

The Village Crier



fermi national accelerator laboratory

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...Wheaton College contingent staffing Magnet Assembly pauses for a photo...

ANATOMY OF A SUPERMAGNET

Last week's CRIER reported a new milestone in Fermilab's Energy Doubler project: successful first-time energizing of four superconducting magnets in series. This week we focus on magnet assembly and a trial production run begun early in April.

According to Will Hanson, head of the magnet fabrication effort, building a supermagnet is a super assignment. The finished product measures 10" x 15" x 22 feet long and weighs about 7,000 pounds. Literally hundreds of assembly and quality control operations are required to form: four precision coils of superconducting wire, a support structure and surrounding cryostat (vacuum bottle) which insulates the coils at -450°F from the outer iron, which is an inch away from the coils but is at room temperature.

A magnet assembly building in the industrial building area houses this effort. This building is isolated for cleanliness and is used for coil fabrication and magnet and cryostat assemblies only. No machining or "dirty" work is done here.

The assembly operation's goal is to develop industrial fabrication capability of one supermagnet per day. Under the supervision of George Jugenitz and Bernie Assell, this was accomplished last week on the magnets and is about to begin on the cryostats. This effort is being spear-headed by Steve Barath with guidance by George Biallas, the design engineer.

A total of 800 22-foot long dipole (beam-steering) magnets and 240 quadrupole (beam-focusing) magnets are required. Most of the fabrication of components and considerable assembly is planned to be performed by industry. The fabrication techniques and tooling for these operations are being developed in the magnet assembly area.

Coils are the heart of the magnets. They are made of superconducting wire, a niobium-titanium alloy in a twisted and flattened cable of 23 strands, each .027 inch diameter. A coil package is formed from top and bottom halves, each made of two layers in saddle-shaped coils. Coil winding is done on a bank of 3 tables.

(Continued on Page 2)

ANATOMY OF A SUPERMAGNET (Continued)

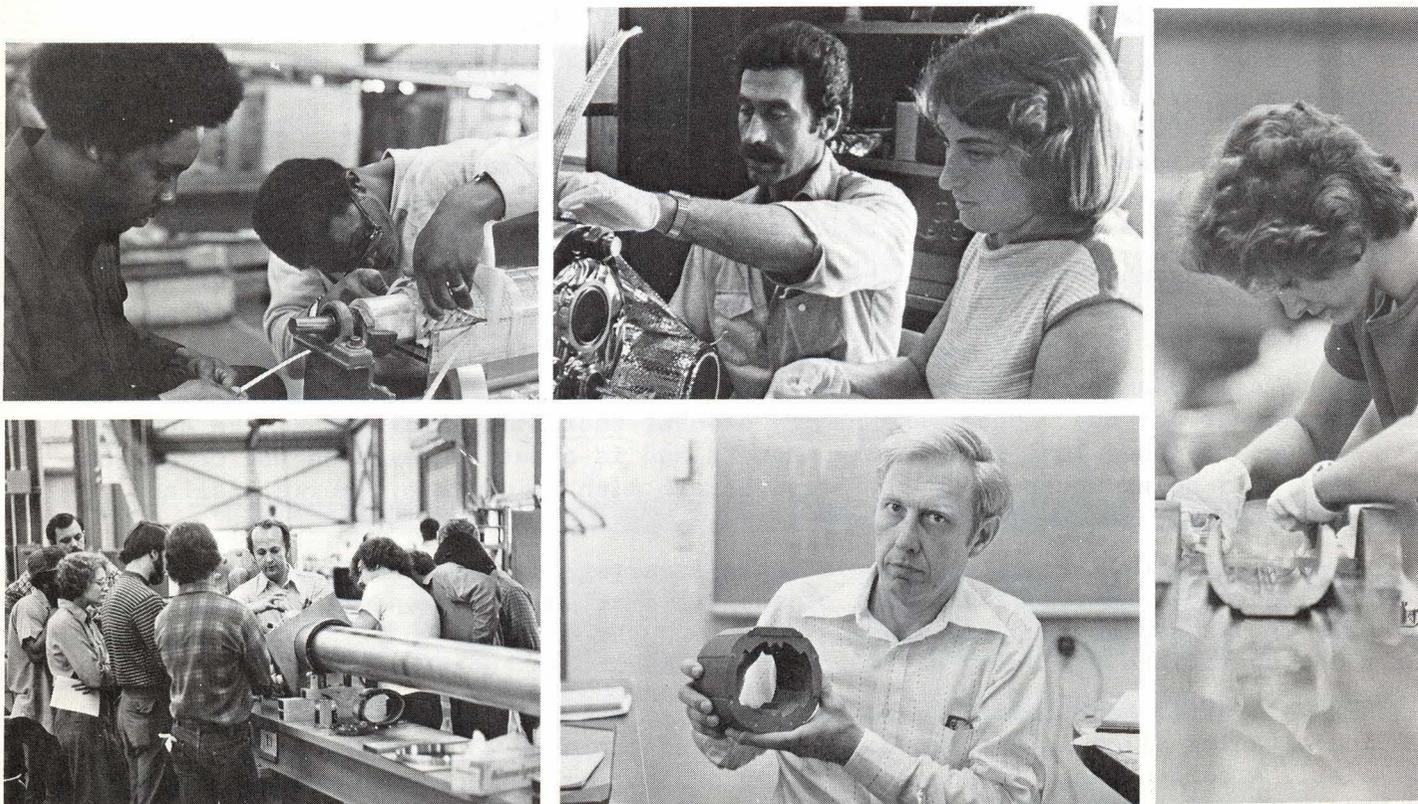
The most unique operation is that of winding the inner coils as pancakes for fast, tight winding and then forming them into a saddle shape, using a 1450-ton press to force the coils into a precision mold. This produces extremely compact and precision coils, yet is much faster than conventional winding techniques. Development of this system has been the responsibility of Ron Hanson, Magnet Facility engineer, and John Carson of Technical Services.

