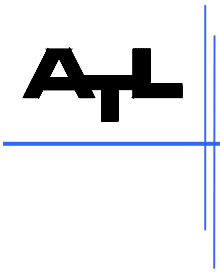

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Profile

CORPORATE PROFILE

Advanced Technology Laboratories, Incorporated (ATL) is a Pennsylvania corporation that provides low-cost, quality engineering and production services to private industry and government agencies in the fields of analog and digital electronics. Since its inception in 1976, ATL has consistently applied advanced techniques in the development of microprocessor-based systems in embedded architecture environments.

The company specializes in the hardware and software design, development and manufacturing of such systems, with its employees fully supported in these areas. ATL's full range of services includes product conceptualization and design; generation of functional specifications and parts lists; hardware, software, and systems engineering; cost analyses; documentation preparation; procurement; manufacturing, and after sale support.

Major application areas for ATL are in technologically-assisted information delivery systems for job performance enhancement, training, and education. Here, the hardware and software design expertise of ATL's engineers can serve to augment specialists in these fields in making the transition to a technology-based orientation. Other areas include data acquisition systems, test equipment and a wide range of stand-alone products.

ATL maintains a staff of engineers, technicians and computer programmers to provide the required services. Office and laboratory facilities are maintained to encourage cost-effective performance. Our engineers are professional graduates with a minimum of a BSEE, while the technicians and programmers have degrees or certificates of graduation from accredited courses.

ATL also maintains a nucleus of specialized equipment for analog and digital circuit design and manufacturing. The development stations are configured to provide a generalized working environment for the engineer, and support both assembly and higher level languages. Assembly language is the language of choice in low-end systems where cost is a factor, and in more sophisticated architectures where speed is important. Higher level languages can be used for "connecting" algorithms, or for simulation of a proposed system. The marriage of the analog and digital computers provides a hybrid environment in which many real-time analog/digital designs may be simplified hardware and software simulation are supported by the development stations. Both embedded system and PC-level software development are supported and embedded/PC integrated systems have been produced. Manufacturing capabilities include surface mount, through hole and mixed technologies. Prototyping through high volume production are supported

ATL's in-house computer aided design (CAD) workstations and desktop publishing provide professional documentation for both mechanical and electronic designs, while serving as the basis for our own printed circuit board development facility. Both 2D and 3D mechanical design is supported. These functions, coupled with our proven experience in a production environment, provide our customers with a complete capability for the development, production and support of their products.

The company has completed close to 3000 separate projects, not counting repeat orders, and has continuing relations with specific customers for over a decade, with over the 25th production run for some products. Production has peaked with over 100 thousand board-level products per year. Our production facilities cover SMT, through-hole and mixed technologies, and provides complete turn-key systems from product concept to delivery. The integration of mechanical and electronic designs, PCB design and layout, procurement and manufacturing under one roof provides a true "one stop shop".

ATL'S PRESIDENT

Mr. Fertner is a graduate Electrical Engineer with heavy management experience. His graduate studies in business management paved the way for his heading up the Electronics Group at the Franklin Research Center (FRC) and forming his own company in 1976. Early work at FRC involved research contracts with the military and federal government. Areas of concentration were the missile safety systems in the American Space Program. Later work included the development of man-in-the-loop flight and ground vehicle simulators for the Air Force, NASA and the Department of Transportation. Further work included the development and support of "smart" systems for military education and training programs. Mr. Fertner was responsible for the technical presentation to members of Congress (invited to the Senate through a "Dear Colleague" letter authored by Senator Samuel Nunn) of a hand-held training aid that used synthetic speech as a feedback element. This device, developed by Mr. Fertner and his team, was essentially one of the first laptop computers on the market.

Mr. Fertner started Advanced Technology Laboratories, Inc. (ATL) in 1976 to further his interest in smart products. ATL's first contract was for the development of a computer-based security system for high rise apartment complexes. From that time on, ATL has concentrated on microprocessor-based products that provide a cost-effective solution to a wide range for customer requirements. ATL became a product development consultant (on a referral basis) for Texas Instruments to help TI's customers gain market share in the digital audio area. ATL has developed long term relationships with large companies and, through multi-year contracts, provides product development and support. This service was extended into the federal government in two product lines ATL now manufactures.

ATL's customer list extends from individuals, through small and medium sized companies, to America's largest corporations and the federal government. The company provides engineering services for product and production line development, fabrication services to actually assemble equipment, and production services to manufacture supported products in any volume.

Mr. Fertner and his company have sought and obtained joint research contracts with the federal government and have participated in the Federal Small Business Innovation Award program and Pennsylvania's Ben Franklin Partnership program. Mr. Fertner also provides cost-sharing on selected programs which align with ATL's primary business direction in return for equity and/or product production rights.

Mr. Fertner recently purchased Hydro Technologies Corporation (HTC), which produces a residential water alarm. The company is currently developing a wireless digital audio dialer for use with the water detector and other alarm systems. Mr. Fertner has retained members of the Warton School, University of Pennsylvania, for generating a marketing plan for the water detector and the dialer.

Mr. Fertner has appeared numerous times on television news and in the local newspapers featuring his latest developments and those of his company. He has presented technical papers to professional groups in geographically diverse areas from Silicon Valley in the United States to Munich, Germany. As the President of ATL, Mr. Fertner continues to provide the impetus behind the company's drive to incorporate advanced technology in products for the federal government, military and industry.

Experience

Staff Experience

In addition to the ATL contractual activity listed in this section, members of ATL's staff have had heavy direct experience relating to the design and development of hardware, software, and courseware for microprocessor-based systems. This experience includes:

Simulator Systems

The following is a summary of relevant projects performed by the personnel of ATL in the area of simulators.

Design of a Federal Highway Administration Highway Simulator - The design of the FHWA simulator was one task on a multi-tasked project for FHWA to determine driver response to variations in tunnel entrance architecture. The total program included instrumentation of vehicles, instrumentation of highways for acceleration profile measurements, measurement of driver response to various tunnel architectures at several different sites, and the simulator task itself. To meet the goals of the project, several special-purpose systems were developed, including a scale model terrain and a visual simulator.

The visual simulator was a fixed-base unit that employed a 16-mm. film display format. The terrain system, which included several highway layouts and tunnel entrance architectures, was designed to run a servoed 16-mm. camera with special optics at the scaled driver's eye height above the road. This camera was driven into the tunnel at scaled speeds of 30 to 55 mph. The playback portion of the visual simulator included a 16-mm. projector fitted with a high-intensity arc lamp, along with servos to provide simulated side motion and variable speed.

In the operational mode, the driver sat in an actual full-scale vehicle, which was instrumented to measure steering wheel and accelerator positions, and pressure applied to the brake pedal. The visual system, mounted on top of the vehicle, projected the driver's view of the road on a 20-foot-wide screen that accommodated peripheral vision. Realistic simulated motion in response to the driver's inputs was obtained through the vehicular dynamic equations contained in a small-scale computer. Highway perturbations (crown, etc.) and crosswind forces were included in the computer simulation.

An instrumentation recorder monitored driver behavior via steering wheel position, acceleration, vehicular velocity, side sway, and other parameters. Data collected from simulated runs were later correlated with those received through tests on full-scale roadbeds in front of actual tunnels.

