Clas-Note 98-013

Control Configuration for the Hall B Polarized Target System

July 30, 1998

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To measure the polarization of the Hall B polarized target, data is acquired by a Q-meter system, analyzed, and displayed as a peak centered within a Q curve. From the area of the peak the polarization of the target is estimated. This paper presents the configuration of the computers and instruments used to measure the polarization and control the target. Specifications of the various systems are given in the appendices.

Each target is controlled by a cryogenic-target-control system and surrounded by coil that is part of a Q-meter system. Figure 1 illustrates the overall PC configuration of the system. The PCs are connected in a client server mode. The client PC is a Dell PC located in the counting house. There are two server PCs in the endstation. One server PC is for communicating with the cryogenic-target-control instruments. The other server PC controls the Q-meter system. All PCs are connected via ethernet.

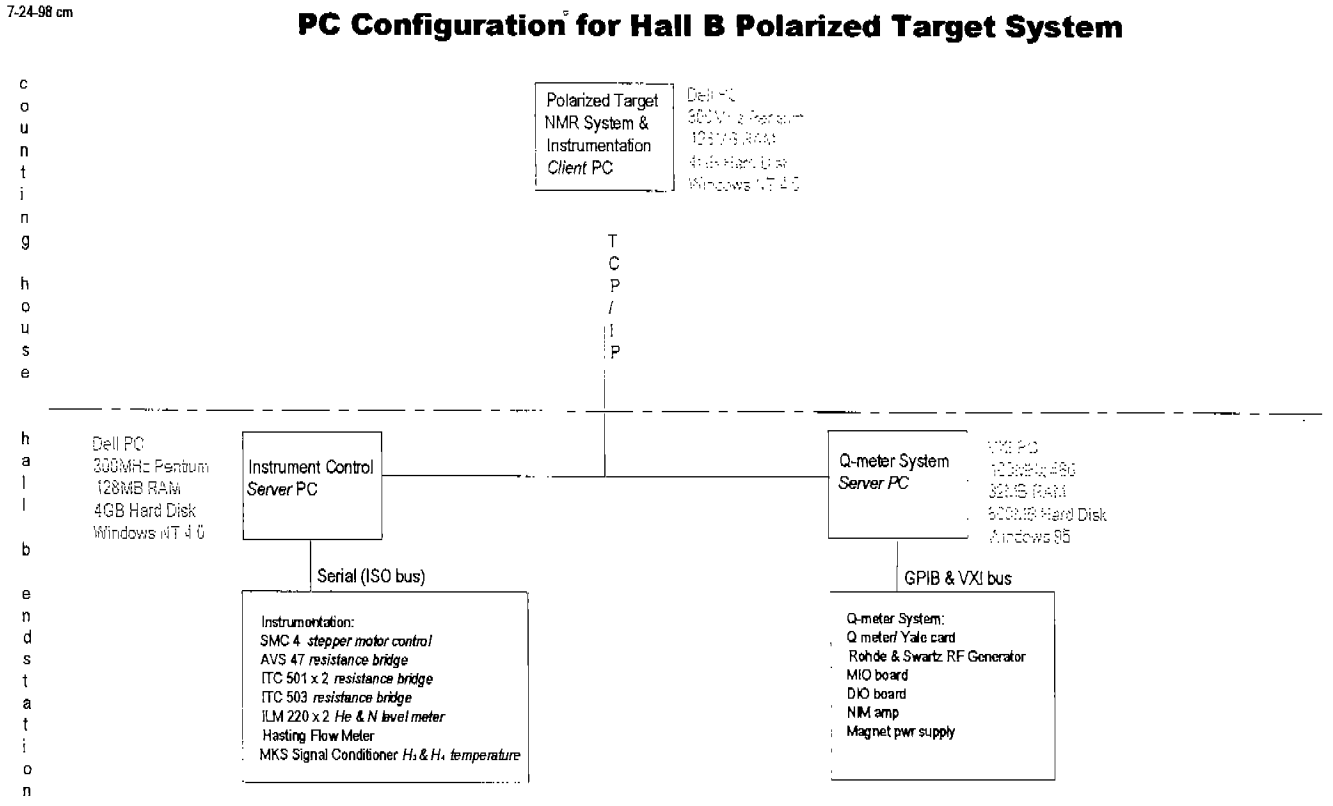

Figure 1 Illustration of the PC configuration for the Hall B Polarized Target System.