When the coil assemblies are complete many electrical and mechanical quality control measurements are made. An independent group of inspectors headed by Jim Humbert, under the guidance of Karl Koepke, makes the measurements and records a multiplicity of information.

Again the coils are subjected to large loads in another 1400-ton press to preload the conductor. The laminated outer structure is epoxy-bonded and cured in place. Heat for this operation is provided in a unique manner by flowing a hot liquid capable of temperatures up to 400°F through the tooling. This system is the result of the effort of Joe Raczek of Architectural Services and Dominick Carullo of the Magnet Facility.

The cryostat consists of a series of stainless steel tubes which carry three types of cooling media and vacuum insulation. The coils are immersed in a 4.5°K liquid helium flowing through a string of 24 magnets. Returning through an outer concentric tube is tube phase helium as a mixture of liquid and gas. Outside of this is a "shield" of liquid nitrogen to minimize heat losses to the helium. Finally, the entire assembly is wrapped with many layers of super-insulation which is contained in a vacuum. Support of the magnet coil assembly through these tubes is accomplished by a series of small insulating wheels which minimize heat loss and provide for differential thermal expansion.

Outside of the cryostat, laminated iron is provided to enhance the magnetic field. This makes the final appearance of the magnet very similar to the present Main Ring magnets but smaller in size. The laminated yokes are being fabricated presently in the old Main Ring core stacking fixtures in the conventional magnet fabrication area under the direction of Jack Jagger. This again is an operation that will soon be performed by outside industry.



Photos: (Clockwise from lower left)...G. Biallas explains cryostat assembly...Magnet outer coil is wound by C. Kirsey and A. Ruffins...Superinsulation wrap is applied by D. Tinsley and L. Dangleis...In a white glove operation, J. Fast begins arranging magnet collars...W. Hanson shows "hardpack" collar for 22-foot superconducting magnets...

