ABSTRACT
Residual Gas Analyzers (RGAs) have been widely used in accelerator vacuum systems for monitoring and vacuum diagnostics. The National Synchrotron Light Source II (NSLS-II) vacuum system adopts Hiden RC-100 RGA which supports remote electronics, thus allowing real-time diagnostics with beam operation as well as data archiving and off-line analysis. This paper describes the interface and operation of these RGAs with the EPICS based control system.

INTRODUCTION
The NSLS-II under construction at Brookhaven National Laboratory is designed to provide an average vacuum pressure of <1x10^-8 Torr across the storage ring and front ends during operation. Quadrupole-type RGAs are installed to measure the partial pressure of residual gas species at selected locations in the booster ring, storage ring, front ends, and user beamlines. Their use will help to identify sources of residual gases, including photoelectron stimulated-desorbed gas from chamber walls, absorbers, air leaks, cooling water leaks, gases back-streamed from the beamlines, and other contaminants. The partial pressure can be measured down to 10^-13 Torr range using the electron multiplier option.

NSLS-II RGA SYSTEM
The NSLS-II RGA system comprises the RGA heads distributed around NSLS-II accelerator complex, the RF boxes, the RGA controllers and the interconnecting cables. Hiden RC-100 RGA RGAs used on NSLS-II are Hiden RC-100 RGA, which contains an RC Interface Unit (IU), a Radio Frequency (RF) box, and a Probe. NSLS-II RGA Installation and Distribution The remote electronics units of RGAs are located at the vacuum control racks in the NSLS-II mezzanine, to allow easy access for online analysis and maintenance. These units are connected to the RF Head using a multi-conductor and high voltage cable with customized length of up to 45 meters. The RF Head is attached to the Probe, which is mounted on vacuum chambers. The RF box is ~50 cm off the mid plane thus minimizing the radiation dosage from the copious synchrotron radiation.

Due to the high cost, RGAs are installed at selective vacuum sections during the initial phase of NSLS-II operation.

MASsoft User Interface
A Windows based software called MASsoft is provided by the manufacturer to use together with the RC RGA system. The MASsoft application provides complete control and tuning of the instrument; also data acquisition, storage, recall and analysis within MS Windows.

Table 1: Numbers of RGAs for BR, SR, FE

<table>
<thead>
<tr>
<th>Section</th>
<th>Number of RGAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booster Ring (BR)</td>
<td>2</td>
</tr>
<tr>
<td>Storage Ring (SR)</td>
<td>98</td>
</tr>
<tr>
<td>Front End (FE)</td>
<td>6</td>
</tr>
</tbody>
</table>

MASsoft User Interface
A Windows based software called MASsoft is provided by the manufacturer to use together with the RC RGA system. The MASsoft application provides complete control and tuning of the instrument; also data acquisition, storage, recall and analysis within MS Windows interface. Communication between MASsoft and RGA is done via both RS-232 serial link and Ethernet link.

EPICS INTERFACE TO NSLS-II RGA SYSTEM
The NSLS-II RGA system will be monitored and controlled by EPICS based control system during commissioning. The EPICS Interface and Control of the RGA's Control PC provides a scan logical device on the RGA instrument as an input or output device. It only supports simple, numerical computations. The Octave is an easy to use application, which provides a convenient command line interface for numerical computations. The Matlab and Python interface to EPICS Channel Access packages facilitate users familiar with these two languages to do array computation and analysis.

SUMMARY
Till now, all RGAs required for NSLS-II initial operation have been installed. All the RGAs in Storage Ring Cell arc sections are operational and functioning properly. We’re still learning from these RGAs and intend on improving system performance.