

# The Village Crier

national accelerator laboratory

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## THE "OBJECTIVE" LASER AIDS "SUBJECTIVE" ENGINEERS

The laser - a modern device that generates extremely pure and precisely focused beams, or pulses, of light - is being used successfully to speed assembly of the NAL accelerator system.

In a dramatic example of the inter-dependence of one aspect of modern technology with another, the "objective" laser is replacing "subjective" man in the completion of important segments of both the Linear Accelerator and the Main Accelerator systems.



Max Palmer, an engineer with the Linear Accelerator section, is in charge of laser operations in assembling the 500-foot-long linac. He explains that to date the laser has been employed to align three linac tanks and about 150 drift tubes inside to close tolerances.

Palmer is very enthusiastic about the contribution of the lasers in making certain that the major components of the linear accelerator are aligned properly and accurately. "We are using helium-neon gas lasers that emit a red-range light beam reference line to align the drift tubes within a tolerance of .003th of an inch. The laser beam is being shot at distances up to 300 feet to align the nine tanks that eventually will make up the Linac system. In this alignment effort, we use two lasers so we will have a beam on each side of the tank."

Palmer said that the lasers have "sped up our work considerably." "In addition," he said, "they give us remote read-outs on a strip recording so that we will have a record of the target positions to the reference line from which we can check tolerances. Formerly, this work was done by optical checking and there was the problem of communication between the operators, limitation of distance and interpretation of when we are 'right on the line,' even though we might have tired eyes after working all day. The lasers never seem to get tired."

NAL technicians, who have been specially trained in operating the lasers, are operating the low-powered



A workman on tower makes target adjustment for laser beam, used as a modern surveying device in construction of NAL's Main Accelerator enclosure. (Chicago Sun Times photo)

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(about one milliwatt) devices in the linac tunnel. Lasers can vary enormously in intensity, from a gentle, firefly-like glow measured in fractions of a milliwatt, to intense, short pulses in the range of trillions of watts. At the lower end of the power scale, the concentrated beam of light is so weak that it cannot penetrate a sheet of paper. Laser power of up to 100,000 watts is sufficient for most commercial applications. Lasers of less than one watt are employed in alignment of industrial tools and in distance measurement. Helium neon, the oldest gas-laser mixture used, yields a visible red beam ranging between 1-10,000th and 1/10th of a watt.

Gas lasers, such as are being used at NAL, predominate in industry today. There is speculation, however, that solid-state lasers will overtake them soon because they are much more efficient in transforming electrical inputs into light radiation and also they are more compact. Someday, lasers may be used in telecommunications and there has been science fiction talk of a laser "death ray."

The Main Accelerator section also is employing the laser to set the precise positions of focusing magnets being installed in the Main Ring, which is four miles in circumference. The tolerances are being set by a triangulation method so that the focusing magnets will be aligned properly.

In addition, DUSAF has crews working with laser beams to set precise reference points from the Gazebo -- in the center of the Main Ring -- to ensure proper alignment in the construction of the Main Accelerator enclosure.