Don't just WATCH... PARTICIPATE in the NATIONAL DISASTER SURVIVAL TEST

A Warren V. Bush Production in cooperation with the National Safety Council

SUNDAY, MAY 1, 1977

**NBC Television 8:00-9:30 p.m. Eastern Time
7:00-8:30 p.m. Central Time**

OFFICIAL TEST FORM	
I. JUDGMENT 1. a b c d 2. a b c d 3. a b c d Score_____	II. KNOWLEDGE 1. T F 5. T F 8. T F 2. T F 6. T F 9. T F 3. T F 7. T F 10. T F 4. T F Score_____
III. ALERTNESS 1. Yes No 2. List the number of potential dangers: _____ Score_____	
IV. STRESS 1. Yes No 9. Yes No 2. Yes No 10. Yes No 3. Yes No 11. Yes No 4. Yes No 12. Yes No 5. Yes No 13. Yes No 6. Yes No 14. Yes No 7. Yes No 15. Yes No 8. Yes No Score_____	V. LEADERSHIP 1. a b c d 2. a b c d Score_____
PRELIMINARY SCORE _____	
VI. SPECIAL SCORING	
YOUR FINAL SCORE _____	



...Test form provided through the courtesy of Fermilab Safety Office/Site Services. For further information, contact Doug Pinyan, Ext. 3580 or Rudy Dorner, Ext. 3494...



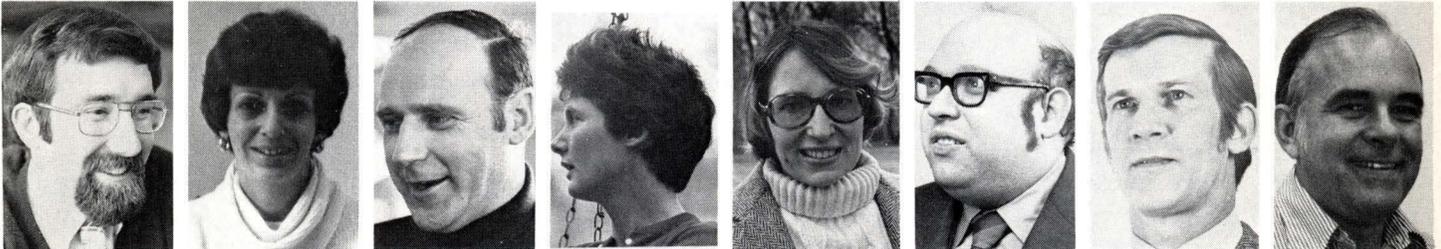
**National
Safety
Council**

POLITICS/PUBLIC SERVICE ASSIGNMENTS ATTRACT FERMILAB PEOPLE

Some won, some lost. All were concerned enough to get involved. They were Fermilab staffers and relatives running in elections held last week in the six-county Chicago area. Lab-related returns compiled by the CRIER include:

Peter Koehler (Physics) won his first four-year term as alderman in Batavia's first ward. Ronald Smith (Accelerator) was among four trustees elected to the Milton Township board. Barbara Lach, wife of Joe Lach (Physics), was re-elected to the West Chicago Elementary District 33 school board. Jo Ann Hogan, wife of Jim Hogan (Accelerator), won a three-year term on the Batavia School District 101 board. On April 4, Bud Stanley (Facility Operations) was sworn in as a Batavia ward alderman. He was appointed by the mayor to serve for two years, filling a vacancy created by a resignation.

Also candidates were: Bob Ducar (Accelerator) for Batavia alderman; Trish MacLachlan, wife of James MacLachlan (Operations), Geneva school board; Helen Ecker (Administration) who campaigned for a trustee's seat in Valley View after serving 10 years as village clerk; and David Sachs (Computer), West Chicago alderman candidate.



Ducar

Hogan

Koehler

Lach

MacLachlan

Sachs

Smith

Stanley

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EXTRA! EXTRA! READ ALL ABOUT US

Much activity and progress--in accelerator technology and particle physics research--was recorded at Fermilab in 1976. The above is among highlights listed in the annual report issued by Universities Research Association, Inc., operator of Fermilab under contract with the U.S. Energy Research and Development Administration (ERDA). A limited number of report copies are available from Public Information, CL-1W.

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CREF & THE STOCK MARKET

Participants in the TIAA-CREF Retirement Plan often question the effect the stock market has on their CREF account. As you know, TIAA invests your premiums almost exclusively in fixed-dollar diversified bonds and mortgages. CREF premiums, on the other hand, buy units in a diversified common stock fund.

