

## SUPERCONDUCTING ACCELERATOR UPDATE

Tim Toohig

Signs of progress on the Superconducting Accelerator project are evident even to the casual observer at Fermilab these days. Among the most obvious is the installation of the high-pressure helium line and the two branches of the LHe/LN<sub>2</sub> transfer line passing under Road D from the Main Ring shielding berm to the Central Helium Liquefier (CHL) Building. The high-pressure line is already in service to allow use of the 40,000 SCF helium buffer tank at CHL in conjunction with the magnet tests at B12. Also very evident these days are the transfer-line support stands which are now in place for the entire ring except for the straight sections. In F-sector three of the four auxiliary service buildings now have their bright-blue heat exchangers protruding from their downstream walls.

### Magnets

Meanwhile back at the Magnet Facility, a total of 149 dipoles of the "smart bolt" design had been produced through the end of March, along with 20 final design quadrupoles and seven spool pieces. There still exists a very large backlog of collared-coil assemblies and the production rate of cryostats to house these has been raised above the projected 10/week to clear the backlog. The A3 upstream cryoloop has been fully installed and all the dipoles of the A3 downstream loop are in place.

### B12 Test Facility

The testing program at B12 using older-style magnets was completed and the facility has been rebuilt using accelerator magnets of the final design and the newer versions of the vacuum and quench-protection circuits. The newer systems were developed on the basis of the earlier B12 tests.

The new system incorporates the alternating bus scheme designed to reduce voltages across the loads during quenching. A collecting header similar to these in the tunnel have been installed and connected to the magnet relief valves. The helium relief valves are now nonlinear, solenoid-driven, Kautzky valves.

The revised system will allow studies aimed at further refinement of the quench-protection system. Extensive studies will be made of the thermal and mechanical performance of the new "smartbolt" trimpots of the vacuum system, etc. A major thrust of the revised B12 program will be the development of the control systems for the accelerator.

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### Controls

Considerable hardware and software development and installation has taken place in the past six months. One of the most obvious signs of progress is the appearance of an Energy Saver control console in the Main Control Room. Link drivers have been installed and debugged and both vacuum and refrigeration subsystems in A-sector and B12 can be controlled from the Main Control Room. The Resident Local Intelligence unit has been installed at B12 and is in use.

Before the old B12 system was dismantled, it was operated for a week on closed-loop control using a standard Doubler ramp to 4000A. This was accomplished without operator intervention. These closed-loop controls are now being down-loaded from the PDP-11 to microprocessors.

### Refrigeration

Installation of refrigeration is paced to construction and procurement of components.

Some compressors have been commissioned and some others are being procured and installed, limited by the availability of funding. The valve boxes connecting the satellite refrigerators to the tunnel have been installed in F-sector. The remaining valve boxes are in hand and will be installed when the tunnel becomes accessible at the beginning of the summer shutdown.

The CHL has had a very successful three-week reliability run which also served to train the operating crews. The run was terminated for installation of the valving and connections to permit delivery of LN2 and LHe to the Main Ring.

Enough LHe/LN2 transfer line and 3 in. high-pressure He line has been fabricated for over half the ring. In A-sector, the line is in place and being welded up. The line for E and F-sectors is stored near F0 and A0 respectively ready to be installed on the support stands.

### RF

The prototype rf cavity has been completed and successfully tested in the Main Ring beam. Installation work for the 3-cavity Saver system is proceeding. The cooling water circuits in the rf Saver addition have been completed.

### Power Supply

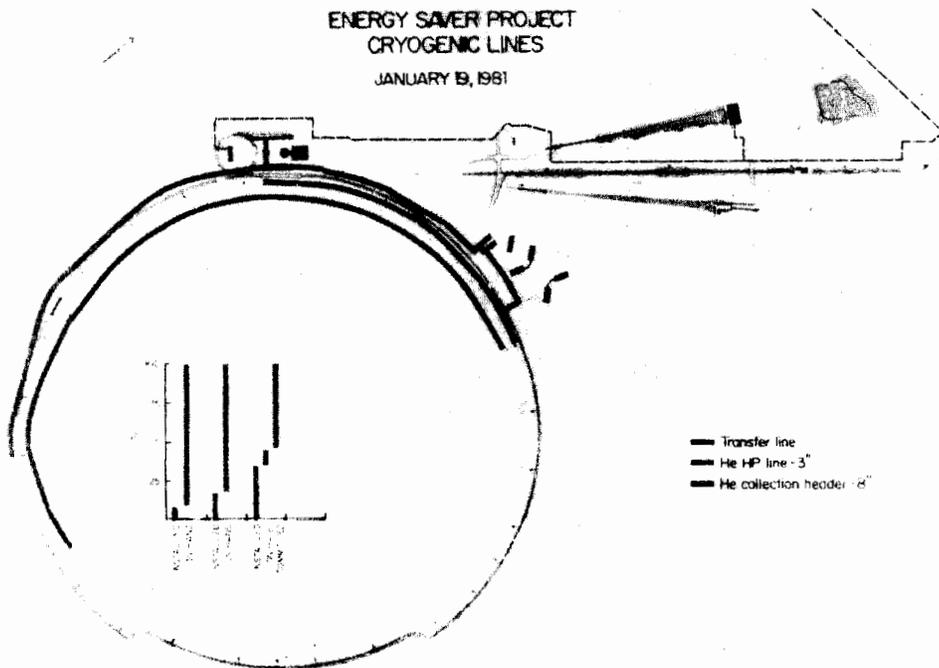
At A2 the Main Ring power supply has been disconnected from the Main Ring system and is being modified for Energy Saver use.

### Injection and Extraction

The conventional bump magnets for injection and extraction were completed by the Magnet Facility. Work proceeds apace on the other components of the systems.

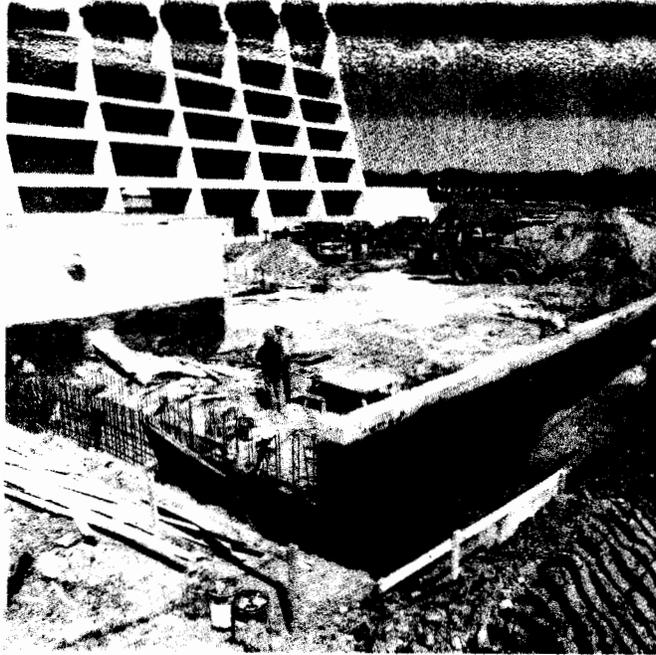
### Summary

All in all, the past six months have witnessed a decisive turn away from prototype activity to production of components and final installation. The Superconducting Accelerator is moving along at high speed.



Progress on the cryogenic system.





Construction of the North Addition to the Transfer Gallery.  
(Photograph by Fermilab Photo Unit)