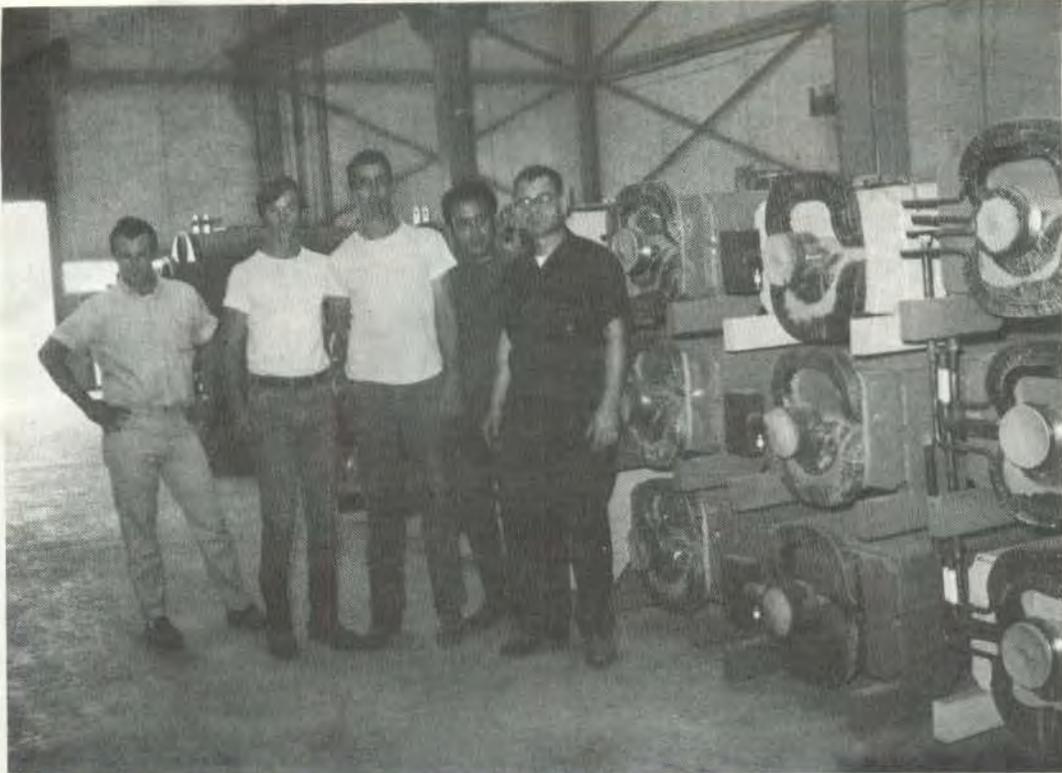
Incidentally, the word "laser" is an acronym; it stands for "Light Amplification by Stimulated Emission of Radiation." The dictionary defines "laser" as "a device that utilizes the natural oscillations of atoms for amplifying or generating electromagnetic waves in the visible region of the spectrum."



DUSAFers Gerald Edler (right) and John Chism operate distance-measuring laser in The Gazebo, survey tower in center of Main Accelerator ring.



Safety engineers have placed "Danger" signs around the areas in which lasers are being used at NAL. Specially designed glasses to filter the beam are worn by employees working in laser beam areas.



MAIN RING GROUP REACHES ANOTHER MILESTONE: L to R: Steve Palermo, Technical Specialist and Supervisor of Industrial Building #1; Lenard Moore, Phil Fitzgerald, Raul Gonzales and Dick Downs standing beside some of the B1 and B2 bending magnets that have been assembled at the NAL Industrial Building. The picture was taken on the occasion of the completion of the 100th magnet for the Main Accelerator. Forty-three of the 100 magnets have already been placed in the Main Ring. (Photo by Helen Severance)

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#### APPOINTED TO DUKANE COMMITTEE

Rudy Dorner, NAL Site Manager, has been appointed to the Open Space and Recreation Committee of the DuKane Valley Council. The Committee Chairman is Mayor Robert Yehnert, of North Aurora; Vice-Chairman is Mayor Milton Stauffer, of Naperville.

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#### FOR NAL SECRETARIES

Here, for NAL secretaries, are some "Wright Right Rules" borrowed from a Navy publication. The rules include:

- Don't use no double negative.
- Verbs has to agree with their subjects.
- Try to not ever split infinitives.
- About them sentence fragments.
- Don't write run-on sentences they are hard to read.
- Don't use commas, which aren't necessary.
- Corect speling is esential.
- Proofread your writing to see if you any words out.

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... Ann Early reviews some of the artifacts she has found in her survey of the NAL site...  
(Photo by Tony Frelø)

#### THE PAST BECOMES THE PRESENT AT NAL

An informal interim report on the progress of the archaeological-anthropological "diggings" on the NAL site was made to the Village Crier recently by Miss Ann Early, 24, of Fairhaven, Massachusetts. Miss Early, studying for her doctorate from the University of Massachusetts, after graduating from Beloit College (BA) and the University of Wisconsin-Milwaukee (MA), has been leading a survey of the grounds to locate, analyze and store remains of pre-historic Indian settlements in the NAL area.

So far, 18 or 19 sites of Indian occupation have been uncovered on the NAL's 6,800-acre site, Miss Early reported. "We are about two-thirds completed in our survey," she said, "and we are hopeful of locating even more settlement areas."

