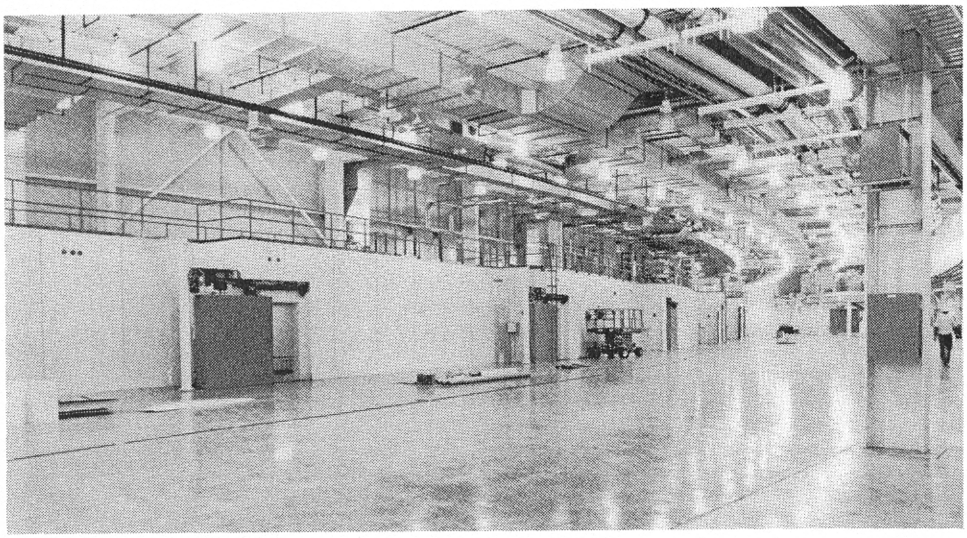
A Progress Update for Employees of the Advanced Photon Source at Argonne National Laboratory

# The Source

September 1993 Number 4

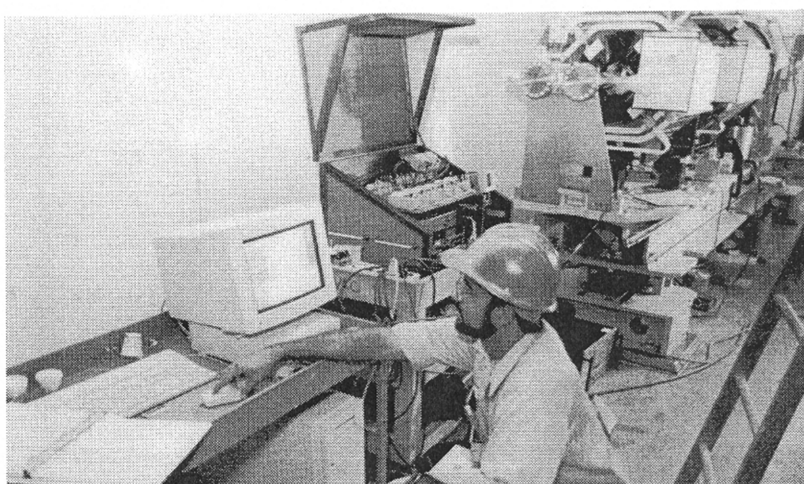


← *Sectors 1, 2, and 3 of the APS experiment hall have been polished up and beneficially occupied by the Project. This is the second completed experiment hall region that is equipped with ratchet wall, shielding doors, and beamline ports. The first sectors to be occupied (32 through 35) are being used for temporary storage. So sectors 1 through 3 are the place where a visitor can get an unobstructed view of the experiment floor, particularly from the adjacent viewing gallery. (For more on beamline and sector numbers, and experiment hall occupancy, see "ANNOTATION" on page 4.)*