Figure 2 illustrates the configuration of the Q-meter system. Starting with the PC housed in a VXI crate and going clockwise the following connections are made: the VXI PC is connected to a Multiple Input Output module (MIO) via the VXI bus. A Digital to Analog Converter (DAC) housed on the MIO module connects to the external input of the radio frequency (RF) generator. The output of the RF generator is connected to the RF input of a Q-meter. One of the target coils is connected to the scan output of the Q-meter. A Yale card which performs the DC offset subtraction, is attached to the Q-meter's signal output. The signal output is then connected to the input of an amplifier housed in a NIM crate. The output of the amplifier connects to an Analog to Digital Converter (ADC) housed on the MIO card.

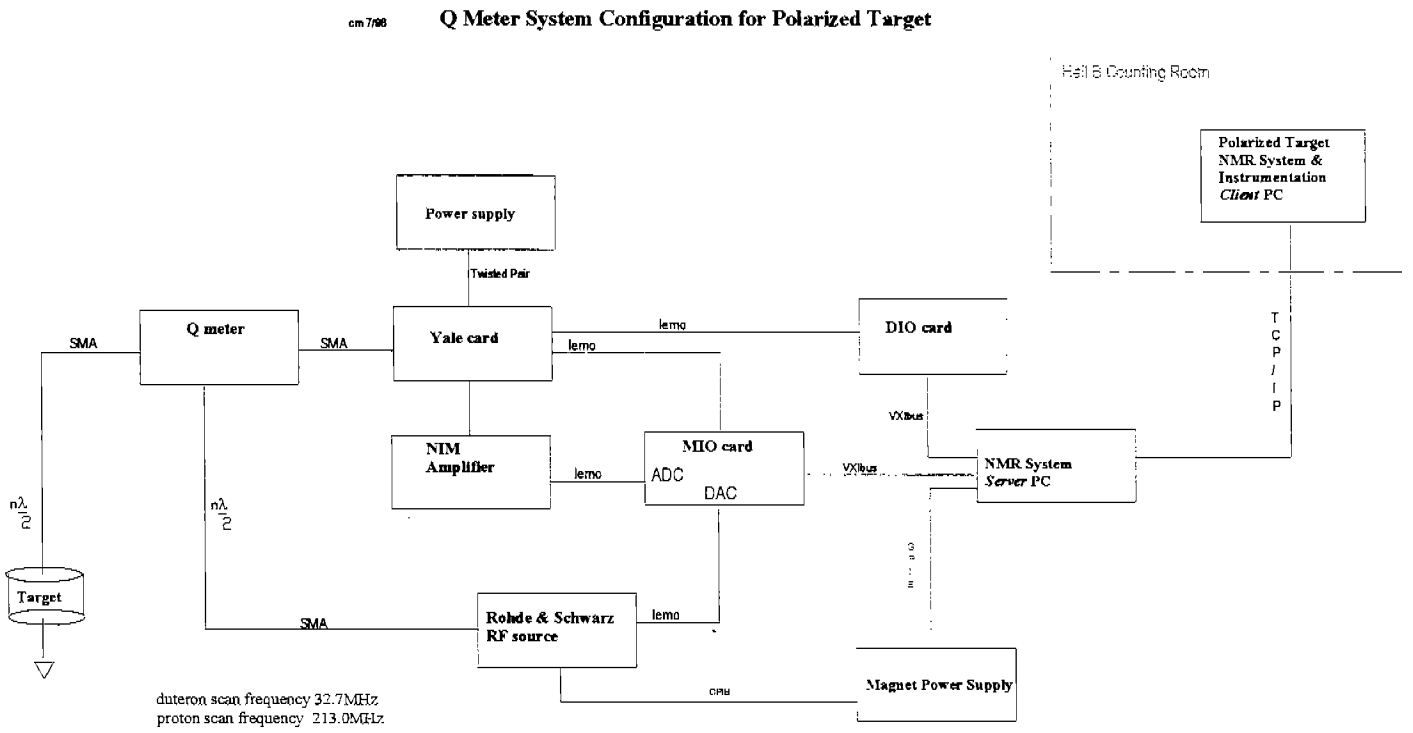

Figure 2 Layout of the Q meter system.

Figure 3 illustrates the cryogenic target control system. It consists of a Stepper Motor Controller, three Resistance Bridges, a Level Meter, Flow Meter, and Signal Conditioner, all connected in series to a communications port (com port 1). A fourth Resistance Bridge is connected to com port 2.

