FAREWELL RESEARCH SERVICES

Frank Beck

The Research Services Department was part of the Research Division, and historically performed services common to the Meson, Neutrino, and Proton Departments. When these three departments were merged into a single Experimental Areas Department in June 1982, Research Services went on fulfilling these same responsibilities. The personnel available for this task comprised one of the strongest cryogenics teams at the Laboratory, supported by two technical groups and a drawing office, a printed circuit shop with the capability for producing large circuits and fine detectors, the hydrogen target group, an electronic instrumentation team, and a hardware and software team to support beam-line instrumentation. These teams, employing some 90 people altogether, were located in two distinct areas, most of the department being in Labs 3 and 8 in the Fermilab Village, with the electronics and software groups on the 14th floor of Wilson Hall. Administration of the Village activities was handled by Rich Smith, assisted by Ron Fast and Al Ito, and on the 14th floor by Frank Beck assisted by Hugh Montgomery.

Cryogenic Engineering

Research Services had the responsibility for several important projects in the area of cryogenic engineering. A major effort of this kind went into the design of the superconducting solenoid for the magnet of the Collider Detector Facility (E-741). This coil was fabricated in Japan and is now ready to install. A complete refrigeration system was designed, fabricated, and put through safety assessments. Preliminary tests of the system were completed and transfer lines are currently in the construction stage, ready for full-scale tests of the magnet in the near future.

Another major superconducting magnet project has been the 30-inch bubble chamber conversion project. This project, which contributes to the Laboratory effort to cut power consumption, has involved remodeling of the iron and the design, construction, and installation of superconducting coils. Research Services has also designed the complete cryogenic support equipment for this magnet, including transfer lines and two large helium dewars. The installation work on this system is now in an advanced stage, as is the plumbing supporting the chamber itself, also a Research Services project.

The superconducting coils of the reconstructed Chicago Cyclotron magnet have been installed in the new Muon Lab. The laboratory was built around this magnet during the summer, and
The Chicago Cyclotron Magnet awaiting the protection of a temporary cover prior to the construction of the new Muon Laboratory.

the magnet will be commissioned this spring. A lot of preparatory work was done for the design of the large superconducting magnet M3 which was to be the principal muon shield for the Prompt Neutrino Facility (E-636). Tight budgets caused the Physics Advisory Committee to require a complete re-think of the prompt neutrino beam line with a view to reducing the price without the loss of too many prompt neutrinos. It is likely that a new design will involve only conventional magnets.

**Conventional Magnets**

Three large, conventional spectrometer magnets for E-687 and E-706 were completely designed, the copper was acquired, and contracts for coil fabrication were awarded. The iron is also on order. Some of the iron is being supplied from the USSR as part of the E-672 collaboration. A fourth conventional magnet, for E-711, is being made by rebuilding an older magnet, increasing its gap, and replacing aluminum coils by copper, which will result in a considerable energy saving during operation.

**Operational Responsibilities**

Research Services has major operational responsibilities in addition to these construction projects. The beam-line control system has been completely rebuilt in previous years, and during
this year it was commissioned and put into operation for experimenters and the beam-line operations staff. New capabilities have been added as experience has shown them to be necessary, and a new phase of the project has been defined, which will allow the system to control diverse services (cryogenics and vacuum) not yet incorporated. It involves the integration of the three independent control systems into a network-based system, with the elimination of reliance on shared memory for the transfer of information between computers. This new phase of the project will also permit a relaxation of certain constraints, such as the limit on the number of concurrent users.

A pilot study was performed for replacement of the user interface of the EPICS system by a personal computer with a color display. Preliminary results were encouraging, and a full-scale project to implement such color interfaces might be considered in the future.

Hydrogen targets are built and operated for various experiments by the hydrogen target group. Three experiments (E-557, E-605, and E-609) were supported in this way in the past year. Operation of the superconducting magnet for the multiparticle spectrometer was a Research Services responsibility, and a helium recycling plant was built and commissioned, which conserved five times its costs in helium during the run which has just ended.

Another important job of Research Services was to provide magnetic measuring equipment. The principal device is the zip-track, on which there was a decisive electronics upgrade this year. A very busy schedule was pursued this summer calling for ziptrack work on experiments E-400, E-605, E-615, E-690, E-705, E-731, and E-745.