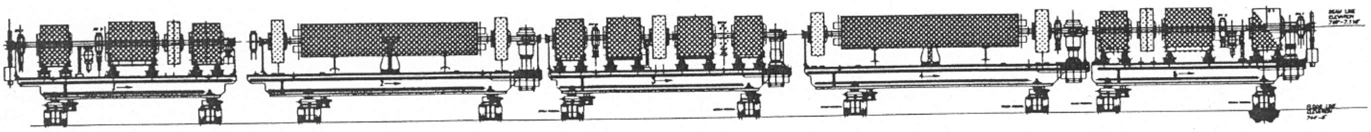
# Storage Ring installation begins

APS storage ring girder #1, equipped with magnets and vacuum chamber, was installed in the storage ring tunnel and rough aligned by August 27, 1993. This achievement met the requirements of ALD/PD Milestone #40 for June 1993 - January 1994. It also marked the beginning of the end for APS accelerator installation activities. "We've begun commissioning the linac, and as installations are completed, we expect to begin, in sequence, commissioning the positron accumulator ring in January 1994, the booster synchrotron in April 1994, and the storage ring in January 1995," said APS Project Director Ed Temple. "Each one of these commissionings implies that the prior commissioning is completed. We intend to meet all of those milestones."

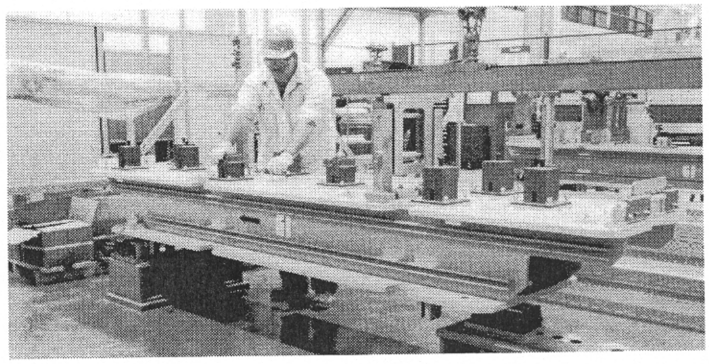
Installing the storage ring is a complex, demanding process that will call on the efforts and skills of a number of people. The article beginning on the following page is the first of two that will highlight some of these people and the tasks they will perform during the next year as the APS storage ring comes together.



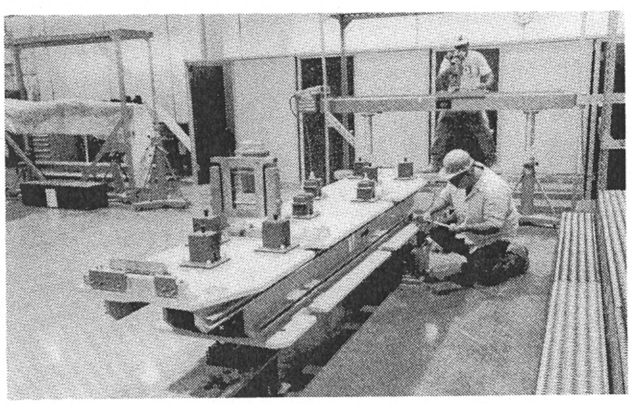
*Installation of a completed storage ring girder provided an opportunity for the first vibration tests of an in-place, powered storage ring subsystem. These tests are part of an extensive, ongoing vibration analysis of the APS facility. Carrying out the tests are Joe Jendrzejczyk, Pedro Rosas, and Roger Smith, all of the ANL Engineering Technology Division. In the photo above, Rosas checks readout from the vibration-test apparatus connected to girder #1.* O



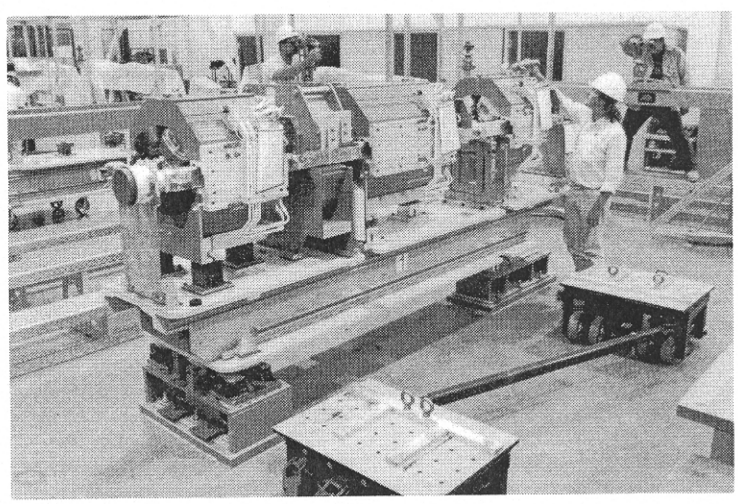
❶ The APS storage ring (SR) magnetic lattice is, as stated in the conceptual design report, "the foundation that determines the character and quality of the emerging photon beams." The basic lattice was decided upon by APS Deputy ALD Yang Cho in 1985, and extensive optimization has been performed since then. Based upon the Chasman-Green lattice, a normal APS storage ring cell (shown above) consists of 2 dipole magnets, 10 quadrupole magnets, and 7 sextupole magnets. The whole lattice is structured to repeat this unit cell 40 times, resulting in 40 straight sections where insertion devices can be located. (Computer-aided drawing by Al Barcikowski [ASD-DDR])

