

Alignment Group Works to Keep Fermilab in Line

by Mark Bodnarczuk

Fermilab's TEVATRON is a powerful new instrument that is often described as a giant microscope because it extends our ability to "observe" phenomena into the region of the subatomic; *micro* means small while *scopein* is to see. Fermilab studies the fundamental building blocks and forces of nature by measuring tiny distances within the nucleus and the angles at which particles recoil from collisions. These distances are infinitesimally small and difficult to detect.

The diameter of a proton is about a ten-trillionth of a centimeter (10^{-13} cm) and a typical beam is composed of a few trillion (10^{12}) of these

particles forced into a beam about the size of a soda straw. In the fixed-target mode, the beam is transported millions of miles at almost the speed of light, extracted, then transported through the external beamlines to detectors in the fixed-target experimental areas. In the colliding-beam mode, a beam of protons and a beam of antiprotons are collided together in the center of one of Fermilab's collider detectors. For this to work, many of the magnets and devices in the Accelerator Complex, Pbar Source, and external beamlines must be precision aligned to distances smaller than the thickness of a human hair. Not an easy task; there are almost 2000 magnets in the TEVATRON and Main Ring alone.

Before constructing a beamline, the physicists who do the design work use sophisticated computer modeling programs like "Transport" to determine the location of each magnet given the energy and type of beam. Once beam successfully navigates the journey on a computer simulation, the physicist has the appropriate magnets moved roughly into position



The Alignment Group align themselves for the camera. From left: J. Boye, E. Dijak, D. Bonham, G. Wojcik, T. Nurczyk, J. Smith, T. Neighbors, G. Adkins, J. Dahlberg, C. Wilson, L. Ketcham, and G. Coppola. Not pictured: R. Hunckler and R. Smith.

inside the tunnel as indicated by the Transport program. The Alignment Group takes these calculations and precision aligns the magnets and other devices to the positions shown on the computer read-out.

The Alignment Group plays an important part in each major accelerator and experimental project. Alignment can only be done after all components of an experiment have been fabricated, assembled, and installed, but it has to be done before the final commissioning and data taking begins.

Sometimes this time window is extremely small! Given the fact that people want to "stick to the original start-up schedule," the Alignment Group has to work fast and accurately. If magnetic elements are not aligned properly, beam that an experiment could use to do high-energy physics may be lost by collisions with elements that are mis-aligned. Consequently, proper alignment of all components is a crucial part of the final performance and quality of data that experiments will take.

Although the Alignment Group is organizationally in the Research Division, it provides surveying for all parts of the Laboratory, including the Accelerator Complex, Switchyard, experimental areas beamlines, fixed-target, Collider experiments, and civil construction. Every element in these areas is referenced to a site-wide coordinate grid whose canonical point is located at A0.

The physics program for 1987 is very ambitious, including both colliding-beam and fixed-target experiments. The Accelerator Complex now includes the Pbar Source, Debuncher, and Accumulator rings

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In Memoriam

Anthony M. Glowacki

1924 - 1987

Tony Glowacki, recently of Construction Engineering Services, passed away on March 3, 1987. Tony also worked in the Main Ring, Meson, and Experimental Areas departments.

Wayne Nestander, Tony's supervisor in Construction Engineering, said, "Tony was an especially close co-worker to me over the nearly 30 years we worked together at both Argonne and Fermilab. He could always be counted on to have the real facts and answers to the problem at hand, and excellent technical judgement, as well. The enthusiasm and energy that he applied to his assignments was seemingly boundless. But most of all, he had a heart that showed through in the kindness and patience that he extended to all who worked for and with him. In every way, he 'walked tall,' professionally, technically, and humanely. We will miss him very much."

Tony is survived by his wife, Lois, a son, Lawrence, and two daughters, Judith Warner and Jan Adams. Mrs. Glowacki has requested that donations be made to the Marianjoy Rehabilitation Center or to Mendin' Hearts, a support group for open-heart patients.

A Tribute to Tony Glowacki

Tony was a close and treasured colleague who made many contributions of particular importance to Fermilab successes. In the years 1969-1972, he was one of a small group of dedicated people who built a world class physics laboratory in the cornfields west of Chicago. In close association, we worked together on the design, construction, installation, and commissioning of the Main Ring. I developed a deep respect and appreciation for Tony's skills and creativity. A friendship developed and deepened.