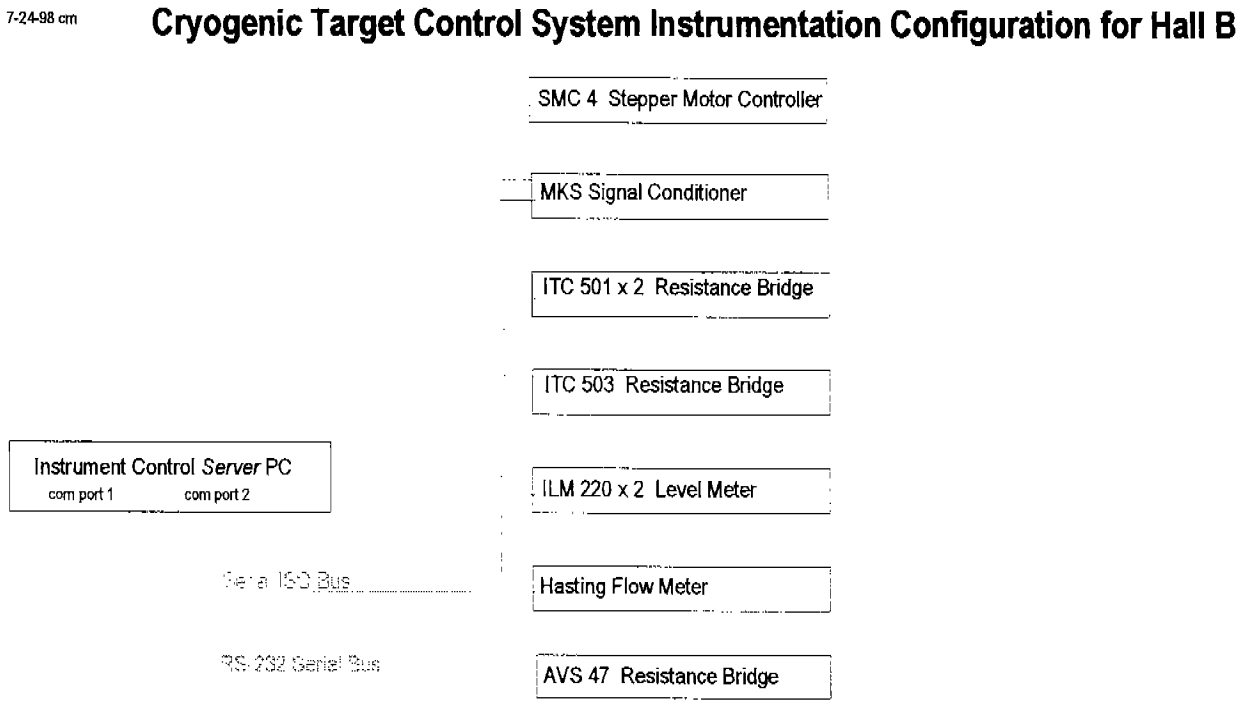

Figure 3 Illustration of the instrumentation configuration for the crygenic target control system.

A prototype of this system has been set up in the Experimental Equipment Lab and found to work satisfactorily.

Appendix A:

Client PC located in the Hall B Counting House

- Dell PC
- 300 MHz Pentium Processor
- 128 MB RAM
- 4GB Hard Disk
- Windows NT 4.0 operating system.
- 3 Com Combo Network card

Appendix B:
Q-meter System

Server PC

- VXI PC
- 100 MHz 486
- 32 MB RAM
- 800MB Hard Disk
- Windows 95 Operating System

Q-meter System

- Q-meter processes RF signals received from the target.
- Yale Card amplifies Q-meter output and performs DC level subtraction on the real part of the RF signal.
- RF Rohde and Schwarz RF Generator provides programmable FM pulse modulation.
- NIM amplifier performs second stage amplification.
- MIO card is a multifunction analog, digital, and timing input/output module for the VXIbus.
- DIO provides digital signal conditioning for the VXIbus.

Appendix C:

Cryogenic Target Control System Instruments

- SMC 4 Stepper Motor Controller controls target position, run and bypass valve, and microwave attenuation.
- MKS Signal Generator measures He3 and He4 temperature in the banjo and He in the pump manifold.
- ITC 501 X 2 Resistance Bridge measures and controls the resistance of the magnet and refrigerator.
- ITC 503 Resistance Bridge measures and controls thermocouples and resistors.
- ILM 220 X 2 Level Meter measures the amount of He in the banjo, separator, and helium reservoir.
- Hasting Flow Meter measures the helium flow in separator, pump manifold, and magnet boil off.
- AVS 47 Resistance Bridge measures and controls the resistance of insert sensors.