The printed circuit shop does not attempt to duplicate services in local industry, but rather specializes in circuits which are too large to be obtained elsewhere (up to 12 ft long) or in fast turn-arounds for research and developmental needs. This department also fabricates SWICs and proportional counter planes, and has most recently made available a Gerber printer-plottter with a routing attachment, for the fabrication of large calorimeter segments by cutting, rather than etching the copper cladding. Single boards 12 ft by 4 ft are available by this method. The routing attachment was made for us by the Physics Department. The first user of this facility is E-706, but there has already been a stream of enquiries about using it from other experiments.

The electronics group has been working in the support of E-705 and E-741. The major project was a precision amplifier, ADC and Cluster Finder System for E-705 which has been completely designed and is in fabrication. This system is for a large array of scintillating glass blocks for which the system which controls
The converted Gerber router (with Delbert Venters, Ed Arko, George Fasurakie, and Wilcox Yang).

the motorized movement has also been designed. In addition development work was performed on the amplifier discriminator electronics for the vertex and central tracking detectors of the CDF project. The group has also supplied the CDF project with a regulated power supply for their superconducting solenoid and

Wrapping the superinsulation on the coil for the Tohoku 32-in. bubble chamber magnet (with Roman Dachnivskyj, David Smith, and Barry Skinner).
worked on the control circuitry for the 32-in. bubble chamber. Some help, mostly in the form of consulting services, was given to the Accelerator Division.

Research Services provided the Laboratory's alignment services, involving a group of 13 people, supported by contract labor, currently about 8 additional surveyors. The group serves virtually every construction project and experiment on the site, and its work was usually channeled from people requiring it through the Experimental Areas Department and the Tevatron Construction Group.

Particle Detector Group

The Laboratory was fortunate in being able to recruit two members of the well-known Charpak group at CERN to found a research group on particle detectors. David Anderson and Stan Majewski have now been with Research Services most of the year, and in addition to installing their laboratory facilities and recruiting two helpers, the group has started to work on their first experiments, involving a beam test of a ring-imaging Cherenkov counter built in collaboration with the Swiss Institute for Nuclear Research and tests on the radiation resistance of barium fluoride, a scintillator. Other projects currently under study are a low-pressure detector for Cherenkov photons and a scheme for doping liquid argon with a photosensitive material to increase the electron yield and drift velocity and to reduce the
effects of ionic recombination. The group is also involved with
the SSC study and has proposed a forward calorimeter for SSC
experiments which was the subject of a working group at the
recent Snowmass meeting.

Reorganization

The combination of the three areas into an Experimental
Areas Department in mid-1982 left Research Services in an anom-23
alous position. Constant discussion of whether a particular proj-
ect should be in EAD or Research Services, and the repeated
requirement for one department to lend effort to the other, made
it clear that a new arrangement of the groups would be needed,
and at the beginning of October this year, Ken Stanfield, the new
Research Division head, announced a new administrative structure.
This structure involves departments with more specialized func-
tions and will in principle allow limited manpower resources to
be applied more efficiently. After some 12 years, Research Ser-
vices is no more.

The group, and the people in them, will continue under a
different management structure to serve the research program as
members of the Cryogenics, Operations, Electrical, and Facilities
and Experimental Areas Support departments. Only the name of
Research Services has come to an end, and it is with a mixture of
pride and regret that I realize that I was the last holder of a
position which served the research workers at Fermilab during
most of its history. As I return to CERN in Geneva, I wish the
erstwhile members of Research Services much luck and a productive
and successful future in their respective positions in the
Research Division. There may not be a "Research Services" any
more, but Services to Research will continue to be what the
Laboratory is all about.

Heads of Research Services
1972-1984

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<thead>
<tr>
<th>Name</th>
<th>Period</th>
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<tbody>
<tr>
<td>Frank Beck</td>
<td>1972-1973</td>
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<td>Brad Cox</td>
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<td>Marvin Johnson</td>
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<td>Paul Mantsch</td>
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<td>Lincoln Read</td>
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<td>Quentin Kerns</td>
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<td>Miguel Awschalom</td>
<td>1984-1985</td>
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The superconducting CDF coil delivered and in the pit at B0.

(Photograph by Fermilab Photo Unit)
A Tevatron II beam enclosure being built.
(Photograph by Fermilab Photo Unit)