Development of a Visual Simulation for the AH-1G Fast Attack (COBRA) Helicopter - The goal of this contract was to develop a simulation system for the evaluation of various head-up display configurations for simultaneous avionics and fire control information display. The simulation consisted of a fixed-base cockpit with active controls and instruments, and an outside-world display mounted in a high-performance, four-degree-of-freedom servo system. Scene generation was accomplished using a 2 1/4 by 2 1/4 color film transparency that was moved in an x-y plane about a fixed optical axis. Forward motion was simulated using a servoed zoom lens. The entire projection motion system was carried on a servoed roll gimbal.

Two maneuvers were simulated: nap-of-the-earth and pop-up. The nap-of-the-earth maneuver provided close-to-the-ground flying to escape radar detection, while in the pop-up, the aircraft would hover at a low altitude, "pop up" to operate as a stabilized gun platform, then go back down behind cover. The scenery generated for the aircraft was actually filmed out of a helicopter flying at low altitude.

A hybrid computer provided synchronization of the four servo systems to simulate all six degrees of freedom of aircraft motion for the pilot. Collective and cyclic sticks, throttle, and pedals were functional to allow pilot control of aircraft flight parameters. Active instrumentation included altimeter, torque meter, turn-and-bank indicator, etc., so that avionics instruments were present in the head-up display. The aircraft performed according to the AH-1G's aerodynamic equations, which were stored in the hybrid computer.

Performance data, such as firing accuracy and aircraft tracking tasks, were gathered for various display configurations. The system therefore allowed for the optimization of display parameters with respect to overall weapons system delivery accuracy.

Design and Development of an Aircraft Simulator - A two-degree-of-freedom aircraft simulator that allowed a person to "fly" to a maximum altitude of 5000 simulated feet (10 actual) was designed and constructed. Aircraft dynamics programmed into the system allowed the simulator to respond realistically to pilot inputs and to provide lifelike simulations of various flight conditions. For example, the flyer could "stall" in a power-on (with nose up) or power-off condition. The pilot could make a successful recovery from the stall using the electronically programmed stick, rudder pedals, flaps, throttle, and landing gear. If a hard landing or crash occurred, it was simulated by an electronic ground system that realistically "bumped" or bounced the aircraft.

The electrohydraulic control system operated at 3000 psig and provided realistic motion for taxiing, takeoff, climb, flight and landing. An auxiliary set of controls provided a ground-based instructor with the ability to demonstrate the aircraft flight characteristics, or "force down" a wayward pilot. Control of the aircraft was achieved through the use of hydraulic servo valves with DC control signals. Flight instrumentation included analtimeter, airspeed indicator, tachometer, and bank-and-turn indicator. The computer provided full interactivity between the pilot and the simulated aircraft's dynamics. From the pilot's point of view, he/she was dealing with the actual aircraft.

A Computer Simulation of a Distributed Energy Management System - A system-level analysis was performed for the Department of the Navy, Philadelphia Naval Base, to obtain operational parameters for a distributed hardware, microprocessor-based energy management system. A computer simulation of the anticipated hardware and software characteristics was generated to provide insight into collision avoidance for communication between the computational modules and the control functions within the system. Communication rates, message lengths, and data formats were modified by the simulation to provide optimum performance in the energy management system. The optimized parameters were used to generate a specification for the design of an advanced distributed management system for use in Naval installations.

Simulation of a Hand-Held Computerized Device - As part of an overall development contract for the U.S. Army Research Institute, a simulator for a hand-held computerized device was generated. The desk-top system allowed operation and exercise of the software, hardware, and firmware of a prototype educational delivery system. By using the simulator, the developers were able to observe dynamic interactions between the user and the courseware materials. Knowledge gained through this process enabled them to modify functions as necessary to optimize operation of the prototype. Further, it greatly reduced development time and the effort required to produce the final version of the hardware and firmware. On the whole, the simulation contributed to the overall success of the hand-held device.

Computer Simulation of Small-Scale Integrated Logic Circuits - As an IR&D effort, ATL funded the development of a logic-simulation program to provide dynamic analysis of small-scale integrated circuit logic functions. The system allows the definition of logic blocks including AND, NAND, OR, NOR and NOT gates, inverters, and buffers. It also enables the definition of nodes (both controlled and autonomous) within the system and provides an indication of the state of the nodes that are designated as outputs. After a user has specified the number of clock cycles to termination of a run, the system generates a printout of the state of all nodes for each clock cycle. Use of the simulator provides an insight into the behavior of the logic system under test and highlights timing problems and logic design flaws.

Education and Training

Development of a Hand-Held Computerized Device for Teaching MOS-Related Vocabulary - Under a contract with the U.S. Army Research Institute (ARI), a hand-held computerized device was developed for teaching Military Occupational Specialty (MOS)-related vocabulary. The project included the development of a set of functional specifications for the device; development of the required hardware, software, and courseware; and the production of 20 prototype systems.

As a separate task, a design rationale was developed to justify the final design strategy selected. A significant component of this analysis was the projection of production costs into future years, including the effects of technology trends and production learning curve behavior. Once approved by ARI, the final design was implemented in an engineering prototype for laboratory testing of the courseware algorithms.

On solidification of the courseware components, the final hardware and software designs were completed and production documentation generated. The final product of the contract was 20 prototype devices--designated as "Tutors"--sufficiently developed to be fieldable.

The prototype Tutors were housed in a 9-by-11-inch plastic case with an indentation to hold a 5-by-5-inch booklet containing instructions and instructional materials. The devices were powered by an internal NiCad battery pack and utilized a large percentage of CMOS integrated circuits. Information from the machine was presented on a 32-character liquid crystal display and spoken through an integral electronically synthesized voice system. For user inputs, a domed printed circuit keyboard with tactile feedback was employed.

Gaming features were installed as an integral part of the courseware, both to increase user interest and to provide a multi-faceted approach for presenting the instructional material.

Additional Tutor Tasks - Under a separate ARI contract, other tasks have been performed to broaden the use of the Tutor and provide additional capabilities. A basic mathematics module was developed, both to demonstrate the versatility of the Tutor and to provide another curriculum that will aid in the delivery of instructional materials within the military system. The courseware was designed to be compatible with materials already provided for the Tutor (Cannon Crewman, MOS 13B). It was ultimately supplied in a plug-in module that fit into the back of existing units.

An RS-232-C serial interface was designed to provide communication between the Tutor and a host computer. This interface provides testing, diagnostic, and courseware-serving functions. The host computer selected is an IBM PC. The software developed for the interface includes machine-language, low-level drivers controlled by a high-level language (BASIC) to provide the desired host functions. These functions include:

- **MOS Selection:** The soldier using the Tutor first connects it to the host computer and selects the MOS to be studied. After the host downloads the selected MOS materials, the soldier can disconnect the Tutor from the host and use the hand-held device in the normal manner.

- **Test:** In this function, the Tutor is connected to the host, which presents test materials to the soldier. The soldier enters answers via the Tutor keyboard. At the end of the test, the host grades it and downloads remedial materials, selected on the basis of the test results. The soldier can then disconnect the Tutor from the host and proceed with subsequent operations.

- **Homework:** At any time after downloading remedial materials, the soldier can use the Tutor for review purposes in the Word War mode, or can select other courseware in the same session by changing plug-in modules. The homework module retains the remedial materials for future insertion and use.

Production of 5 Prototype Tutors - On a separate purchase order, ARI procured 5 additional units for further use in demonstrating Tutor utilization. These devices were produced according to the documentation package generated from the Tutor Functional Specifications.