On December 31, 1976, a CREF accumulation unit equaled \$42.66. This was 17.4% higher than at the end of December 1975. The higher unit value is a reflection of the 1976 stock market. The effects on your CREF account would include, a larger death benefit, a higher value for each unit you hold in the CREF fund and during 1976 premiums paid to CREF bought fewer units of participation in the fund than in prior years because of the higher accumulation unit values. If you would like to check on your TIAA-CREF distribution, contact the Employee Benefits Office, CL-6E, Ext. 3395.

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ADMINISTRATIVE APPOINTMENT

John McCook, head of the Administrative Division, has announced that John Paulk has been appointed to the position of assistant head of the division. The appointment is effective immediately.

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FOOD FOR FERMILAB KINGS AND QUEENS

A bountiful buffet will be featured Thursday nights at the Users' Center starting May 5. Serving gets underway at 7 p.m. A sumptuous assortment of delicious foods arranged buffet style will be offered. A glass of wine is included. The May 5 menu will feature chilled leek and potato soup, rib eye roast beef, parsley buttered potatoes, Ratatouille filled crepes, mixed fruit salad and zabaglione. Reservations, \$4 per person, are due by 4:30 p.m. Wednesday, the day before the dinner. Call Helen Ecker, Ext. 3126. Future menus will feature Chinese, French and Greek cuisine.

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Gourmet luncheons are coming to Fermilab's cafeteria! John Barry, manager, has announced that restaurant-style gourmet spreads limited to 30 persons, will start May 3. According to Chef Bill Ross, the premier menu includes Oysters Rockefeller, Beef Wellington with Bordelaise Sauce, Pommes Parisienne, Fresh Asparagus, Strawberries Romanoff and Caesar Salad. Diners will be seated in a reserved section of the cafeteria and served by the staff. Reservations, \$4 per person, must be paid in advance by 4:30 p.m. the day before the luncheon. To make your reservation, call Ext. 3646 or sign up in the cafeteria.

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ALL ABOARD FOR ARBOR DAY

"Bring your shovels!" That's a general invitation from Dave Sauer, Site Services, for Fermilabbers to join in a site Arbor Day observance Friday (April 29). Accelerator-style Johnny Appleseeds should meet at the Village manager's office, 30 Sauk, at noon for directions. Monday, May 2, will be the rain date.

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ARTS & CRAFTS SHOW SIGNUPS DUE FRIDAY

Friday, April 29, is the deadline to enter NALREC's 1977 arts and crafts show. The opportunity for employees, experimenters and relatives to show off their creativity will be held May 9-13 in the Central Laboratory atrium. Show committee members will be on hand to assist in set-up at 9 a.m. May 9. Exhibits must be removed by 5 p.m. Friday, May 13. Display works will be insured (\$250 per item) and extra security will be provided. Applications to enter are due Friday (April 29) at Helen Ecker's office, CL-1W.

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SWIM POOL PASS SALE POSTPONED

Sale of passes for Fermilab's summer swimming season has been postponed to Friday, May 13. The tags were due to go on sale Friday (April 29). Due to a delay by the manufacturer, the tags will not be available for sale until May 13. They will be available from the cashier, 4E, until 2 p.m. weekdays. Rates will be: single person, \$15; married couple, \$25; family, \$35; and daily admission, \$1.50 per person. The pool will open on Saturday, May 28 at 9 a.m., weather permitting.

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ROUTE TO:

MAY DAY MAY DAY MAY DAY MAY DAY MAY DAY MAY DAY

- Fermilab
- staff,
- visitors

SURVIVAL BULLETIN

NATIONAL DISASTER SURVIVAL TEST NATIONAL DISASTER SURVIVAL TEST

...Learn how to survive a natural disaster...and accident prevention actions to take before a disaster happens that can save life, limb and property. Tune your TV to The National Disaster Survival Test, May 1. The official test form is inserted in this week's CRIER to enable you to participate. Compare your score with your family and friends...

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