❷ Storage ring girders are manufactured to APS specifications and shipped to the early assembly area (EAA) in the experiment hall. Adhering to a plan developed by Danny Mangra (ASD-ME), Mike Kuzmicz (ASD-ME) coordinates installation activities in the EAA. First, the girders are cleaned and coated with an extra metal protectant. Then self-indexing mounting fixtures are attached, as Greg Banks (ASD-VAC) is shown doing here.

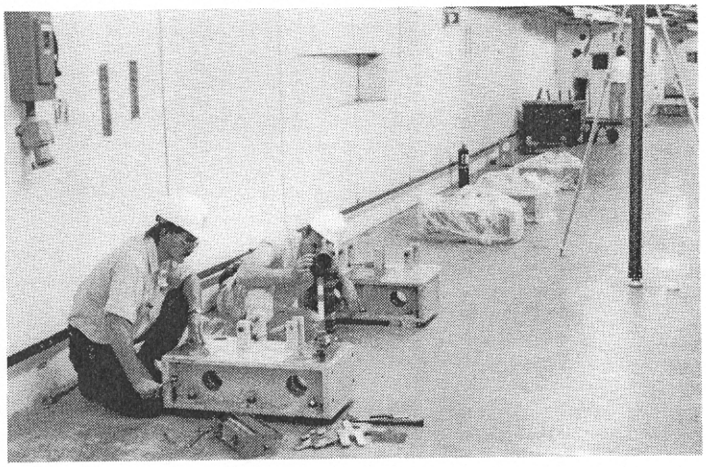


❸ After the girder is prepared, it is positioned on an alignment bench in the EAA. Banks (foreground) and Richard Taylor (ASD-SVY), at the surveying scope, align the girder to within 50 $\mu$m, using a tooling bar (not in photo) as a reference. The girder is then ready to receive magnets and vacuum chambers, which have brought to the EAA from the ANL 300 area.

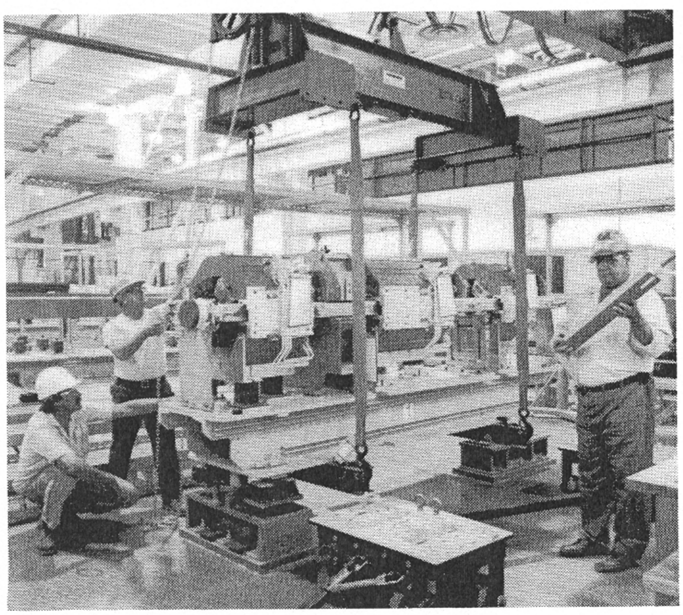


❹ Magnets are tested at the measurement facility in the EAA. They are then ready to be mounted on girders and aligned, as Taylor (l.), Stan Johnson (ASD-SVY), and Julius Fazekas (ASD-SVY) are shown doing in the photo above. Storage ring quadrupole and sextupole magnets (shown here) are aligned to within ± 0.15 mm in the horizontal and vertical directions relative to each other. Storage ring dipole magnets are aligned to within ± 0.2mm in the horizontal and vertical directions. *"Install" cont'd on page 3*

"Install" cont'd from page 2



❺ In the SR tunnel, two pedestals for each of 200 girders must be aligned, as John Dynes (ASD-VAC) and Mike Nargang (ASD-SVY) are shown doing here. The ideal APS-facility floor elevation has been defined as 226.7712 m above sea level, and the beam height is to be 1.4 m above the floor. Using state-of-the-art equipment and an intricate network of reference points, the Survey & Alignment Group is positioning girders to within ±1 mm relative to the APS global reference system.



