

# The Village Voice



fermi national accelerator laboratory

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## BIONIC ARMS SALVAGE NEUTRINO TRAIN

"Bionic" arms, Fermilab's version, are helping salvage a train "wreck" in the Neutrino Area.

The arms are servo-manipulators, electro-mechanical creations that perform the functions of arms, hands and fingers with human direction. Fermilab Neutrino engineers are employing the bionic arms to clean up a disabled neutrino target train. A modified mine locomotive hauls beam line equipment into the target tube on narrow-gauge (30 in.) tracks laid in the complex--including the target tube, target hall (Neuhall) and target service building.

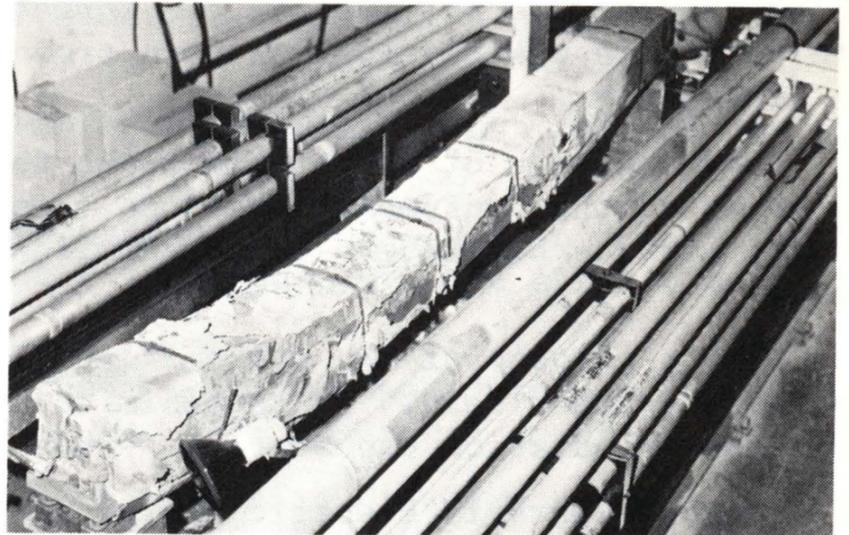
According to Jack Lindberg, associate mechanical group leader, the salvage story started in December. The Proton Area went into standby Dec. 20 to allow high intensity beam running to the Neutrino Area. During the morning of Wednesday, Dec. 29, all beam was shut off to the Neutrino Area--three experiments reported 80-90 percent decrease in triggers, E310, E482 and E460.

"Something in the beam," Shigeki Mori, mechanical group leader said, "was stopping secondary particles which decay into neutrinos. Everybody was puzzled; no one knew what the problem was."

They found out by looking into the target tube with a 60X telescope. The view revealed that an eight-foot long steel collimator--a device for collimating secondary particles--had been heated to about 1500<sup>o</sup>F by the particles during the high intensity run.

As a result, the assembly of a series of two-inch steel slabs, measuring 6 x 6 inches, had begun to soften. When it couldn't support its own weight, the collimator sagged into the beam, becoming a sponge for neutrinos. Richard Lundy, associate section leader, credited the collimator with nobly doing its job of protecting the downstream magnet.

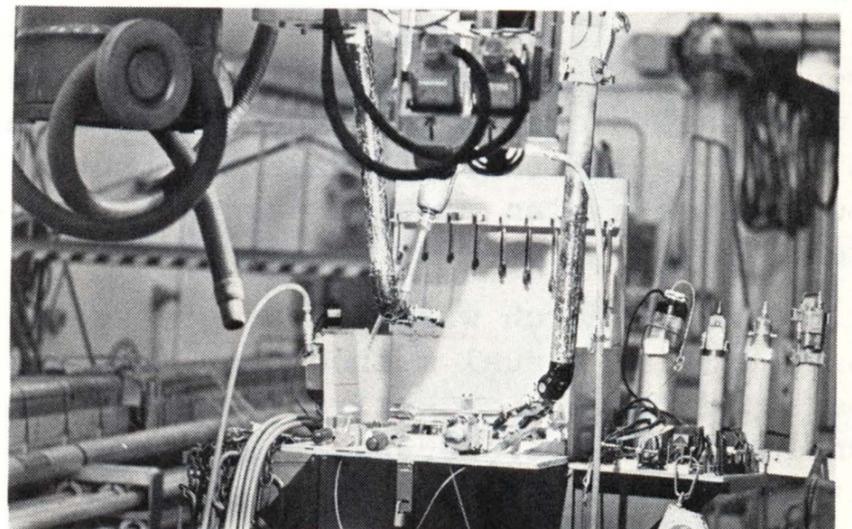
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*...Failed collimator after being heated to 1,500 degrees F...*



*...Repair crewmen in action are (L-R) J. Simon, J. Grimson, D. Borree, F. Gardner and S. Bastion...*



*...Arms reach into toolbox for impact wrench socket...*

## BIONIC ARMS (Continued)

Only shreds remained of the collimator's aluminum cover.