Corporate Experience

Prior experience under direct contract activity within ATL illustrates the commitment to the design, implementation, and production of embedded architecture microprocessor-based systems. Additional work shows that factors such as cost-effectiveness, production problems and testability are as important as the generation of prototypes themselves. The following is a list of programs that display the breadth of ATL's experience in system and product design, development and production. The list is not exhaustive due to the volume of the company's business activity, and the proprietary nature of many programs.

Development of a Preliminary System Architecture for an In-Buoy Transient Acoustic Processor - ATL developed the preliminary hardware and software architecture for a digital signal processing system for anti submarine warfare (ASW) applications. The work included the analysis of timing requirements, selection of candidate hardware components, development of a parts list, generation of a preliminary printed circuit board layout on ATL's CAD workstations and pricing of the system in production quantities of 100 thousand units per year. The final system included a TMS320C25 DSP, three wide-band and one narrow-band analog data channels. The design provided band-pass and low-pass filtering, FFT manipulation and statistical analysis of acquired data.

Design, Development and Manufacture of MIDAS (Miniature Integrated Data Acquisition System) for the Department of Defence, U.S. Navy – Through a Small Business Innovative Research (SBIR) program with the Naval Sea Systems Command, ATL developed a tablet computer-based system to analyze the "health of ship-board machinery and aid in the prediction of future equipment failures. The system was designed specifically to meet the Navy's requirements for its database structure and communications protocols. ATL developed all of the hardware, software and system specifications, fabricated prototypes that were field tested world-wide, and has delivered in excess of 50 systems to date. The company is currently working on a Cooperative Research and Development Agreement (CRADA) with the Navy to co-develop an commercial version of the system.

Design and Development of a Theodolite Digital Control and Readout System - Electronic control and readouts were developed for a mechanical/optical theodolite for the measurement of near-surface winds as an aid for military aircraft landings. The system consists of both azimuth and elevation measurement and readout. Variable red illumination was provided to preserve the operator's night vision. Over 60 systems have been produced to date.

Development of a Wireless Angle Measurement System for for the Control of the Bending of Large-Diameter (48 inch) Pipes – A self-calibrating system consisting of 2 transmitters and a single 2-channel receiver was developed using commercial inclinometer transducers. The communications protocol used packet technology to determine the quality of the received data, an effective measure of the signal quality and the integrity of the measured parameters. A self-zeroing capability provides no operator effort to determine the initial condition of the pipe bend and provides error messages for out of tolerance positions prior to bending. A total of 15 systems have bee produced to date.

Generation of PCB Layouts and Fabrication of Instrumentation Modulesfor an Instrumentation for Plasma Energy Experiments – ATL provided the printed circuit board designs for and instrumentation system for the monitoring of Plasma Physics experiments. ATL also fabricated the instrumentation modules from the generated designs. The work was done in cooperation with Princeton Plasma Physics Laboratory, a member of the National Laboratory System coordinated by the U.S. Department of Energy. ATL has a 5-year rolling contract with PPPL to provide design and manufacturing services.

Generation of a Personal Computer BIOS for Embedded Processor Application - ATL engineers developed a PC BIOS that flagged peripheral errors and allowed the system to operate without a keyboard, monitor or display driver. Programming in a combination of C and assembly language provided the correct

I/O timing for peripheral operation and compatibility with virtually all PC accessories. The system, used by Bell Atlantic, is part of a central office test system that evaluates subscriber lines.

Development of Customer Site Equipment for RABITS - Based on specifications provided by Bell Atlantic Corporation, ATL developed and manufactured the customer site equipment for the Remote Access Batch-Programmed Interoffice Test System (RABITS).

Development of a Remotely Programmed National Advertising System - ATL developed a high technology national advertising system that distributes advertising material over wide areas through remote programming. The system also has a provision for local control to allow modification of promotional material.

Development and Fabrication of a Time Domain Reflectometer (TDR) for Cable Testing - A 60 channel, computer controlled TDR measurement system was developed for quality control measurements on a production floor. The software was menu driven, and the operator interface simplified so that production personnel could use the system with little training. The system automatically characterized a known good assembly and used the parameters to set up the TDR measurement without operator intervention.

Development and Fabrication of an Automatic Fixture - Produced as an accessory for the TDR, the fixture automatically clamped and inserted cable assembly connectors into the system for test. A three axis servo system was used for clamping and positioning of the cable assemblies. The system also measured the connector insertion force.

Multi-Layer Printed Circuit Board Development - ATL has produced CAD-generated designs for multi-layer boards with both buried via and through hole construction. Designs with up to 16 conductor layers have been produced and incorporated into products to date.

Design and Development of the VocAlert Smoke Detector Speech Module - ATL generated the software and hardware design for a synthetic speech module for use with a proprietary ionization type smoke detector. The system was designed with supplementary circuitry that determines the presence of smoke, heat and light and uses this information to modify directions for exiting structures in emergency situations. The printed circuit board was designed using design rules for automatic insertion and assembly.

Product Design Fault Isolation and Remedy - ATL engineers performed a design review on a product that the customer had experienced a 100 percent failure after one month of operation in the field. The problem was isolated, laboratory tests run to confirm the diagnosis and a retrofit kit produced. A 100 percent success rate was experienced after the product was modified.

Preliminary Design of a Physical Test Machine - ATL engineers performed the design study, tradeoff analyses and preliminary hardware and software designs for a computer-based physical test machine. The design task included software flowcharting, mechanical system design, packaging, computer and interface design and safety system design.

Design and Development of a 32-Channel Low Level Multiplexer - Designed as a part of an instrumentation package for data recording during high energy physics experiments at Brookhaven National Laboratory, the system allowed the switching of 32 analog channels simultaneously via either computer or local control. The design conformed both physically and electrically to the VME bus specification and met a 100 picoamp maximum leakage current in any output channel under full input specification. The multiplexer is now offered as a standard product by ATL.

Development of Mechanical and Electrical Designs for Patent Disclosure - ATL personnel have developed for clients product designs for patent processing. Typical tasks include generating electrical and mechanical designs from concepts, formalizing patent drawings and working with attorneys to aid in obtaining the broadest patent coverage for a specific product.

Design of a Liquid Crystal Display (LCD) - CAD-based artwork was generated for the font design, front and back plane images and the production guides and targets for a three digit LCD system. Design limits were three mil lines and spaces.

Speech Encoding Services - ATL uses a combination of a Texas Instruments SDS-50 Speech Development System and proprietary hardware and software developed by the company to provide speech encoding services for its customers, as well as for use in its own systems. The customer base is derived from both TI referrals and ATL's marketing of speech services and products.

Development of a Low-Cost Speech Board - ATL engineers have developed both processor-based and processorless speech boards supporting the TSP5220C speech processor. Hardware and software designs were both developed at ATL, with all documentation generated on the company's CAD workstations.

Development and Construction of a Portable Organizational Level Maintenance Aid (POLMA) - POLMA is a low-cost, portable device that provides maintenance procedures through a speech channel to a service technician. The instrument can acquire signals, record results and step the technician through a decision tree until the fault is identified. An interface to a larger computer provides access to a relatively large maintenance database from which the unit selects sections that are pertinent to the maintenance task at hand.

