

## BOOSTER INSTALLS LAST OF 96 MAGNETS

It was a busy, fruitful December for NAL's Booster Section. Approximately four months ahead of its original and formal schedule, the Booster group completed the precise installation of the 48 complex girders carrying 96 magnets in the 500-foot-diameter Booster tunnel at the Main Site.

The heavy installation work was completed at noon on Monday, December 14; a week later, on December 21, the Booster Ring was completely aligned and a vacuum was achieved all around. The first "topping off" was observed with an informal party in the tunnel; the second was celebrated with a party at a restaurant near the NAL site.

In the impressive and intricate triad of the NAL accelerator system, the Booster, so to speak, is the "sensitive middle-man" -- the vital link between the Linear Accelerator and the Main Accelerator. The NAL Booster is designed to accelerate protons to Eight Billion Electron Volts (BeV) at the rate of 15 pulses per second.

The Booster, which will receive the proton beam from the Linac at an energy of 200 Million Electron Volts (MeV), is one of the few "rapid-cycling" booster synchrotrons in the world. In the esoteric field of elementary particle physics, two other "booster" accelerators are being built at this time -- one at CERN in Switzerland for its 28 BeV accelerator and another for the Zero Gradient Synchrotron at the Argonne National Laboratory.

The NAL Booster synchrotron, unlike the Main Accelerator's separated function system, is a combined-function design, but in many other respects it is similar to the Main Accelerator. It is housed in a similar semi-underground enclosure, with equipment galleries above. Earth shielding will keep radiation levels in the galleries below permissible tolerance levels.

Each of the 48 steel girders in NAL's Booster Ring has two magnets, which are made of laminated silicon steel sheets 1/40th of an inch thick. Each girder is 23 feet long and four feet in height, includes three capacitor banks, a titanium-ion vacuum pump and a transformer. Full power tests are being carried out on the Ring, including power supply operation through the control system.

Roy Billinge, Booster Section Leader, is pleased by the accomplishments of his staff. He lauds the team work of his group and the support of many sub-contractors. For example, when a major problem developed with one of the magnet suppliers, Will Hanson was able to increase magnet fabrication in the Booster Lab Building reaching a peak production rate of



....Belding Engineering Co. employees use rope pulley instrument called a "come-along" to install the 48th girder supporting final pair of Booster Ring magnets. Roy Billinge, Booster Section Chief, stands at far right watching the event. Behind Billinge is Bob Peters, NAL physicist....

Photo by Tony Frelo, NAL

two magnets per week. The fabrication crew, under the leadership of Leo Ray and including Del Miller and Bob Jensen, built more than twice as many magnets as originally planned so that about one-third of the installed magnets were built here at NAL.



....Cross Gallery "travel-lift" machine lowers 48th girder, supporting final two Booster magnets....

Prior to installation in the enclosure the Booster "modules" undergo pre-assembly at the Main Ring's West Chicago facility under the supervision of John Clark. In parallel with this, magnets are measured carefully by optical means by Jon Sauer and Bobby McNeal. They are then optically set on the girder and all power and water connections made, under the supervision of Jim Humbert. Next, the module is powered, in series with a "standard" module, and by means of current carrying wires stretched through the magnet gaps. At this point, Bob Peters and Harland Gerzevske compare the magnetic fields of the production magnets with the standard prototypes. The vacuum chamber is then welded in place, between the magnets, the vacuum pump installed, and the whole assembly leak-checked.

Photo by Tony Frelø, NAL  
Shumate. Finally, the module is connected to the power/cooling supply and integrated into the Ring vacuum system by Umer Patel and his team of technicians.

Following installation in the Ring, the modules are surveyed into position by Jim Walton, Tom Topolski and Billy

"During January," says Billinge, "we hope to begin attempts to circulate a proton beam around the Booster. And, we are expecting to get acceleration during February. Once we have achieved acceleration, somewhere about one BeV, we expect to extract the beam and transport it to the Main Ring.