❻ Completed girders are transported on dollys to the storage ring, where placement of girders on pedestals is handled by riggers. Ken Bult (ASD-MAG, EAA lead technician), Dean Dudevoire, and Jerry Hurst (both PFS-DR) are shown lowering girder #1 onto a transport dolly. ○

**Next issue: In the tunnel**

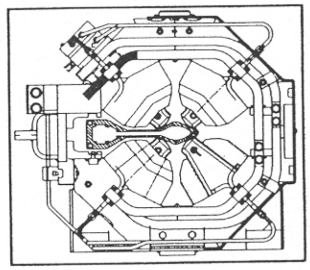
→ **Magnet consultant: Ken Thompson (ASD-MAG). Computer-aided-design for storage ring magnets by Cliff Pitts (ASD-DDR), and Arlen Nyman, Tom Crain, and Anatoly Oberfeld (all EP). Conversions by Gary Hawkins (formerly ASD-CS) and Dan Haid (ASD-CTL).**

Beamstoppers Notebook ✂ Clip & Save

## Know Your APS Magnets
# The Storage Ring

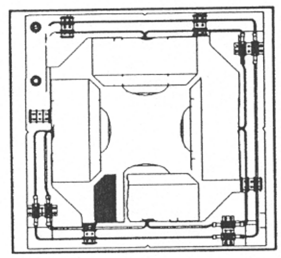
***QUADRUPOLE MAGNET…***

*…focuses the positron beam. Three lengths are produced for use at different locations in the storage ring (SR) lattice: 80 each of the .8 m and .6 m quads, and 240 of the .5 m quads.*



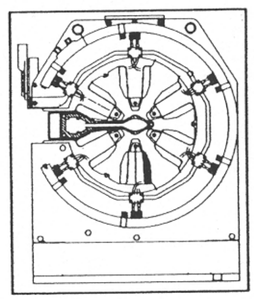
***SKEW QUADRUPOLE MAGNET…***

*…is a correction magnet. Twenty of these in the SR will adjust the total skew strength, which also has contributions from the other SR magnets, primarily the quadrupoles.*



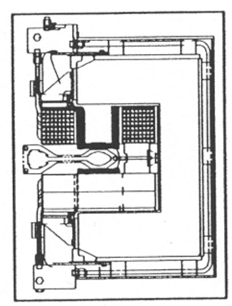
***SEXTUPOLE MAGNET…***

*…provides correction of errors from other SR magnets and adjustment of the chromaticity, an optical effect that can adversely impact the positron beam. Current plans call for up to 280 of these in the SR.*



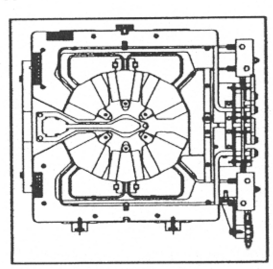
***DIPOLE MAGNET…***

*…keeps the positron beam on an orbital path. There are a total of 80 in the SR, two per sector, The second dipole magnet in each SR sector provides radiation to experimenters via a beamline.*



***CORRECTION MAGNET…***

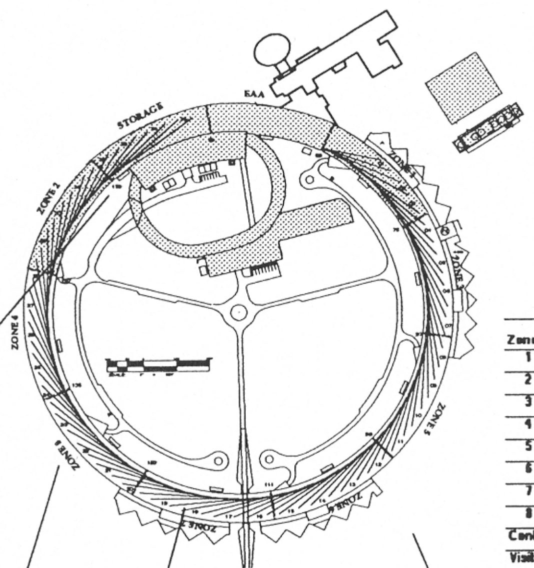
*…maintains proper beam position in both transverse planes, keeping the beam at a fixed location near the center of the vacuum chamber.* ○