Design and Production of a proprietary product to Meet Foreign Competition - ATL is engaged in the specification, design, and production of an extremely small microprocessor-based product, to enhance its competitive posture with respect to foreign competition. The company is doing this with a combination of Surface Mount Technology (SMT), semi-custom Large-Scale Integration (LSI), CAD board design, injection molding of cases, and computer generation of board production documentation.

Design, Fabrication and Installation of a Computer-Based 400-input High-Rise Security System - ATL designed a total system to monitor building security for a 400-unit high-rise apartment building. The system consisted of a single board computer, an opto-isolation system, a printer, and a console. It scanned 23 floors in less than a tenth of a second. Salient features included l500 volt opto-isolation on all building wiring, redundant hardware scan failure alarms, a self-checking isolator subsystem, simple console commands, and battery backup for power failure protection. Each apartment door was monitored continuously, while the alarm activity was controlled at the central console. The operator had the ability to activate the security unit in any single apartment from the front desk.

Product Engineering and Technical Support for the Production of a Residential Security System - ATL performed engineering cost tradeoffs, production engineering, and testing of completed units for a manufacturing facility during the startup of a new electronic product.

Design and Construction of a Computer-based Energy Management System for the Fast-Food Industry - Engineers at ATL designed a modular system that provided 32 channels of combined time and demand control of electrical loads. The system allowed onsite programming in a simple manner by non-technical personnel. An integral clock/calendar allowed the programming of timed functions for each day of the week, with weekends using a different schedule. A holiday feature allowed the selection of specific dates on which a special schedule was required. The clock and memory were protected from power failure and an automatic startup routine provided for the timely and coordinated reinstatement of the control algorithms. A serial interface was provided for rapid programming and use in distributed processing environments.

A multiplexing system expanded the output control capability, to allow the effective management of large hotels and motels. For this application, a parallel-word, serial-command protocol was implemented, permitting the control of an array of modules that managed 16 loads each.

Test and Calibration of Physical Test Machine Equipment - The production test and calibration of complex test equipment is performed on a continuing basis at ATL. This type of service is performed for manufacturers that do not have their own test and engineering departments. Current contracts include the

pickup, test, calibration, and delivery of the systems. Engineering services, such as new component evaluation, are also provided as the need arises.

Test and Calibration of a Digital Electrical Demand Limiter - Production test and calibration of demand-limiting equipment was performed to provide a complete, ready-to-install system to the customer. Testing included the simulation of building lines, load requirements, and demand dynamics.

Critical Design Review of a 64-Channel, Time-Multiplexed Power Control System - ATL provided the expertise to critically review the electronic design of a multiplexed system that had encountered problems in the field. The review included the actual design and its safety margins, noise immunity, production-related problems, and installation impact. The results indicated that the design was not as bad as the customer first thought, and that handling of the CMOS components during installation caused some of the failures. A training program for the field crews was implemented along with recommendations to the manufacturer.

Engineering Support Services - ATL provides services to industry to fill gaps in technology and expertise that a company may experience due to financial constraints. These services, performed for a number of clients, range from analog and digital circuit design to production testing of electronic systems.

Design and Construction of a Prototype Radio-Frequency Remote Automobile Control System - This system was designed to implement many of the features of a standard passenger car including starting, warmup, fast and curb idle, accelerator control, radio, heater, air-conditioner operation, and shutdown. All control was maintained through a Radio-Frequency link, via a hand-held control pod. Operation could be maintained over a distance of 1500 feet.

Electrical Energy Survey for Pennsylvania Bureau of Taxes - ATL provided the survey and analysis of information for the determination of production-related electrical energy demand for the purposes of tax litigation. The work included a survey of the manufacturing plants, compilation of equipment and represented demand, and segregation of the equipment into manufacturing and non-manufacturing components. The reports issued were subsequently used in successful litigation to obtain tax credits.

Product Engineering and Technical Support for the Production of a Residential Security System - Engineering cost tradeoffs, production engineering and testing of completed units were performed for a manufacturing facility during its startup phase of manufacturing a new electronic product.

Maintenance of a High Rise Security System - A service contract for the support of a computer-based security system provided for the maintenance of the computer and the building wiring. Emergency service was provided with a response time of 4 hours maximum, and non-emergency response for routine repairs of 24 hours. A monthly inspection provided preventive maintenance.

Maintenance of a Master Antenna Television System - A service contract was devised that provided competitive services at a significantly lower cost than previous contracts. The system included head-end broadband amplifiers, a broadband master antenna and a cable distribution system to over 600 television outlets.

Design of a 400-Unit Television Distribution System for a 10-Acre Townhouse Development - A system was designed to provide local television reception for a 400 unit planned community. The system included head-end broadband amplifiers, frequency converters, mixers, filters and narrow-band amplifiers. All utilities in the community were underground. Consideration of "tilt" in the transmission system required the equalization of frequencies transmitted through the system over channels 2 to 13. The design called for all TV cable to be underground, with line amplifiers, taps and splitters mounted in above-ground enclosures.

Production Engineering and Production of Computer Safety Systems - ATL provided the development and production expertise for the production of electronic safety devices used in the monitoring of computer-based telephone company central office equipment. The task included the design

of the circuit boards, component procurement, low-volume (1500 systems) production and testing to the customer's specifications.

Printed Circuit Board Design - Printed circuit board designs were generated for a local manufacturer of electronic equipment. ATL engineers used computer aided design (CAD) work stations to generate the required schematics, board layouts, and artwork for silkscreens and soldermasks. The use of computers provided a cost-effective way to obtain the designs for production in a short period of time.

Computer Aided Design Services - ATL is currently providing a range of CAD services to local industry and utilities. These services range from existing product documentation and the generation of production drawings to ground-up electronic and mechanical designs targeted for production.

Production Services - Both ATL's designs and those of its customers are currently being produced by ATL. Production runs of up to 40,000 systems have been made. Runs to 50,000 systems have been costed.

Design and Construction of a Computer-Based Production Test System - A computer-based test was developed for the production testing of assembled memory modules. The hardware was designed to interface with an IBM PC computer. A multiple module database and automatic sensing software were developed to allow the identification of five different modules. The system has the ability to read additional modules as they are developed and create corresponding databases for the test sequence.

Design and Construction of a Hardware-Based Production Test System - A logic system was developed for the test of long-interval timing circuits under operating loads. The hardware and the test regimen were designed to allow inexperienced production personnel to exhaustively test for timing, operating levels and load current. The system was used to test ATL-produced systems.

Engineering Services for Bell Operating Companies - ATL is currently under an open-ended Engineering Services contract to develop electronic and electromechanical systems for the solution of operational problems internal to the telephone company. Six system designs have been produced to date, with production volumes ranging from 200 to 2000 systems each. The requirements for each task were individually defined, but over the life of the contract, ATL personnel have provided services ranging from conceptualization through system and packaging design, to final production, testing and shipping.

Joint Development Contract - ATL has entered into a joint agreement with Bell of Pennsylvania under which ATL can develop equipment required by Bell technical personnel in the performance of their duties. ATL's background and appreciation for customer requirements provides the vehicle by which the company can design and manufacture equipment for the operating company without violating the consent decrees between AT&T and the Bell operating companies.

Development of a Test and Tutoring System - ATL's engineers developed and constructed a battery powered, hand-held device for the administration of professional examinations and tutoring of individuals using advanced teaching techniques. The device provides test and courseware materials in a plug-in module that also retains information about the user. This information includes test scores, user identification numbers and courseware answer keys, and corrective feedback. A salient feature of the device is a synthetic speech output to provide additional feedback to the user. A specially designed interface allows the contents of the plug-in module to be read into an IBM PC or compatible computer for further analysis and storing of scores.