The first important step was to build a complete working prototype in the Village. Starting in the summer of 1969, work proceeded at a frantic pace until completion earlier than our own milestone date of March 20, 1970. Based on that success, Bob Wilson was able to announce a doubling of the original 200-GeV energy goal. Tony's personal contributions were to design the crucial magnet cooling system, and work tirelessly to install it and the precision magnet stands.

Then, in our hip boots, we waded through the mud and began magnet and utility installation in the Main Ring tunnel. Tony was a leader in the installation

team. We met each day at 8:00 a.m. in the tunnel, wearing our hard hats, to establish the goals for that day. Every job that Tony undertook was completed on time, competently and professionally.

Our paths separated after the Main Accelerator began to operate. Although miles apart, Tony and I would see each other from time to time. Sometimes I would go to him for help on a particularly difficult problem, having complete confidence that the answer Tony would give me would be correct.

In the late 1970s, the TEVATRON was under construction, and the experimental program and facilities were redesigned for much higher beam energies. In these circumstances, Tony and I found ourselves working closely together once again. In his capacity as Chief Engineer of the Meson Area, Tony led the engineering effort that transformed what was a marginal 200-GeV area into the solid 1000-GeV area it is today.

Tony designed the major portion of the Meson construction projects. His unusual combination of civil, mechanical, and electrical engineering skills gave him an overall vantage that optimized the construction together with the lay-out, handling, and powering of the components in the underground enclosures. His many good ideas on the evolution of the Area and implementation of the experimental program improved the schedule and led to better physics.

Tony was the finest engineer I have ever known, and one of the most dedicated. He worked long hours, took problems home, and the next day had solutions, calculations, and highly original suggestions. Physicists competed with each other for his help, for they knew that with Tony on their side, they were more likely to succeed.

Besides his ability to build experiments and beam-lines and the buildings to house them, Tony was sensitive to people. He was very fair and honest, and helped many at Fermilab. I treasured his wisdom and sound judgement. Part of Tony's charm was his modesty. I wonder if he was aware of the significance of his contributions.

I was able to see Tony shortly before he died. We were both embarrassed that I would see him in his weakened state, and we both wept at the tragedy that had befallen him. I was overwhelmed by the courage, patience, and devotion of Tony's wife, Lois. All of us, and I know that I speak for Tony's many colleagues at Fermilab, mourn the loss of this beautiful human being.

- Ernest Malamud

Stockroom Closings

The Fermilab Stockrooms, located in the Wilson Hall Catacombs and at the Site 38 Warehouse, will be closed for the 1987 annual audited inventory on the following schedule;

Wilson Hall: May 18th & 19th

Site 38: May 20th & 22nd

Frank Cesarano, Stores Management Supervisor, has issued the stock reminder that, "In order to maintain service continuity, one stockroom will make *emergency* issues while the other stockroom undergoes inventory. We ask that you hold off on your stock transactions until after May 22nd in order to allow us to complete our inventory.

"In the event that either or both stockrooms complete their inventories ahead of schedule, they will then open for business as usual. Anyone with questions can call ext. 3808. Stores Management wishes to thank everyone in advance for their cooperation."

Recent Retirements

Frank Cilyo

Frank Cilyo of the Accelerator Division Pbar Source Department will start his early retirement from Fermilab on April 1, 1987.

Frank joined Quentin Kerns' RF Group in July of 1968. Since then he has been involved in various phases of precision power supplies, and has been a member of the Pbar Source Department since its inception. His professional interests include power electronics and precision measurements; he is the holder of seven patents in related areas. In 1983, Frank's precision current sensor garnered an IR-100 Award for Fermilab. After moving to a warmer climate, Frank intends to do some consulting and teaching, and to devote more time to community affairs, jogging, and his tennis game.

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with experiments scheduled for B0, C0, D0, E0, and the Pbar Source. The Alignment Group operated at full throttle, pushing to precision align the B0 and D0 overpasses, Linac, Booster, Pbar rings, the Main Ring, and CDF all within the scheduled start-up time-frame. They not only finished these tasks on time, but Stan Pruss of the Accelerator Division claims that the commissioning of the beam through the redefined orbit of the B0 Overpass went very

smoothly, with the beam being transported from A0 to C0 on the first attempt without using trim correction magnets. This is partially the result of precision alignment. Having completed the Accelerator Complex alignment, the group has turned its attention to the multitude of new and modified beamlines and detectors in the fixed-target experimental areas. The fixed-target program for the next running period includes a record 16 beamlines with 18 major experiments and test beam apparatus' scheduled to receive beam. As the program expands, so does the number of components that must be surveyed.