No one expected secondary particles to deposit that much thermal energy, and as a result the area received significant radiation contamination, requiring a four-day cleanup project conducted by Radiation Physics personnel. Fred Gardner, radiation safety officer supervised procedures.

Repairs got underway after New Year's. The disabled triplet was pulled from the target tube and stored for reconstruction. A horn train was inserted in mid-January.

Rejuvenation of the triplet, due to high radioactivity of the equipment, was done remotely in the target service building. Enter Fermilab's bionic arms!

"Main purpose of the system," John Simon, remote systems engineer said, "is to minimize, if not totally eliminate, radiation exposure to personnel."

Argonne Mark IV Electric Master-Slave Manipulator Installation is the technical name. It, and a 20-ton crane, are mounted on separate overhead bridges and operate on the same set of rails. Two closed-circuit TV cameras, equipped with zoom lenses and pan and tilt supports, are mounted at opposite corners of the building.

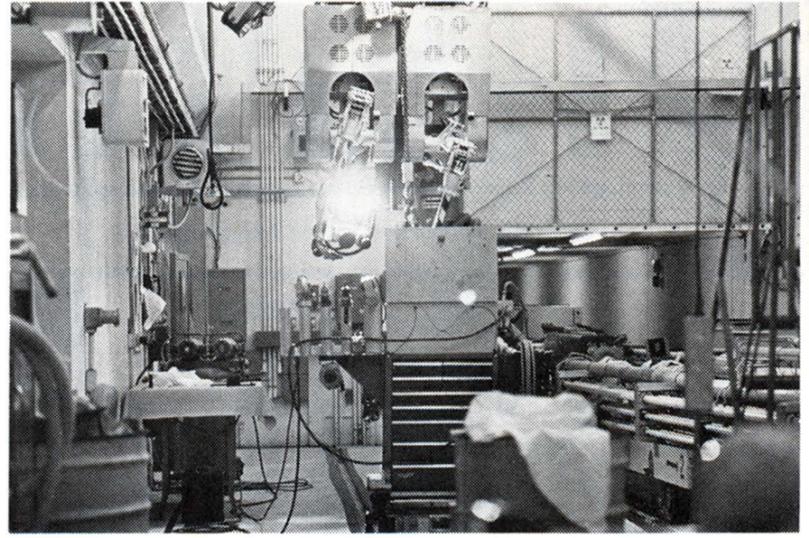
The manipulators were prototypes developed by the Remote Control Division of Argonne National Laboratory. Except for modernization of transistor servo-amplifiers, they are original equipment. The manipulator unit consists of a pair of slave servo-manipulator arms mounted on a bridge, carriage and rotating turret.

The arms move five feet on a vertical post. They can reach about 85 percent of the floor area from the floor to about 10 feet high and approach most work from any angle.

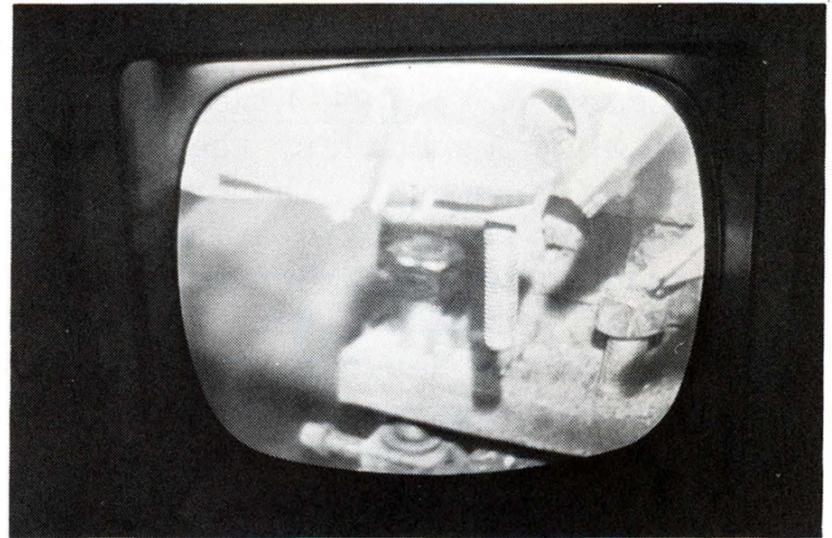
The unit's eyes are two high-resolution TV cameras mounted under the body of the right-hand manipulator slave. One camera, with a zoom lens, provides a detail magnified view; the other, with a wide-angle lens, covers the entire area reached by the arms. A third TV camera, mounted facing down, gives a plan view of the tongs and operating area.