# RECONCILING EXPERIMENT HALL NUMBERING SCHEMES

## A rose is a rose, but a column line is not necessarily a sector.

There exists a certain degree of confusion as to how one should denote one's location in the APS experiment hall. One has the option of citing zones, column lines, beamlines, and sectors. This plethora of locators is due to the terminology used by each group of workers who ply their trade in the building. For instance, RUST Engineering subcontractors and APS installation crews use column numbers (literally the numbers of the columns which support the experiment hall ceiling).



Advanced
Photon
Source
Argonne National Laboratory

DATES FOR BENEFICIAL OCCUPANCY

| Zone | Column Lines | Storage Ring | Main Floor | Top of Storage | Mechanical Mezzanine |
|---|---|---|---|---|---|
| 1 | 63-75 | [illegible] | [illegible] | 9/93 | 9/93 |
| 2 | 147-159 | [illegible] | 8/30/93 | 8/30/93 | 9/93 |
| 3 | 75-87 | 8/25/93 | 9/25/93 | 9/25/93 | 10/93 |
| 4 | 135-147 | 8/25/93 | 9/25/93 | 9/25/93 | 10/93 |
| 5 | 87-99 | 9/20/93 | 10/20/93 | 10/20/93 | 11/93 |
| 6 | 99-111 | 10/17/93 | 11/17/93 | 11/17/93 | 12/93 |
| 7 | 111-123 | 11/17/93 | 12/17/93 | 12/17/93 | 1/94 |
| 8 | 123-135 | 12/31/93 | 1/31/94 | 1/31/94 | 2/94 |

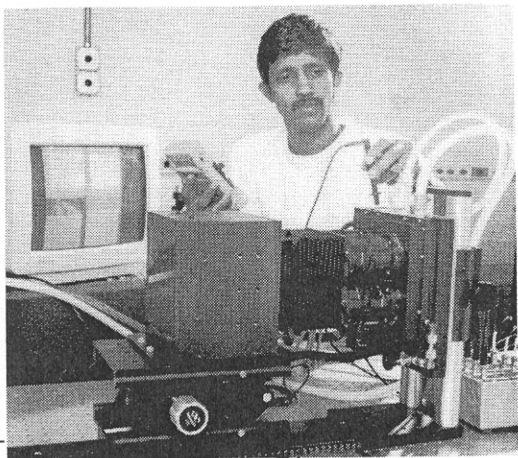
Control Center - 10/4/93 — (shaded) Beneficial Occupancy Taken
Visitor Mezzanine - 10/93 — APSC2 — Updated 8/9/93

DOE is granting the Project beneficial occupancy of the experiment hall and storage ring by zone. These zones are not numbered clock- or even counterclockwise, but rather in the order that beneficial occupancy is occurring.