Tutor Hardware and Software Enhancement - ATL was awarded a multi-tasked contract to enhance the Tutor hardware and software systems (the Tutor is a hand-held, computerized educational/training delivery system developed for military use). These enhancements include the development of hardware and software for procedural guides for the M1 tank, the enhancement of the performance of the Tutor power supply, the production of plug-in modules for a basic mathematics curriculum, and the production of 20 prototype Tutors.

Data for both the M1 procedural guides and the basic mathematics module were generated with an Authoring Aid developed by ATL for this purpose. The result was much higher efficiency in module production and more consistent performance from module to module.

The Tutor power supply was modified to effect a drastic reduction of audible noise in the speech output. After reviewing the existing design, ATL generated a new design that was compatible with overall system operation and fit into existing printed circuit board space. Part of the electronic design was performed using computer-aided engineering (CAE) techniques, and a new printed circuit board was designed using a computer-aided design (CAD) system. A cost database was generated during the procurement phase of the contract so that cost/impact analyses could be performed on the new power supply.

Repair of Prototype Tutors - ATL was responsible for the repair and refurbishment of fielded Tutor systems. As part of this activity, the company analyzed failure modes to provide data for determining ways of increasing Tutor reliability. The value of the program has already been demonstrated. For example, the battery systems have shown an extremely high failure rate. Inspection of the batteries on failed units revealed that the seals at the positive electrodes were leaking, causing a deposition of corrosive salts on the external battery surfaces. The salts in turn resulted in loss of connection between individual batteries in the pack. To eliminate this problem, welded battery packs were incorporated in specific systems for testing.

Development of an Authoring Aid for the Vocabulary Tutor - ATL has developed an Authoring Aid for use in formatting courseware materials for the Tutor. The system works interactively with the courseware designer to generate materials for the Pretest, Instructional Sequence, Word War, and Picture Battle modes. The system is menu-driven, thus minimizing training requirements. A salient feature of the Authoring Aid is the incorporation of the Tutor's inherent format limitations in the generation of the courseware materials. For instance, the Tutor can handle a maximum of 10 Pretest questions, so the Authoring Aid requests questions, answers, and distracters up to question 10 only. The courseware designer therefore does not have to know the specific limitations of the format. He/she must deal only with the general requirements, which are easier to grasp.

Another capability of the Authoring Aid is the editing of encoded speech data. The Tutor requires that each utterance be treated as a single word. Phrases, therefore, cannot be directly handled in Word War, and each phrase must be made to look like a single word. The Authoring Aid can display the LPC-10 parameters, to allow the editing of the data to modify the sound and to concatenate separate words to form single "word" phrases.

A PROM programming facility is built into the Aid, to allow the direct programming of speech and data PROMs from disk files.

Development of a Degraded Mode Gunnery Module for the Training of M1 Tank Commanders - ATL had the responsibility for the generation of both speech and ASCII databases for training courseware for the M1 tank under contract with the US Army Research Institute. ATL's SDS-50 Speech Development System was used to generate the speech data, while textural materials were authored on the HHTA Authoring System. 20 Plug-in modules compatible with existing HHTA hardware and software were manufactured.

Design and Manufacturing of a Printer Buffer/Controller - A combination hardware/software solution was generated for the downloading of customer data from a proprietary format data collector to a PC-compatible printer. The hardware was comprised of a microprocessor, 256 mb of memory, a serial communications interface and a printer command controller. The system was housed in an injection molded housing designed by ATL using 3D modeling software. A foam insert and custom boxes were designed and manufactured to provide a complete kit of the controller, serial interface and printer cables, an IR to RS232 serial interface module and a power supply. A total of 5000 systems were manufactured.

Design and Fabrication of aTheodolite Measurement and Remote Readout System - Developed for a military customer, the system provided a means for determining local weather wind velocities as a function of altitude for aiding military aircraft landings. A total of 4 local readouts and a summary of the data sent over a serial communications link provided data output. ATL developed the entire system from the chip level, including the LCD drivers. Four and 6 layer PCBs were designed and produced. The system is now in production at ATL.

Design and Production of a Field-reconfigurable Industial Keyboard - A total software solution for an industrial keyboard was devised. The array of key switches was decoded and the serial communitions protocol for a standard PC compatible computer was generated for each key. Macros or special functions can therefore be programmed into the keyboard prior to delivery to suit the special needs of specific industries. The assembled keyboard can also be programmed in the field to change its operational characteristics. The keyboard is in current production.

Design and Production of a Portable Vibration Analysis System - A 6-channel pen computer based system was designed for the collection and analysis of vibration data obtained from rotating machinery. The system required the development of the PC-based software, the embedded processor software and the programmable interface software. The embedded system included a 10 routing layer PCB .028 inches thick. Developed for the U.S. Navy, the system is used by Naval personnel to analyze the performance of ship-board systems ranging from air-conditioning compressors to main propulsion systems. The data is used to predict when failures will occur in the future so that timely repairs can be made to reduce potential repair costs and to increase the safety of military personnel. The system has been tested worlwide and is in current production.

Design and Fabrication of a Prototype Disposable Cell Phone - A credit card-sized prototype cell phone was fabricated using the components of a standard cell phone and a unique packaging concept. The packaging combined a "printed" keypad in conjunction with selective product identification printing on a continuous sheet. Once wrapped upon itself, the polyester sheet formed both the working keypad and the housing for the phone. A total of 5 fully working prototypes were fabricated. Each was approximately 1/8 inch thick, including all of the electronics and the housing.

Design and Fabrication of a Phone Card Phone - A demonstration cell phone was fabricated using standard cell phone electronics and an interface preprocessor developed by ATL. The preprocessor trapped the user keypad inputs of the desired phone number and transmitted the phone card vendor's number and access code and then transmitted the user number. The operation paralleled the use of a standard phone card, but in a manner transparent to the user.

Production Equipment

Production Equipment

Surface Mount Technology

PCB Prototype Assembly, Low Volume Production and Rework

OK Industries SMT 8000 "Pick and Place" System
- Automatic vacuum pickup
- 12" X 18" maximum board size
- 6.2 MM stick feeder
- 10.0 MM stick feeder
- 8.0 MM SMT feel feeder
- Solder paste dispensor
- Loose parts dispenser

Pace Model MBT Surface Mount Rework Station
- Vacuum de-soldering
- Hot gas re-flow
- Removal equipment for PLCC44, PLCC68, SOIC, SOHIC and all passive components

Pace Model ST-60 Sensatemp hot air SMT rework station
- Vacuum de-soldering
- Hot gas re-flow
- Removal equipment for PLCC44, PLCC68, SOIC, SOHIC and all passive components

(5) OK Industries (SA-750) re-flow plate
- 140 to 482 Deg. F temperature range
- 6" X 8" work surface
- Oven enclosure

Volume Production Equipment

Samsung CP-20CV automated assembly system
- 17.5" X 16" standard board size
- Top and bottom fine pitch vision systems
- Dual LASER alignment systems
- Laser fiducial recognition
- 9500 CPH throughput
- 104 tape feeder capacity
- Adjustable lane stick feeders
- Automatic bit changer with 14 bit capacity
- Waffle tray system for large QFPs
- 0402 component and BGA capability