By late March work had progressed to the point where partial manual methods could be substituted. The repair unit's objective is to have the train completely revitalized by June, with help from Fermilab's "bionic arms."

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*...Arms at tool caddy before working on triplet train (R)...*



*...Detail TV view of the tong removing collimator bolt...*



*...F. Gardner uses hand/foot monitor before leaving target service bldg...*

## FERMILAB EMPLOYEES PROTECTED IN LONG TERM DISABILITIES

Protection against a complete loss of income during a long illness or disabling injury is provided by Fermilab for employees, through a Long Term Disability (LTD) Insurance Plan under a contract with the Connecticut General Life Insurance Company.

If an employee is out of work for more than 180 days, income for the remaining period of the disability is paid through the LTD plan up to the time the person recovers or retires at 65. After six months on disability, the insurance plan takes over as follows:

- 1) LTD guarantees 60% of the person's basic monthly income to a maximum of \$1,500. For example, payments made by Social Security and/or Workmen's Compensation are included in the computation of the 60%, and the insurance company's payment is added to the other payments to equal 60%.
- 2) LTD pays the monthly total regular retirement contribution--both for the individual and for the Lab.
- 3) The individual's basic medical and life insurance coverages continue each month and LTD may waive the individual's supplemental insurance coverage after nine months if under 60 years of age.
- 4) The individual must continue to pay the standard \$7 per month premium for dependent medical and \$1 per month premium for dependent life insurance coverage.

For example, John Jones, a Fermilab weekly employee, became disabled on June 1, 1976, at which time his salary was \$15,400 per year. He had accumulated a total of six months of sick leave, so he received his regular pay checks for six months, i.e., \$934.00 (gross pay--\$1283--minus taxes, retirement, dependent medical, supplemental and dependent life insurance and long-term disability).

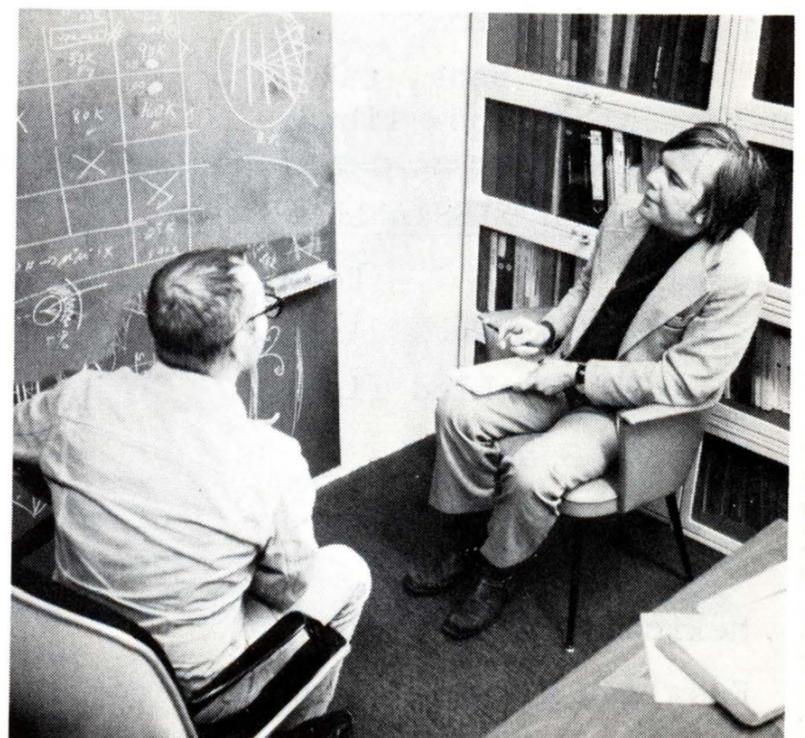
After six months, on January 1, 1977, LTD paid John 60% of his base monthly income or \$770 (Social Security actually contributed \$687 of this amount and the insurance company contributed \$83). LTD also paid \$150.75 into his retirement fund (his contribution and the Lab's). John paid for Supplemental Life insurance for himself (\$4.38) for three months; after that LTD may waive this premium. John paid for dependent medical and dependent life insurance coverage (\$8.00). Therefore, his take-home pay was \$757.62 for months seven, eight and nine and \$762.00 per month after that. This monthly payment will continue to be made to John until he recovers or retires. To summarize, as a disabled person John receives an income of \$762 per month versus his working net pay of \$934 (roughly 80%) and continues to participate in insurance benefits.

Questions regarding the LTD plan should be directed to the Employee Benefits Office, CL6E, Ext. 3395.