"There are more persons who should be thanked for their work than I can name here," says Billinge. He especially noted the untiring efforts of his Associate Section Leader, Helen Edwards. Among others were Ed Hubbard, Roland Juhala and Bill Martin, for their efforts on the 200 MeV beam-transport system; Lowell Klaisner and John Dinkel for their work on the controls and beam detectors. "I simply cannot say enough good things about all of the Booster people. I just think they have done a great job," says Billinge.

Among contractors Billinge cited employees of Belding Engineering Company of West Chicago, who had worked with efficiency and diligence to transport and place the Booster girders properly in the tunnel.

1971 will continue to be a busy year for the Booster group. On his calendar, Billinge has several more major milestones to be achieved. Most important is to record a Booster accelerator energy of Eight BeV by about May 1.

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SEEK EMPTY BEVERAGE CANS FOR NAL DESIGN EFFORT

An appeal for literally thousands of empty beverage cans -- for a construction research effort -- has been made by Hank Hinterberger, NAL Technical Services, and Robert Sheldon, Main Ring.

"The use of garbage to some beneficial end is being given nation-wide consideration," said Hinterberger. "We, at NAL, have concluded that there is a possibility that pollution from cans strewn throughout the countryside might be profitably exploited in the architectural development of a portion of the Laboratory."

Hinterberger explained that used beverage cans might be employed for the production of structural building panels. For instance, he said, the empty cans are being tried in the production of panels for the geodesic dome being planned for NAL's Bubble Chamber building.

The dome consists of a light structural frame which is to be clad with these panels. Each panel is an equilateral triangle with a ten-foot side.

When the used cans are received at NAL, their tops and bottoms are removed to permit the transmission of light through them from each end. They then are assembled into panels by

bonding a glass-reinforced fiber plastic sheet, top and bottom, to form a sandwich some five inches thick in a sort of honey-comb structure.

Experimental panels constructed in this fashion, as shown in the photograph, have proved to be extremely stiff, thus enabling the structure to withstand both wind and snow loads. Furthermore, the panels are inexpensive in that the core material is the used cans, which can be obtained either free of charge or for very small cost.

Hinterberger stresses that the beverage can design was "an invention of Bob Sheldon's." Sheldon has filed a patent disclosure statement regarding the unique design with NAL. Fabrication of the design is being carried out jointly by Hinterberger and Sheldon.

Hinterberger is asking NAL and DUSAF employees to save their beverage cans and to place them in the receptacles provided for their collection near each soft drink vending machine on the NAL site. In addition, he also is asking employees and friends of the Laboratory to bring in any empty beverage cans that they might have for disposal at home.

"The future of these panels is not limited to geodesic domes," Hinterberger says. "Perhaps many other forms of building materials and building panels may be developed from this unique effort now going on at NAL."

With Sheldon, Hinterberger also has enlisted the assistance of Bernie Lensmeyer, Food Service Manager, in collecting the empty cans for use in the NAL-related project.

There are many advantages to a project of this sort -- the cost is extremely low since the main component is normally scrapped; from an ecological point of view, the use of discarded cans will help remove them from the environment. But, the most important advantage is that these panels are easily handled, very sturdy and many patterns can be achieved for a variety of constructional purposes.

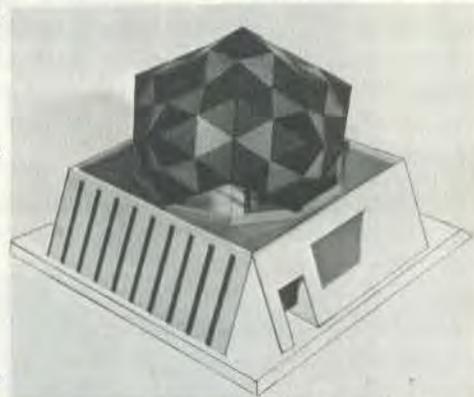


...."Recycling" used beverage cans....

Photo by Tony Frelo, NAL

The receptacle is appropriately marked - EMPTY POP CANS ONLY - please discard your other trash elsewhere!

So remember...when you're taking the pause that refreshes, sipping the un-cola, or making Milwaukee more famous...you may be contributing to a challenging endeavor at NAL. Bottoms up!!



