minutes. If some trouble occurs in the vacuum system, the preceding signals are transmitted to the EWS's. Furthermore, after this trouble occurs, the status signals of the vacuum condition for the optional time are transmitted to the EWS's also .

The RIO slave station is a remote station for two cells of vacuum apparatus. The slave station outputs command signals to the apparatus by orders of the RIO master station and transmits signals of vacuum control data to the RIO master station.
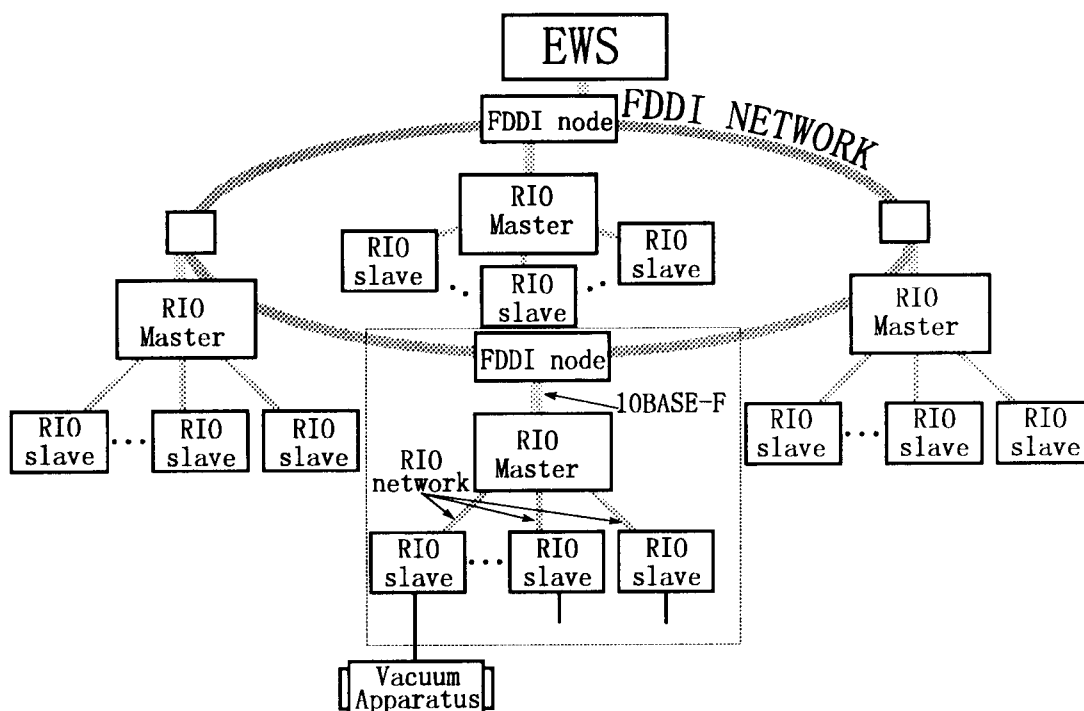

Fig.1. The abstract of VME-RIO system

3. PLC System

The PLC system is an interlock system to protect vacuum apparatus against the damages of vacuum components caused through the trouble and completely independent of the VME-RIO system. This system consists of 24 local stations, a network-managerial station and a PLC network. The PLC system keeps a lookout for the vacuum pressures, cooling water flows for absorbers, and cooling water temperatures for crotch absorbers. The gate valves in the ring is closed by means of the PLC, when the vacuum pressure becomes unusual. Further the PLC makes the signal of beam abort when there are an abnormal pressure rise in vacuum or any trouble in the water cooling system.
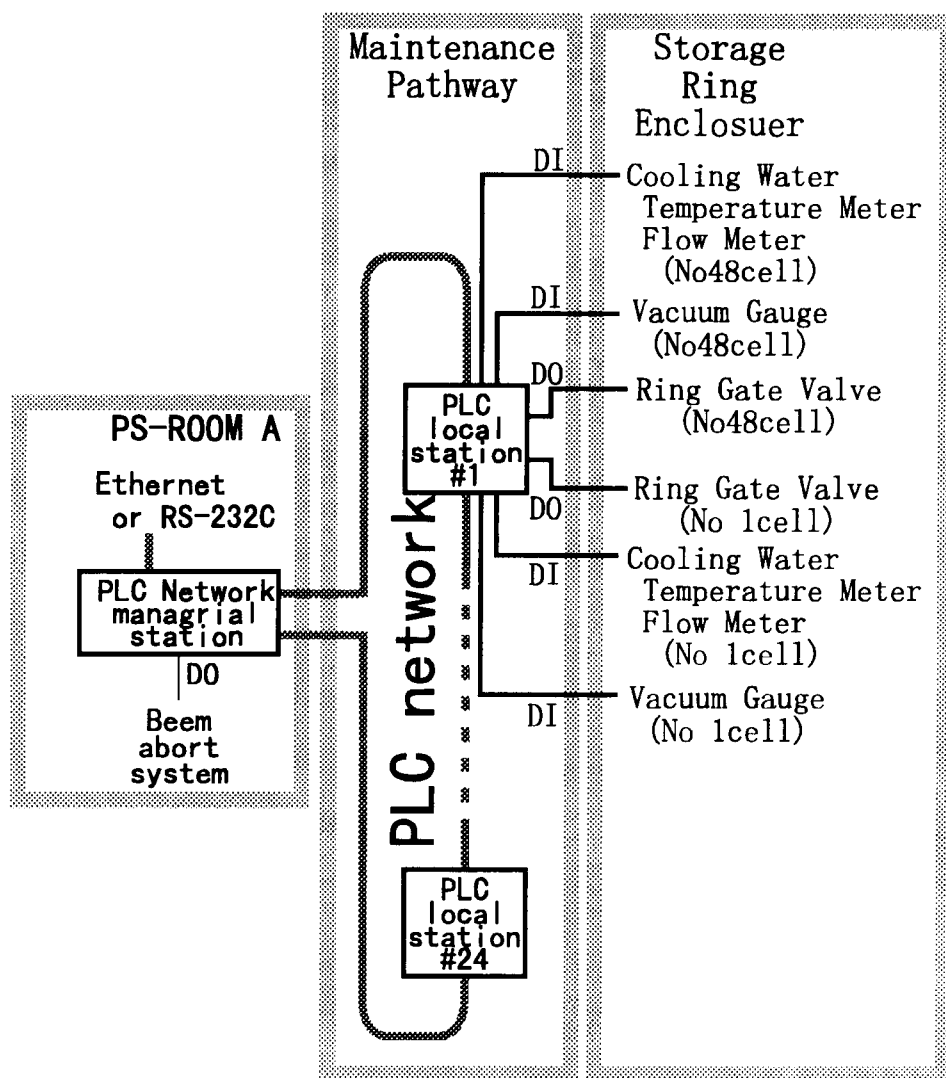
References

[1] T. Higashiura et al., the SPring-8 Annual Report,1944 P.113

Fig.2. The abstract of PLC system