Mamiya ECM96 automated assembly system with integrated dispenser
- 17" by 14" standard board size
- Dual digital drive on X and Y axes
- Digital Theta and Z axis control
- Fiducial recognition via fiber optic sensor
- Teaching camera and monitor

4500 CPH throughput
72 tape feeder capacity
Stick feeder system with 20 lanes, maximum
Automatic bit exchanger with 6 bit capacity
In/Out conveyor
Computer control with integral drive boards and interface

Mamiya Quick Exchange Fine-Pitch Assembly Station
Pre-alignment tilt station
Quick change waffle pack tray holder
Control software

DIMA/SMT Systems SMRO-0405 Computer Controlled Full Convection Oven
10 separately controlled zones
16 inch conveyor width
Nitrogen inerting capability
Integral cooling air ionization
.1 to .7 meter per minute conveyor speed

MDC M-2020 Dual Squeegee Stencil Printer
20" by 20" maximum stencil frame
Pneumatically controlled dula squeegees

Through Hole Technology

Lead Preparation Equipment

(2) Simmonds LLP-274 Lead Processor
Dies: Dual inline packages
Inline packages
TO8 Cans
Radial lead capacitors
FET/Transistor
Ideal 45-145 pneumatic power stripper
Manncorp Model GG-1 taped axial lead component former
Manncorp Model CG-1 taped radial lead component former
OK Machine Tool Company Model ST100-30 stripper
Vector Electronics Model P187 mass termination fixture
Henry Mann Model RCD/1H1 component lead former

HEPCO Model 3000-2 Preform machine
Dies: 3322-1C-TSP TO 220 horizontal die set

Solder Equipment

ELECTROVERT MICROLINE 250 wave soldering system
ESICO Model 80T dip soldering system, maximum board size 6 X 12 inches
ESICO Model RSP9-5-2 dip soldering system, maximum board size 12 X 18 inches
(4) Weller Model EC2002/M DOD ST-2000 soldering stations
(4) Weller Model EC1002 DOD ST-2000 soldering stations
(5) Weller Model EC1201A soldering irons
(5) Weller EC1205 soldering stations

(3) Weller WE550 soldering stations
Solomon SL-30 Digital soldering station

INSPECTION

RCA TC100 video camera, 20:1 magnification lense system
Javelin VM9C 9 inch monitor
(18) Staco inspection lamps, 4 diopter lens
(2) Optivisor 3 and 5 diopter lens
Bausch and Lomb 5 power inspection lens
Bausch and Lomb 10 power inspection lens
Sciencescope Stereo Zoom Microscope 5 to 60 power
Sciencescope High resolution color video camera with scope adapter
Ultrak Model KM1400CN high resolution color monitor
Snappy II frame grabber computer interface

Facility Equipment

Facility Equipment

DEVELOPMENT SYSTEMS

Hewlett-Packard Model 64000
- Operating System: HP proprietary DOS
- Disk System: 2 flexible drives for backup 1 15 Mb Winchester drive (80 Mb, max.)
- I/O: 2 RS-232-C, 2 CL, 1 H-P IB
- Console: CRT
- Emulation: User-definable emulator system for both 8 and 16 bit target systems
- Assembler: User-definable assembler for both 8 and 16 bit target processors
- Inverse Assembler: User-definable for both 8 and 16 bit systems
- Linker: User-definable linker
- Emulator Subsystems: Z80 Emulator pod, assembler, linker, debugger and emulation software

International Microsystems
- Operating System: CP/M, TP/M, NS Disk Operating Systems
- Disk System: 4 drives (8-drive capability, dual controllers)
- I/O: 4 RS-232-C, 1 parallel, 1 tape drive
- Console: CRT
- Emulation: Bi-directional bus interface for direct control of target system bus
- Prom programming: Direct PROM programming from disk files generated by system assemblers and compilers

Motorola Model M68KIT92DSP56 Development System

(2) P and E Microsystems BDM Multilink Background Debug Module

(2) Motorola 01-RE90705W01 Low Voltage Serial Debug Interface

Motorola Model MC68HC05EVM
- Operating System: MS-DOS
- I/O System: RS-232-C
- Console: PC/AT class computer

Motorola Model M68HC705KICS
- Operating System: MS-DOS
- I/O System: RS-232-C
- Console: PC/AT class computer

Motorola Model M68ICS05J
- Operating System: Windows
- I/O System: RS-232-C
- Console: PC/AT class computer

Texas Instruments Model EVM50C10
- Operating System: MS-DOS
- I/O System: RS-232-C
- Console: PC/AT class compute

Metwowerks In-Circuit emulator
- C cross-compiler for 68HCS05 microprocessor, Integrated Development Environment

COMPUTER AIDED DESIGN SYSTEMS

(3) CAD Engineering Workstation
Operating System: Win 2000 Professional
Disk System: 80 Gb Winchester drive (2 max)
I/O: 1 RS-232-C, 1 Parallel, 6 USB 2.0, 1 Firewire
Display System: Matrox G450 Series Dual Head Graphics CArd
Graphics Resolution: Display – 1600 X 1200
Driver - 1600 X 1200
Monitor: Dual 20.0 inch Monitor system with 2 NEC Model LCD2060NX-BK Multi-Sync intelligent flat panel LCDs
Graphics Input: Microsoft Intellimouse optical mouse

(1) Pentium Based Engineering Workstation
Operating System: Windows
Memory System: 256 MByte, 100 MHz SDRAM, 1MByte cache
Disk System: 40.0 GByte IDE drive (2 max)
I/O: 2 RS-232-C, 2 Parallel, 1 Light pen, 2 Joysticks
Display System: IBM Enhanced VGA Standard
Graphics Resolution: Display - 1280 X 1024
Driver - 1600 X 1200
Monitor: NEC Model 3D Multi-Sync intelligent Command Display System: Hercules Mono-chrome standard
Graphics Resolution: Display - 1280 X 1024
Driver - 1600 X 1200
Monitor: Samsung Model MA2565
Graphics Input: Mouse Systems optical mouse
Graphics Output: Drum Plotter, Gerber format for optical and laser plotters

(2) Pentium Based Engineering Workstation
Operating System: Windows
Memory System: 256 MByte 100 MHz SDRAM, 1 MByte cache
Disk System: 40.0 GByte IDE drive (2 max)
I/O: 2 RS-232-C, 2 Parallel, 1 Light pen, 1 Joystick
Display System: IBM Enhanced VGA Standard
Graphics Resolution: Display - 1024 X 768
Driver - 1280 X 1024
Monitor: NEC Model JC-2001VMA Multi-sync intelligent 20 inch CRT
Command Display System: Hercules Monochrome standard
Graphics Resolution: Display - 1280 X 1024
Driver - 1600 X 1200
Monitor: Samsung Model MA2565
Graphics Input: Mouse Systems optical mouse
Summagraphics Professional digitizing tablet, 12 by 18 inch active area
Graphics Output: Drum Plotter, Gerber format for optical and laser plotters, Xerox Model 2230ij color ink jet E size plotter

(2) PC-AT Based Engineering Test Workstation
Operating System: MS-DOS 6.1
Disk System: 40 Mb Winchester drive (2 max)
I/O: 2 RS-232-C, 2 Parallel, 1 Light pen, 1 Joystick