It's no accident that the events that occur inside these precision aligned detectors are indicative of events that occurred in the early stages of the formation of our Universe. As cosmology and astrophysics continue to use the results of high-energy physics experiments as data points in the reconstruction of the creation of the Universe, surveying continues to play an important part of mapping-out the cosmos in space-time.

Extracurricular Activities

Tai Chi Classes Offered

It's not too late to enroll for instruction in Tai Chi, the Oriental art of slow, gentle exercise which is touted as being beneficial for relaxation, coordination, and muscle tone. Proponents of this ancient art say that once learned, Tai Chi movements become instinctive and can produce genuine benefits to one's physical well being. Classes will be held on Tuesdays and Thursdays from 5:00 p.m. to 6:00 p.m. in the Village Barn, and are \$80.00 for an 8-week course. For more details, contact Denis Farnum at ext. 3648.

Annual Rafting Trip Ready for Launch

Spring is here, the rivers are roaring, and it's time for the annual Fermilab rafting trip on the Peshigo river at Crivitz, Wisc., May 29 through 31, 1987. \$115.00 (due in full by April 28) per person includes an air conditioned bus ride to your two-to-a-room lodging at Popp's Resort, river rafting, a sunset boat cruise, a water show, swimming, fishing, boating, hiking, campfires, three breakfasts, one lunch, snacks, and refreshments. Call your local NALREC rep, or Dominick (ext. 3187), Jesse (ext. 4305), or Joe (ext. 4181).

Benefits Notes

Hot Off the Press

Fidelity Investments publishes a new magazine entitled *Investment Vision*, which is now available from the Benefits Office. The magazine will be published quarterly and is designed to address money topics that are suggested by Fidelity investors.

Some of the articles in the current issue are: "Teaching Your Children to Manage Money," "Planning for Your Child's College Education," "Model Portfolios," and "New Attraction of Tax-Free Funds."

Pick up a copy from the Benefits Office while they are still available!
- Paula Cashin

Credit Checks

Loan Programs

The Argonne Credit Union's (ACU) loan program was enhanced in 1986 with the addition of a first mortgage/home loan refinancing program. The ACU offers members a 15-year fixed rate at market rates, with a 20% minimum down-payment requirement. Maximum loan amount is \$125,000, minimum is \$25,000. A \$250 application fee is charged; this fee is then applied toward the appraisal and credit check costs. Other settlement costs are approximately \$1000; however, these costs do vary with the amount financed.

While the new Tax Reform Act of 1986 phased out many interest rate deductions, interest paid on most home equity loans, such as the ACU's Home Equity, Line-of-Credit Loan, is still deductible. The maximum amount loaned is \$50,000. The initial amount advanced on the ACU Home Equity Loan is \$5000, and subsequent advances are \$2500. Interest is charged at a variable rate based on 2% above the current prime. For complete details on the Home Equity or home mortgage loan programs, contact the ACU loan department.

IRA's

IRA's are thriving at the ACU. No matter what category the new tax rules place you in, IRA's are still tax-deferred until you withdraw your funds. ACU members can contribute up to \$2000 (or \$2500 with a spouse) annually. What has changed is the amount you are able to deduct. 1986 contributions can be made up to April 15, 1987. 1987 IRA con-

tributions can be made any time. The ACU currently offers two IRA programs: 1) an accumulation account and 2) a certificate account. Members can develop their IRA program using either or both programs. IRA's are fully insured, as all other ACU savings programs are.

New Credit Card Policy at Lab

Fermilab plans to begin accepting VISA and Master Card on March 30, 1987, in lieu of cash or check for certain transactions. Locations where credit cards may be utilized will initially include the Travel Office, the Cashier's Office, Housing, Chez Leon, the Reception Desk, and at conferences.

Typical charges would include dinner charges at Chez Leon only, housing charges and equipment rentals, sales of tickets, books, etc., car rentals, airline tickets, hotels, travel packages, cash advances (\$100 limit, only at Cashier's Office, and only for those with Fermilab/DOE I.D. cards or conference participants), payment of travel advances, Accounting invoices, phone bills, conference registration, prepayment for conference proceedings, special seminars, and tours. Minimum charge per slip will be \$10.00.

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Portion of consumer purchases in the United States that are paid for in cash: **1/4**

Average interest rate charged on bank credit cards: **17.83**

Percentage of Americans who don't know the interest rates charged on their credit cards: **25**

- from *Harper's Index*

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