

Evolution of the Argonne Tandem Linear Accelerator System (ATLAS) Control System*

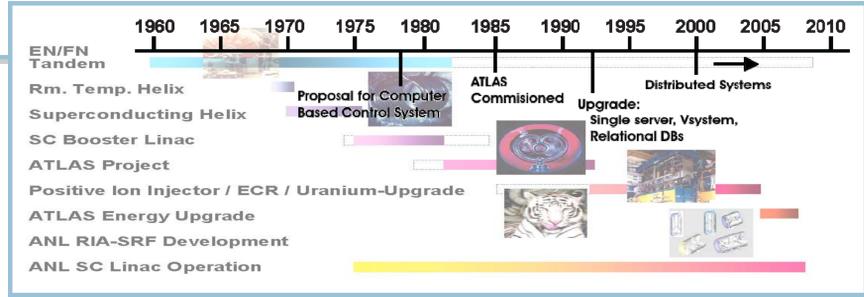
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Abstract

Given that the Argonne Tandem Linear Accelerator System (ATLAS) recently celebrated its 25th anniversary, this paper will explore the past, present, and future of the ATLAS Control System, and how it has evolved along with the accelerator and control system technology.

ATLAS as we know it today, originated with a Tandem Van de Graff in the 1960s. With the addition of the Booster section in the late 1970s, came the first computerized control. ATLAS itself was placed into service on June 25, 1985, and was the world's first superconducting linear accelerator for ions. Since its dedication as a National User Facility, more than a thousand experiments by more than 2,000 users worldwide, have taken advantage of the unique capabilities it provides.

Today, ATLAS continues to be a user facility for physicists who study the particles that form the heart of atoms. Its most recent addition, CARIBU (Californium Rare Isotope Breeder Upgrade), creates special beams that feed into ATLAS. ATLAS is similar to a living organism, changing and responding to new technological challenges and research needs. As it continues to evolve, so does the control system: from the original days using a DEC PDP-11/34 computer and two CAMAC crates, to a DEC Alpha computer running Vsystem software and more than twenty CAMAC crates, to distributed computers and VME systems. Future upgrades are also in the planning stages that will continue to evolve the control system.



Touch screen control board



The right side of the room is the original (not computer controlled) control of the accelerator.

1994 was a record year for ATLAS

The Argonne Tandem Linear Accelerator System (ATLAS) set a record for hours of operation in fiscal year 1994, with nearly 5,300 hours of beamtime available for research—a 60 percent increase over 1993.

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BEAM TEAM — At right, ATLAS operations employees pose for a group photo after their record year.



The accelerator's flexibility is a strong attraction for researchers interested in medium-energy physics. The device offers hundreds of possible beam energies and combinations.

"At Fermilab, for example, you can have any beam you want, as long as you want protons," Pardo said. "At ATLAS experiments can ask for neon, tin, gadolinium, all the way up to uranium."

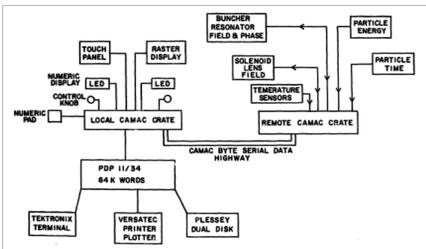
A second, more powerful heavy ion injector has been approved, and construction of some components is under way. The entire project should be completed in about two years.

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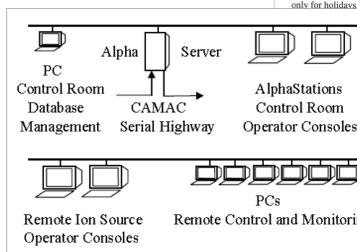
NEW CONTROLS — Engineering Specialist Iain Tibbcock (PHY) keeps watch on ATLAS with a new control system now being phased in. The "point-and-click" system will eventually replace much of the large rack-mounted array of toggle switches and dials at right, which date back to the late 1970s. (Note the gaps where obsolete equipment has already been removed.) The large monitor shows the status of ATLAS resonators. The operator can adjust beam energies, troubleshoot, or get status messages from almost any element of the accelerator. "Satellite" control stations allow operators to monitor and control ATLAS from several places along the machine's nearly 500-foot (150-meter) length.



Argonne News



Original computer control system proposal, 1978

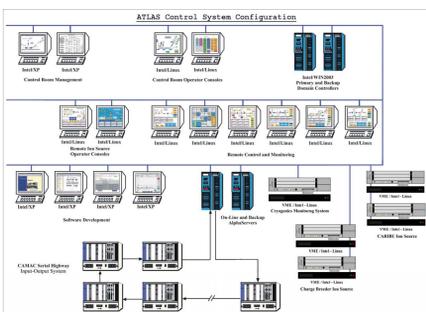


1990's Upgrade Configuration



Current Control Room

Control Room circa 1985. The right (grey counter) is the accelerator control system including the original Booster and added ATLAS sections. The left (white counter) is the added beamline control system.



Current ATLAS Control System configuration

Distributed VME systems on the CARIBU source.

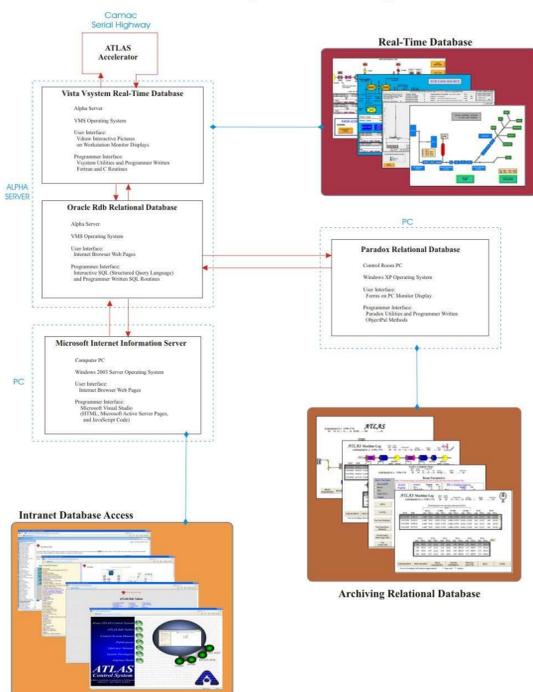


The distributed Cryogenic Monitoring system has been updated from a distributed CAMAC system to a VME system.



Hytec 9010 Blade I/O Controller

ATLAS Control System Data Management



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