Display System: IBM EGA Standard
Graphics Resolution: Display - 1024 X 768
Driver - 1024 X 768\
Monitor: NEC Model JC-1401P3A Multi-Sync intelligent 14 inch CRT
Graphics Input: Mouse Systems optical mouse
Graphics Output: Drum plotter, Gerber format for optical and laser plotters

DESKTOP PUBLISHING SYSTEM

Pentium Based Engineering Workstation
Operating System: Windows
Operating Environment: Windows
Disk System: 80.0 Gb IDE drive; 40.0 Gb IDE drive, mirror
I/O: 4 RS-232-C, 2 Parallel
Display System: IBM SVGA Standard
Graphics Resolution: Display - 1280 X 1024
Driver - 1280 X 1024
Monitor: CTX Model 1765 GMe, 17 inch SVGA display system
Graphics Input: Mouse Systems optical mouse
DFI HS 3000 variable resolution scanner
Hewlitt-Packard Model C7670A flatbed scanner with automatic document feeder
Hewliee-Packard ScanJet 4C Large format flatbed scanner
Software: PageMaker 7.0
Fonts: Bitstream Font Generator, HP Softfont packages
Output: HP LaserJet Series II laser printer, HP Laserjet 4MV printer
with postscript, 11 X 17 inch format, Xerox 2230ij Wide Format (48 inch) Inkjet Printer

WORDPROCESSING

(2) Pentium Based Workstation
Operating System: Windows
Disk System: 80.0 Gb IDE drive (2 max)
I/O: 2 RS-232-C, 2 Parallel
Display System: IBM SVGA Standard
Graphics Resolution: Display - 1280 X 1024
Driver: 1280 X 1024
Monitor: NEC model 1760NX Multisync 17 inch LCD panel

ENGINEERING WORKSTATIONS

(10) 80586 Based Engineering Workstation
Operating System: Windows
Disk System: 40.0 Gb IDE drive (2 max
I/O: (2) RS-232-C, (1) Parallel
Display System: SVGA
Graphics Resolution: Display - 1024 X 768
Driver: 1024 X 768

PLOTTERS

Houston Instruments Model DMP-56 Revolving Drum Plotter
- Media handling: Engineering - A,B,C,D,E
  Architectural - A,B,C,D,E
- Resolution: .001 inch
- Media: Paper, vellum, mylar

Xerox Model 2230ij Color Inkjet, Roll Feed, Auto Media Cut
- Media handling: Engineering - A,B,C,D,E
  Architectural - A,B,C,D,E
- Resolution: .001 inch
- Media: Paper, vellum, mylar

MISC. COMPUTERS

Intel SBC Series
- CPU: 8080A
- ROM: 4K
- RAM: 1K
- Console: Serial port
- BUS: Intel Multibus

Heath EC-1 (analog)
- Channels: 9
- Output: +/- 100 volts

PORTABLE COMPUTERS

Compaq
- CPU: 8088
- Main memory: 640 Kb
- Disk system: 360 Kb floppy (2)
- Display: Internal monochrome, CGA compatible
- Bus: IBM PC

Toshiba Satellite 2715XDVD
- CPU: Pentium III
- Main memory: 128 Mb
- Disk system: 20 Gb HD, CD/DVD, 1.44 Mb floppy
- Display: Internal color, XVGA compatible
- Bus: IBM PC

FIRMWARE

TDL Monitor (2K)
Intel Monitor (1K)
8K BASIC (Microsoft)
BASIC Interpreter (12K)
Text Editor (3K)

SOFTWARE

DEVELOPMENT

Microsoft Visual Studio, Enterprise Edition
National Instruments Measurement Studio
Metrowerks Integrated Development Environment, version 2.01
Bsquare WINRT Windows driver development system
Relocatable Macroassemblers
User-definable Hewlett-Packard Meta-assembler for 8 and 16 bit microprocessors
Cross-assemblers
"C" compiler (68HC/S12 Targets)
“C” Compiler (68HC08/S08 Targets)
DEBUG-II - dynamic debugging system for 8080, Z80
ZSID - symbolic instruction debugger
DUMP - direct disk editor
Z-TEL - TDL text programming system
TOPS - TDL text output processor
Wordmaster - screen-oriented text editor

LANGUAGES

BASIC Compilers
- BASIC E
- CBASIC II
- BASCOM - Compatible with MS version 5.2
- Microsoft VISUAL BASIC, professional

BASIC Interpreters
- 12K Disk BASIC (Northstar)
- 14K Disk BASIC (Computer Design Labs.)
- 18K Disk BASIC (Microsoft)
- 24K Disk BASIC (Microsoft)

FORTRAN
RATFOR
PLI
“C”
PASCAL
COBOL
FORTH
PILOT
SL5
LISP
ALGOLM
FOCAL
UCSD Pascal, with compatible 8080A and Z80 assemblers, Linker and Library Routines.
Microsoft VISUAL BASIC

ASSEMBLERS

8080 80x86 68HC05 68HC08 68HC12
Z80

CROSS-ASSEMBLERS

6502	MC68HC05
6800	MC68HC705
1802	TMS50C10111
8048	TMS320CXX
8049	
68000	

WORD PROCESSING

Wordstar - with Mailmerge file merging and Spellstar spelling correction options
Z-TEL - TDL text programming language
TOPS - TDL text output processor
Microsoft WORD 97/XP
Adobe Pagemaker 7.0

DATABASE MANAGEMENT

Microsoft ACCESS XP
DBASE-III - Relational database management system
Superfile - Archival, bibliographic database system
ATLIMS - ATL information management system for inventory, parts lists and mailing lists
PC-File Plus, Version 5.0 - Utility database
Microsoft ACCESS 97
FileMaker Pro Ver. 7.0

COMMUNICATIONS

MODEM-4 - (all computers)
D-TRANS - Intelligent file transfer system
COMPAC - High speed, port-selectable communications package
PROCOMM - PC compatible communications package

PRINTERS

(2) Hewlett-Packard LaserJet Series II Laser Printer
Centronics Model 779 - 132 column line printer
(2) Texas Instruments Model 810 - 132 column line printer
Sperry-Univac Model 0797-00 - 80 column line printer
Panasonic Model KXP1592 - 132 column line printer

(3) Panasonic Model KXP1091 - 80 column line printer
Panasonic Model KXP1191 - 80 column line printer
Hewlett-Packard Laserjet Model 4MV Laser Printer
11 X 17 Full Bleed, 600 DPI, Adobe Postscript level 2
Hewlett-Packard Model 895CSE color inkjet printer
Hewlett-Packard Model 895CXI color inkjet printer
(3) Hewlett-Packard Model 890CSE color inkjet printer
Hewlett-Packard Model 9650 Large Format ink jet printer
Xerox Model 2230ij large format color inkjet printer
Hewlett-Packard Model 7110 Multifunction printer, scanner, FAX

OSCILLOSCOPES

(2) Tektronix Model TDS3014 color digital phospher (4-channel, 100 MHz)
HPIB interface
FFT module
Math function module
Tektronix Model 7403 N (dual-channel)
Tektronix Model 2235 (dual-channel, 100 MHz)
Tektronix Model 420 (dual-channel, 50 MHz)
Philips Model PM3250 (dual-channel, 50 MHz)
Philips Model PM3217 storage scope (dual channel, 50 MHz)