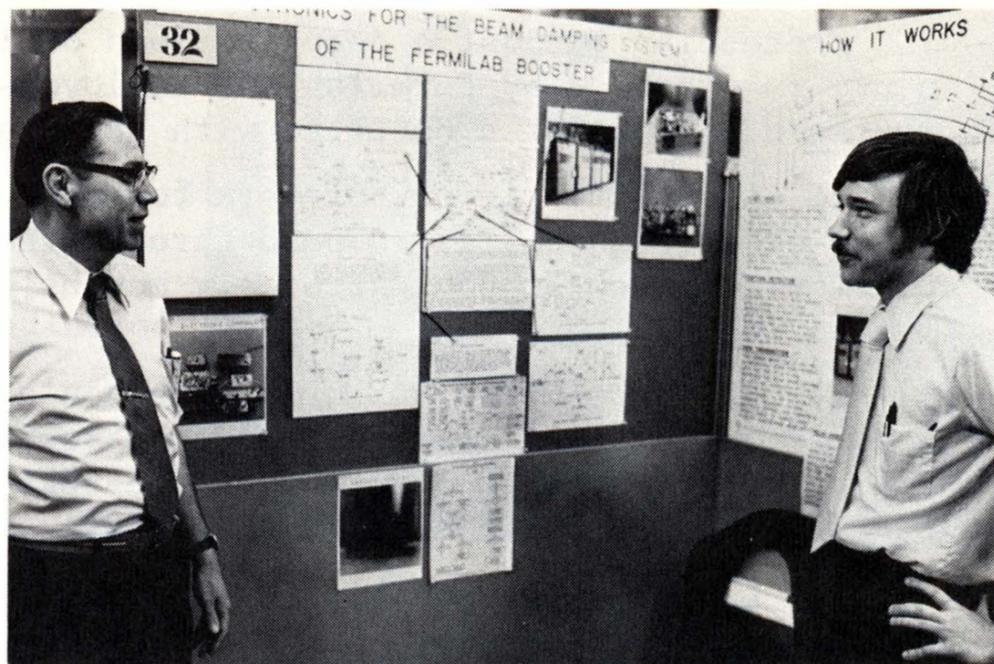
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*...Dietrick Thomsen, Science News Magazine physics/astronomy writer, spent two days here last week gathering material for articles. Here he is shown interviewing Dr. Frank Nezevick about the physicist's work with Fermilab's 15-foot bubble chamber. During his visit, the journalist also met separately with Director Robert R. Wilson and representatives of the Research Division, Colliding Beams, Energy Doubler and Experiment 310. Science News is a weekly magazine published by Science Service, Inc., Washington, D.C., a nonprofit corporation founded in 1921 for the public understanding of science...*

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## PARTICLE CONFERENCE ALBUM



...Fermilab, with Argonne National Laboratory, organized "1977 Particle Accelerator Conference: Accelerator Engineering and Technology," a three-day international meeting held at Chicago last week. Above left, conference chairman Lee Teng, Accelerator Division, talks with a visitor. Right photo, Ed Higgins and Steve Jachim, Accelerator Division, are at a poster exhibit. Burton Sandberg also helped prepare the exhibit...

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### INTERNATIONAL FILM FEATURE FOR APRIL

A French film, "Le Sex Shop" is a 90-minute color feature directed by Claude Berri who also plays the male lead--a very conventional owner of a scholarly bookstore that is going bankrupt. Business improves when he changes to a different product line...but he finds himself unable to appreciate the interests of his new customers. His attempts to do so and his ultimate return to fidelity results in a very funny, charming, but sophisticated film. (Note: This film is not recommended for children.) Friday, April 8, 8 p.m., Fermilab Auditorium. Admission: \$1.50, adults; 75¢, children.

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### CLEANUP DAY APRIL 1

Site-wide spring cleaning is set for Friday, April 1. Coordinators will be: G. Doyle, Ext. 3421, the Village; D. Smith, Ext. 3492, Research and Accelerator areas; G. Plant, Ext. 3824, Central Laboratory.

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### RECYCLE YOUR BOOKS

"Bring a book, take a book" at Fermilab's monthly book exchange Wednesday, April 5, in the third floor library of Central Lab.

#### MEXICAN FIESTA LUNCHEON

Thursday, April 7 - Fermilab Cafeteria  
11:30 a.m. - 1:30 p.m. \$1.95

Seviche (Pickled fish)  
Mexican Spare Ribs  
Chiles Rellenos (Peppers stuffed  
w/cheese)  
Mexican Rice  
Ensalada Naranja (Orange salad)  
Almendrado (Jello w/almonds)



The Users Center announces a new food service for evening customers--a "Steak Special" at \$3.25.

8 oz. (grill your own) filet  
baked potato  
tossed greens salad  
hard roll

Available 5 p.m. through 11 p.m. weekdays, at the Users Center in Fermilab Village.