INSERTION DEVICE CONTROL SYSTEM THAT SYNCHRONIZED WITH STEERING

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OUTLINE

The insertion device of UVSOR had set up an undulator gap and steering magnets manually. We built the new control system as follows.

We use PCs as an insertion device control computer and operation computers. The insertion device control computer controls the undulator gap controller and steering magnet power supplies by GPIB. During gap change, the insertion device control computer sets up steering magnets current value corresponding to a gap value.

Since CORBA(Common Object Request Broker Architecture) is used for communication between PCs, the beam line PC on the same network can operate a undulator gap.

INTRODUCTION

The insertion device for the UVSOR had set a GAP value and output current value with controlling Undulator Gap Controller and steering magnet power supplies each manually by operator. Therefore, by collaborating with the UVSOR we decided to develop the insertion device control system jointly, which is possible the Undulator Gap Controller and steering magnet power supplies from remote place and follow output current value that is accompanied by GAP value change.

SYSTEM STRUCTURE

Fig.1 shows system structure of UVSOR's insertion device control device.

GPIB connects the Undulator Gap Controller and steering magnet power supplies to the insertion device control computer control. The network connects to the Insertion Device Control Computer and Operation Computers.

The command which is operated by Operation Computers, such as a GAP change command, are delivered to the Insertion Device Control Computer through the network. The Insertion Device Control Computer transmits a GPIB command changed by GAP to the Undulator Gap Controller and drives the pulse motor. During the pulse motor drive, the GAP present value is got, and output current value, which is suitable for GAP value, is sampled from output current correction table, which made preparation in advance. Then the current change GPIB command is transmitted to steering magnet power supplies. GAP change and output current value state monitoring are possible in the Operation Computers.

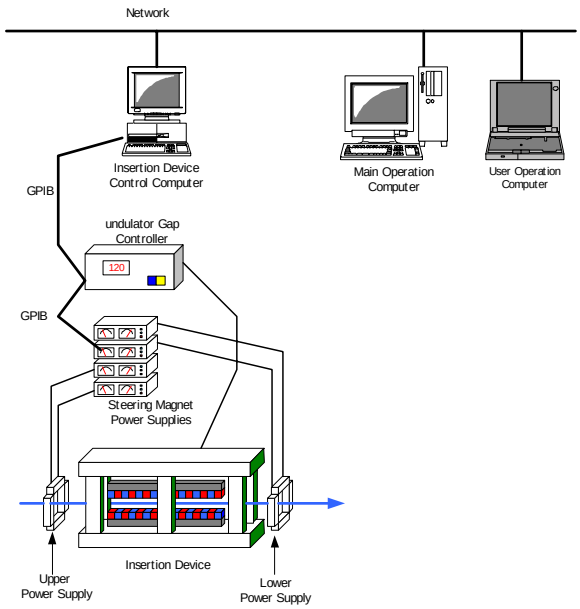

Figure 1: System composition figure.

SOFTWARE STRUCTURE

Fig.2 shows software structure of USVR's insertion device control device.

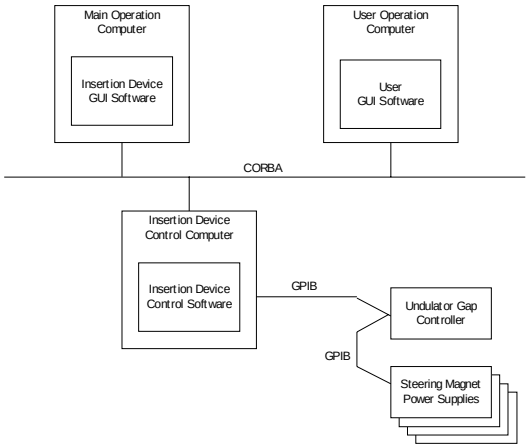

Figure 2: Software composition figure.

The Insertion Device Control Software controls and obtains the present value of the Undulator Gap Controller and steering magnet power supplies through GPIB. GAP is changed to a GAP value which is transmitted from GUI Software. During GAP change, the current setting value is sampled from output current correction table, which is prepared in advance, and it is set to the Steering Magnet Power Supplies. The Insertion Device GUI Software is the GUI that controls the Insertion Device. The GAP value and power supply output current value are set and sent to the Insertion Device Control Software. In addition, current output ON/OFF of the Steering Magnet Power Supplies and Reset output are set and sent to the Insertion Device Control Software.

Moreover, the present GAP value, power supply output current value, status information etc, are obtained from the Insertion Device Control Software and is displayed on screen. CORBA communication is used when communicating with the Insertion Device Control Software.

INTERLOCKING OF GAP CHANGE AND OUTPUT CURRENT VALUE

In order to adapt GAO change action and follow output current value, output current correction table is arranged and saved to file. Fig.3 shows the table structure.

This table defines the GAP value and output current values of four Steering Magnet Power Supplies by one line.

When the GAP value is changed, the GAP value is obtained from the Undulator Gap Controller, and the current value which is suitable for GAP value is sought by straight line interpolation from the output current correction table. Then the output current is set to four Steering Magnet Power Supplies. This process is repeated until the GAP value change action has finished.

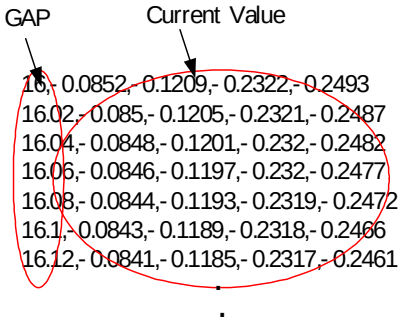

Figure 3: Output current correction table.

GUI

For GUI, there are the Insertion Device GUI and the User GUI.

Fig.4 and 5 show the Insertion Device GUI and the User GUI.

GUI can perform the following settings.

(1) GAP value setting
(2) Current output value settings
(3) Current output ON/OFF and RESET setting
(4)Output current correction table setting
(5) GAP change driving speed setting
(6) Whether User GUI operation is permitted or not.

The following status are as follows:

(1) Present GAP and output current value
(2) Current output ON/OFF status
(3) Driving status
(4) Speed setting status
(5) Status whether User GUI operation is permitted or not.

Figure 4: Insertion Device GUI.

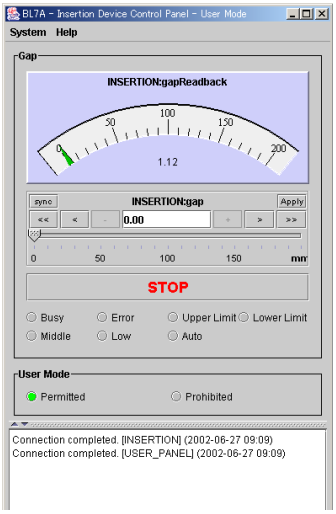

Figure 5: User GUI.

CONCLUSION

Many network PCs are able to be controlled remotely, and the GAP can also be changed at beam line side.

Moreover, it is also possible to monitor GAP values and output current values remotely.

REFERENCE

[1] UVSOR (Ultraviolet Synchrotron bital Radiation Facility), http://www,uvsor.ims.ac.jp/

[2] Cosylab,http:/www.cosylab.com

[3] NDS,http://www.ndssf.co.jp