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EN Tandem at ORNL

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N. L. Jones

Accelerator-Based Atomic Physics, Oak Ridge National Laboratory, P.O. Box 2008
Oak Ridge, Tennessee 37831-6377, USA*

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1. Belt

Experiments with urethane belts continue. The Ropanyl belt began failing in the spring, which limited terminal voltage to 4 MV by the end of the summer. Fortunately, the research being conducted at the time did not require higher voltages. Another belt was ordered, and recently was installed. A report on progress of the investigation into machine improvement will be given at this meeting. Within the past week, the machine was conditioned to 6 MV and returned to the researchers for use.

As part of the belt change, quite some time was devoted to removal of belt residue from the column. Once again, components sold for the cleaning of firearms were utilized to clean into the numerous nooks and crannies of the machine.

An arrangement for observation of terminal belt position was installed last fall, which has been very helpful in maintaining accurate belt tracking. This is critical on an EN, because the terminal alternator is only ~1.5" wider than the belt.

2. Belt Charge Power Supply

The belt charge power supply consists of a 50 kilovolt supply proceeded by a current regulator. The current regulator was modified in the 70's to use two 6BK4 tubes in parallel with a 2N3440 transistor as an emitter follower. The bandwidth for this system has been calculated to be on the order of 400 kilohertz. After a failure in the regulator circuit requiring it to be completely rebuilt, an investigation was made into replacement with a more modern supply. It was found that the existing supply is the best type for the purpose, so the regulator was very carefully rebuilt and returned to service. During the interim period a substitute was assembled using six 200 megohm resistors in parallel and placed in series with the high voltage supply as suggested in previous SNEAPs. Charging was regulated by using a screwdriver to adjust the variable voltage transformer that feeds the primary of the supply. Although all feedback electronics were bypassed by this method, it performed surprisingly well.

3. Resistors

The column gradient control system continues to perform very well. No resistors have needed replacement, and all still measure within $\pm 2\%$ of their specified values. After

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the belt change, the only adjustments needed were a quick spark gap check and adjustment.

4. Recirculating Terminal Gas Stripper

A recirculating terminal gas stripper system has been funded and most of the vacuum components have been acquired. It will use a 250 liter per second, hybrid turbo pump (Edwards) recirculating to a stationary baffled canal with a 200 position foil stripper (NEC) positioned in the center of the canal.

Figure 1. Top View of proposed terminal layout. Beam is from left to right. The central baffled stripper tube portion will be stationary. The chamber and foil stripper were acquired from EN 22 at the University of Pittsburgh.

As part of this project, a system for control and monitoring of terminal parameters is being assembled that will use a distributed control system (Group 3) communicating via fiber optics to a personal computer in the control room. A networked secondary control computer will be used for local control of the ion source during start up and shut down operations. The intention is to utilize the intuitive control system of the 25 URC as a model. Assignable shaft encoders will be utilized as virtual potentiometers for control input. As programming talent and time is in very short supply, the system will probably be programmed in either LabVIEW (National Instruments) or Visual Basic (Microsoft). This system will be the foundation for a complete accelerator control system upgrade that is planned. Researchers are interested in the ability to save and restore run settings, and the ability to program rates, relative settings, and limits is an attractive feature for equipment protection. The ion source is planned for the first conversion, as it can be easily accessed for maintenance and adjustments. It is also prone to large EMF disturbance and will provide testing of transient shielding and suppression.

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