Miss Early completed her area-by-area investigation of the NAL site July 15. By September 15 she hopes to have completed a report for Robert R. Wilson, NAL director, and Professor Stuart Struever, of Northwestern University's department of anthropology. It will cover what has been found and offer suggestions on whether further investigations should be conducted by qualified scholars on the NAL site.

"I am pleased by what we have found," said Miss Early. "Actually, we have discovered more than we expected to locate on this site. All of the artifacts have been washed and are being catalogued and stored in the Mensing farmhouse on the site. A number of our discoveries are quite old and require further analysis," she said.

Miss Early's colleague at the beginning of the study was Miss Susan Howser, 19, of Salem, Oregon, a junior in anthropology at Northwestern. Miss Howser left

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THE PAST BECOMES THE PRESENT AT NAL (Continued from Page 3)

her assignment to join Professor Struever and other students in a similar expedition on the Illinois River area near St. Louis.

In the last fortnight, some of the many artifacts collected by Miss Early were stolen by a thief or thieves who entered a building on the site in which they had been stored. Several bags and boxes of specimens were taken. An electric typewriter also was stolen. The FBI has been called in to investigate the theft.

It is understood, however, that Miss Early had taken precautions against such an event by photographing some of her more important finds as well as putting the major portion of her archeological specimens that she had been unearthing on the NAL site, in another place for safe-keeping. Rudy Dornier, NAL Site Manager, said that most of the artifacts taken in the burglary appeared to be of relatively little value in the context of the scholarly work being done by Miss Early under the direction of Professor Struever.



*Typical of the relics uncovered by Archeologist Ann Early are these Indian points found in the south-western corner of the NAL site. Some of the arrowheads are believed to be from the middle woodland culture period which dates from 0 A.D. to the 18th century.*



*Other points found on the former Bartelt property are relics of first century occupants. It is believed that the NAL site has been occupied by several different cultures.*

*(Photos by Ann Early)*

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A REMINDER: You can still buy swimming pool memberships at the NAL Personnel Office. The family season membership is \$12; the weekly membership is \$2. To date, 135 family season memberships and 10 weekly passes have been sold.

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FOOTBALL NIGHT: See the All-Star Game in Chicago Friday, July 31. Call Ext. 225 for information. It's a \$9 bargain.

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MAIN RING SECTIONS START HERE: An aerial view of Main Ring enclosure concrete sections in the pre-cast yard near Eola road. The sections are poured and cured here and then trucked to the sites excavated for the Main Ring---a four-mile-in-circumference enclosure that will be the main component in the NAL accelerator system. (Photo by Tony Frelø)

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MARK YOUR CALENDAR: The NAL picnic will be held Sunday, August 23 from 10:00 a.m. to 3:00 p.m. in the NAL Village. Refreshments will be served.

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BASEBALL SCORES

July 21 games

Personnel 12 vs. Linac 3  
Machine Shop 25 vs. R.F. 10

July 23 games

Beam Transfer 10 vs. Personnel 9  
Physics Research 30 vs. Linac 5

CLASSIFIED ADS

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FOR SALE - Normandy B-flat clarinet w/case. All new pads, excellent condition. \$100.00. Please call Spike, Ext. 351.

WANTED - Good used car, not over \$100. Contact Wilbert Droughns, DUSAF, 879-2900 EXT. 237.

FOR SALE - Ruger Rifle, model 10/22, 10-shot rotary magazine, .22 I.r. cal. Canadian Centennial. \$70.00. Remington Pump Action Shotgun, model 870, 20 gauge, 28 inch modified choke, ventilated rib. \$70.00. Call Carl Ohrn, Linac Machine Shop, or 469-4512.

WANTED - Good used camera 35 mm. Ernest Wilkinson, DUSAF, 879-2360, Ext. 25.

FOR SALE - '63 Ford, 4 dr., stick shift, 6 cylinder, good tires, runs good, \$100. Call MA7-9361.

FOR SALE - '65 Buick LeSabre, 4-dr., radio, heater, pwr. s/b \$475. Dan Moline, Ext. 445.

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