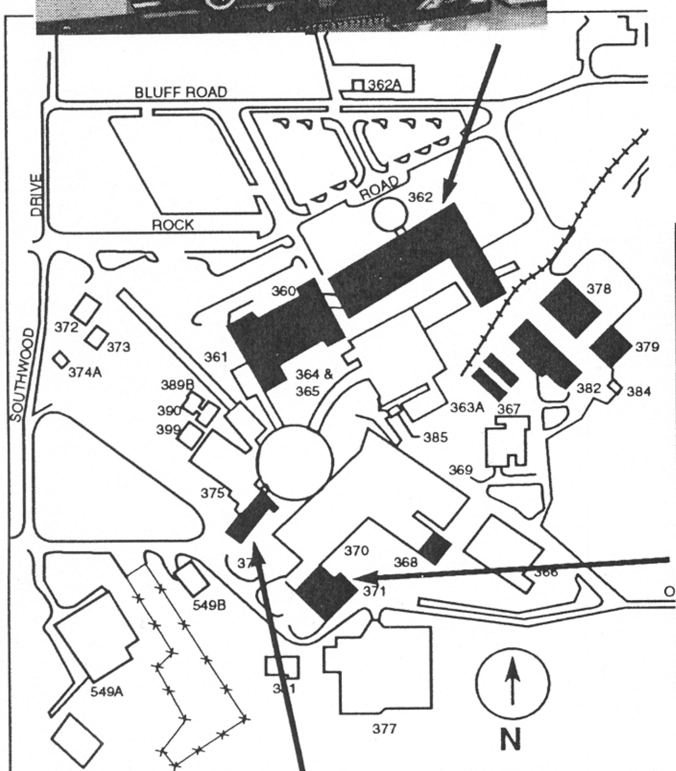
As the time for operations draws near, sectors and beamlines (the language of users) are to be the locators of choice. Each numbered sector comprises an insertion-device beamline, a bending-magnet beamline, and the walkway between them. Painted lines on the experiment hall floor will mark the walkway. The beamlines emerge tangentially from the storage ring ratchet wall, so the sectors correspondingly begin at the ratchet wall some distance upstream. A traveler in the experiment hall will be able to get her or his bearings from wall-mounted, illuminated signs denoting sector numbers. Fred Onesto (APO-ADM) has designed these and is having them affixed to the interior wall of the experiment hall.

Obviously, being on the same page is to everyone's advantage. This is that page (not shown full size). It is a computer-aided drawing of the facility matched to a tabular account of beneficial occupancy dates. This "Rosetta Stone," as Installation Coordinator Don Getz (APO-ADM) has aptly called it, places all three numbering schemes in visual relationship to each other, thereby providing a handy deciphering tool for these numeric hieroglyphics. This device was put together by Carlos Pero (APO-ADM). Pero is studying general engineering at the University of Illinois at Champaign-Urbana. He spent the summer with the Project Office as an intern from the GEM Program coordinated by the National Center for Graduate Education for Minorities. This beneficial occupancy diagram and information will be updated by Dan Prokop (ASD-DDR) as needed. Copies can be obtained from Wendy Strle (APO-ADM, ext. 8852). The latest version will also appear (in readable form) in future issues of *The Source*.

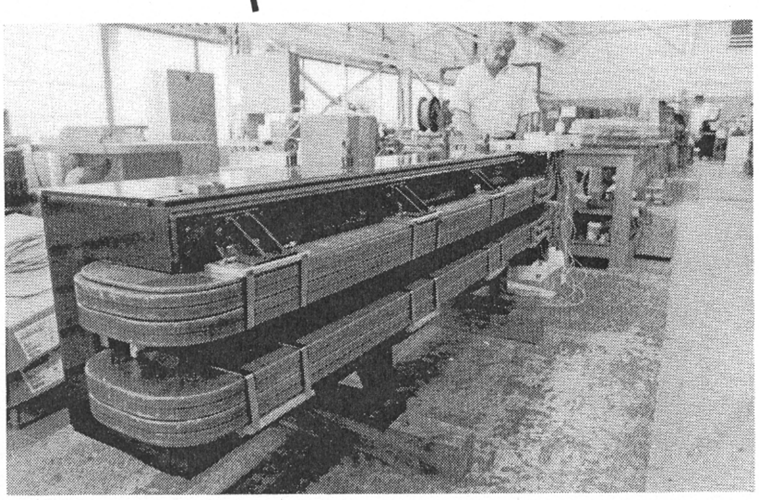
# Progress at the 300 Area



← ***Bldg. 362, Lab F340/Optics** — Brian Rodricks (XFD-OP), with the assistance of Qiang Huang, Ron Hopf, and Kemei Wang (all XFD-OP), has developed and constructed a new large-area charge-coupled-device (CCD) detector for synchrotron x-ray applications. The detector has an active area of 140 mm x 140 mm, the largest to date for a CCD detector. With image intensifiers that act as rapidly as electronic shutters (20 ns), the system can display images in real time. The device also permits multiple exposures on a 100-microsecond time scale. Rodricks, who is a member of SRI-CAT, will be using the device for time-resolved Laue diffraction studies.* O