....A model of proposed geodesic dome for Bubble Chamber building....

Photo by Tony Frelo, NAL

THE FOLLOWING HOLIDAYS WILL BE OBSERVED BY NAL DURING 1971

<u>EVENT</u>	<u>DATE OBSERVED</u>	<u>DAY</u>
Memorial Day	May 31, 1971	Monday
Independence Day	July 5, 1971	Monday
Labor Day	September 6, 1971	Monday
Thanksgiving Day	November 25, 1971	Thursday
Day after Thanksgiving	November 26, 1971	Friday
Christmas Eve	December 23, 1971	½ day Thursday
Christmas Day	December 24, 1971	Friday
New Year's Eve	December 30, 1971	½ day Thursday
New Year's Day 1972	December 31, 1971	Friday

In addition, Charles Marofske, NAL Personnel Manager, points out that the floating holiday for 1971 will be an optional date selected at the discretion of each employee. The employee must give his supervisor two weeks advance notice of the day he or she has selected.

## NAL SUPERVISORS COMPLETE SAFETY TRAINING COURSE

On December 9th a graduation ceremony was held in the Village Barn for 23 NAL supervisors who had successfully completed a "Supervisors' Safety Training Course." The "Key Man" Development Program was taught by John Epperson, Training Coordinator, National Safety Council, who came to NAL each week for six weeks from the Council's downtown Chicago offices. The program is designed to help supervisors understand the problems of accident prevention. The course will be offered again in 1971.

NAL supervisors who completed the course include: Leon Bartleson, Booster; Leon Beverly, Linac; Clarence Bowling, Main Ring; Ed Brezina, Safety; Ray Brown, Safety; George Doyle, Maintenance; Arthur Gilbertson, Main Ring; Leonard Grimstead, Fire Protection; Alan Guthke, Beam Transfer; Patrick Herin, Experimental Facilities; Norman Hill, Material Services; James Hogan, Linac; James Humbert, Booster; Ronald Norton, Material Services; Michael Otavka, Experimental Fac. Robert Scherr, Beam Transfer; John Semmelman, Radio Frequency; William Sundeen, Material Services; Stan Tawzer, Radio Frequency; Ed Tilles, Beam Transfer and Jan Wildenradt, Linac.

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....Paul Reardon awarding certificate to Bill Sundeen, NAL Receiving Supervisor, for satisfactorily completing the Key Man Development Training course....

Photo by Tony Frelø, NAL

## AWARD PLAQUE FOR CHRISTMAS DECORATIONS AT NAL



Marilyn Paul (R) of Experimental Facilities, presents the three-year plaque which reads "...Award for Best 1970 Christmas Decoration" to Chuck Andrie of the NAL Instrument Facilities Section. The group decorated their house at 32 Winnebago, for the third annual judging on December 23rd, with bright flashing lights and "Merry Xmas" across the exterior. Leticia Salazar (L), AEC, was on hand to view the presentation.

Photo by Tony Frelø, NAL

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CALENDAR: Friday, Jan. 15 - Family Skate Night at NAL. Sunday, Jan. 31 - Bus trip to hockey game, Chicago Stadium - Blackhawks vs. Montreal Canadians. Contact "Peaches" 879-2711. Sunday, March 28 - Hockey Night. Blackhawks vs. Montreal Canadians.

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## CLASSIFIED ADS

AVAILABLE - Reserve a 1 to 3½ acre lot for building or investment. The sites are located in Batavia just 10 minutes from the Laboratory. Contact Marilyn, Ext. 453 for information.

FOR SALE - IBM Selectric typewriter, model 72, five months old. Eric Jarzab, Ext. 415.

GIVE AWAY - NAL Mascot - Rosebud - 18 mo. Skunk. Needs loving home. Housebroken. Call Dottie, Ext. 307. Also black male cat, under 1 year old.

FOR SALE - '66 Chevy Belaire, 4-door, stand. trans. radio, air cond. \$700 Call Dick Zych, 879-2250.

FOR SALE - Allied model 2589 police fire ban monitor. \$50. Call Fred Cload, Ext. 413.

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