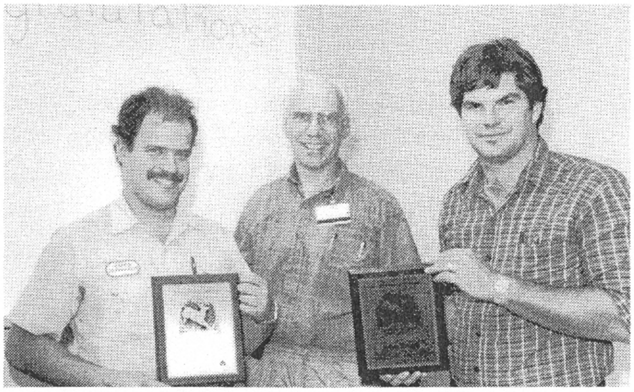



↓ ***Bldg. 371/Radio Frequency Systems** — The ASD RF Systems Group is clearly getting a kick out of gathering around the first of 16 production storage ring radio frequency (rf) cavities. The cavity was received from the manufacturer on schedule, installed on a test stand in Bldg. 371, and has met all vacuum and acceptance tests. Meanwhile, the booster synchrotron rf cavities are being installed in the booster synchrotron tunnel.* O



← ***Bldg. 376/Magnets** — Tony Gorski (ASD-MAG), the Magnet Group TCAM, gazes fondly at the first of 83 (including spares) storage ring dipole bending magnets to be completed and delivered to ANL. As the magnets arrive at the Gauss House, they are uncrated and then transported to the Magnet Measurement and Test Facility in the experiment hall Early Assembly Area.* O

# Congratulations to ...



... **Matt Lagessie** (l. in photo) and **Tom Russell** (r.), both ASD-LIN, and **Kevin Dunne** (ASD-PS, not pictured) who received Pacesetter Awards for their work on the design and construction of the APS linac modulators. Presenting the awards is ASD Division Director **John Galayda**. O

... the APS Outlaws softball team, which ran up a 21-1 record on the way to capturing the 1993 ANL16-inch-softball league championship. Pictured in the team photo are (l. to r., top row) **Greg Owens** (PFS-DR), **Tom Crain** (EP), and **Gian Trento** (ASD-PHYS); second row: **John Pace** and **Ric Putnam** (both ASD-MAG), and **Frank McConologue** (ASD-DDR); third row: **Randy Jackson** (ASD-MAG), **Ralph Bechtold** (ASD-MAG), **Ed Theres** (ASD-MAG), and **Mike Jagger** (XFD-ID); fourth row: **Kevin Costello** (EP) and **Mike Bubulka** (SSD-MS). Not pictured: **Jim Biggs** (ASD-MAG), **Glen Cherry** (EP), and **Ed Russell** (ASD-MAG). O

... the winners of the 2nd Annual Ron Johns Zuchini Bread Bakeoff. First-place winner **Ginny Dow** (APS-HR) is front and center in the p hoto at right. Third-place winner **Julie Hlavacik** (APO-ADM) is third from left. Co-2nd place winner **Char McDade** (APO-CFG, fifth from left), tied with **Barbara Kilis** (PFS-CU, not pictured). The winners are surrounded by the judges who selflessly donated their lunch hour to the cause (of eating zuchini bread): **Ron Johns** (APS-HR), **Don Getz** (APO-ADM), **Russ Huebner** (OTD-APS), and **Fred Onesto** (APO-ADM). O

## *APS ES&H I.Q. Q&A*
## The Answers

Listed below are the ES&H transgressions skillfully !staged! in the photograph that appeared as the "APS ES&H IQ Q&A" in the July 1993 issue of *The Source.*

1) Cables piled on the floor constitute a tripping hazard.

2) Wipes left carelessly near flammable liquids and an ignition source (in this case, a soldering iron) are a fire hazard, as is the proximity of the flammable liquid to the ignition source.

3) Food (cheese and crackers) near chemicals.

4) Unlabeled containers.

5) Obstructions in front of a circuit-breaker panel.

6) Generally reprehensible housekeeping. O


*The Source* is a vehicle for enhancing communications within the APS Project on matters of technical accomplishments and pro-gress, ES&H, research programs, and management news.

**Editor** Richard Fenner
**Editorial Advisors** Joanne Day, Donald Getz, Russell Huebner, Sr.
**Photography** ANL Media Services

Address story suggestions and/or comments to Rm. G-218, Bldg. 360 or FENNER@ANLAPS.

The Source *is issued by the Advanced Photon Source at Argonne National Laboratory, which is operated by The University of Chicago under contract with the U.S. Department of Energy.*