METERS

Simpson Model 260 VOM
Simpson Model 270 VOM
Heath Model IMD202-2 digital multimeter
Data Precision Model 1450 - 4 1/2 digit-digital multimeter
Data Precision Model 3500 - 5 1/2 digit-laboratory standard
Micronta Model 22-195 - 3 1/2 digit-digital multimeter
(2) Micronta Model 22-191 - 3 1/2 digit-digital multimeter
Keithley Model G21 Electrometer/picoammeter
Associated Research Model 04048A AC/DC HyPot tester, 0-5 kV output
Tenma Model 72-410A 4 1/2 digit-digital multimeter

GENERATORS

Eico Model 377 Function Generator
Continental Specialties Corp. Model 2001 Function Generator
Stanford Research Systems Model DS345 Synthesized Function Generator
Tektronix Model AFG310 Arbitrary Waveform Generator
Tenma Model 72-6644 Function Generator/Frequency Counter

ANALYZERS

Continental Specialties Corp. Model LP-1 - logic probe
OK Industries Model SF-110 short finder

LOGIC ANALYZERS

Mid-South Instrument Services Model MS-1 - 8 channel logic analyzer

Hewlett-Packard Model 64302A - 48 channel logic state bus analyzer (used with HP 64000)

Dolch Model LAM3250 - 32 channel logic state and timing analyzer, 50 MHz asynchronous and 25 MHz synchronous sampling, 5 ns glitch capture

Dolch Model 3250-65 Serial Interface Personality Module, 110 to 9600 baud, variable word length, odd, even or no parity

SPECTRUM ANALYZERS

Stanford Research Systems Model SR785 dual channel dynamic spectrum analyzer, 100 KHz, HPIB interface

PHYSICAL TEST SYSTEMS

Spectra Quest Model MFS2000 Machinery Fault Simulator
- 1 HP variable frequency drive
- Alignment system with calibrated dials and jack bolts
- Bent rotor shaft alignment kit
- Bearing fault kit
- Critical resonance study kit
- Eccentric rotor
- Cocked rotor
- Coupling end bent rotor shaft alignment study kit
- 1 inch shaft bearing study kit
- 1 inch shaft bearing loader
- 5/8 inch sleeve bearing kit
- External precision tachometer

FREQUENCY COUNTERS

Data Precision Model 5740
Global Specialties Corp. Model MAX-50A
Philips Model PM6652 50MHz programmable high resolution timer/counter
- Frequency A, B; period A; ration A/B; time A-B; pulse width; phase A-b; rise/fall time; duty factor, and total pulse count

LABORATORY POWER SUPPLIES

PMC Model BPA40D - 0 to 40 VDC at 1.5 amperes
Lambda Model CC5 - 5.0 VDC at 10 amperes
Lambda Model LPD 422 FM 2X - 0 to 40 VDC at 1.0 amperes
Tenma Model 72-6905 2.2 to 5.5 v at 1.0 amperes, 0 to 30 V at 3 amperes X 2, 8 to 15 V at 1 ampere

POWER SUPPLIES

(3) Electrostatics, Inc. Model 302 - 5.0 VDC at 15 amperes, +/- 12.0 VDC at 2 amperes
Lambda Model LZS10 - 5.0 VDC at 450 milliamperes
Acopian Model TD15-40 +/- 15 VDC at 4 amperes
Acopian Model 51515T6A 5.0 VDC at 5 amperes, +/- 15 VDC at .3 amperes
(3) Elenco Model XP-581/Quad Output Precision Power Supply, 5.0 VDC at 3 amperes, +/- 12.0 VDC at 1 ampere, 2.5 - 20 VDC at 1.5 ampere

RECORDERS

(2) Esterline-Angus "Event-Graph" - 20-channel event recorder
(2) General Electric Model 3-5121B data recorder

CALCULATORS

Texas Instruments TI Programmer
Texas Instruments TI LCD Programmer
(2) Texas InstrumentsModel SR50 Scientific Calculator
Texas Instruments Model SR51-II Scientific Calculator
Sanyo Model CY2000DP Desktop Printing Calculator
Casio Model fx-115N Scientific Calculator

MODEMS

(5) US Robotics 56K V.9 internal modem
(2) Cardinal 28.8K internal modem

PROTOTYPE BOARDS

Various Manufacturers - solderless and wirewrap

PROM PROGRAMMERS

Cromemco "Bytesaver"
ATL bus-driven programmer
Gtek, Inc. Model 7956 production programmer - computer controlled, software configurable gang programm
Texas Instruments Model TM 990/302 Software Development Module
MCT Model MOD-EMUP-A Universal Programmer and Tester

BOARD EXTENDERS

100 pin - S-100 bus
44 pin - proprietary bus
(3) 56 pin - STD bus
62 pin- PC 8 bit bus
62+36 pin - PC AT bus

MISCELLANEOUS

OK Machine Tool Company Model ST100-30 stripper
OK Machine Tool Company Model EW-8BF production wrapping gun
Vector Electronics Model P187 mass termination fixture
Henry Mann Model RCD/1H1 component lead former
Ultraviolet Products, Inc. Model UVS-11E EPROM eraser
(2) Henry Mann Model T-243 test fixture
Powerstat Model 110 variable autotransformer
Staco Model L1010 variable autotransformer
ESS, Inc. 24 X 48 inch static mat and accessories
Tripp-lite Isobar Model B-8 AC line conditioner

PHOTOGRAPHY/REPRODUCTION/GRAPHICS

Hewlett-Packard Model C2520B 2400 DPI optical scanner
Play, Inc. video frame grabber, 640 X 480 DPI
Xerox Model 2510 engineering copier
Input media: Any transparent or opaque material
Output media: 20 lb bond, 20 lb vellum, .004 inch Mylar
Input/output media size: 36 inches by any reasonable length
Canon Model PC-24 plain paper copier
Canon Model 850 11 X 17 plane paper copier
GBC Image Maker 2000
Stacor Model S1824 18 X 24 inch light table
Logan Model 810/920 9 X 12 inch light table
Bishop Model 3500 optical comparator, .005 inch graduations
Bishop Model 3525 36 inch AccuScale, .005 inch graduations
(2) Smith Victor Model Q60 600 Watt photo flood lamps
Fotolite Model CW 250 Watt fill in reflector flood lamp
SLIK Model U100 Photographic tripod
Canon Model AE1 35 mm camera
Promaster Spectrum 7 35-200 mm macro zoom lens
Canon Model 277T automatic electronic strobe
Nikon Coolpix 885 Digital Camera

ENVIRONMENTAL

Tenny/Lunaire Model TUJR, Temperature range: -75 Deg. C to +200 Deg. C
(2) Extech Instruments Model 445702 Hygro-Thermometer Clock, -10 Deg. C to + 50 Deg. C, 25% to 80% RH

Network

Verizon/Zoom DSL Modem and 100 Mbs router
SMC TigerHub TP12 24 port Network Hub
D-Link DGS1024D 1Gb full duplex 24 port network switch
Belkin wireless access point
Linksys 10 port workgroup hub
D-Link DWL-120 Workgroup Hub

Symantec SGS320 Hardware Firewall with Stateful Packet Inspection and managed network anitvirus compliance.

Audio/Music Production

Audio/Music Production

SPEECH DEVELOPMENT SYSTEMS

Texas Instruments Model SDS-50 Speech Development System
Operating System: TI firmware-based proprietary OS
I/O: 2 RS-232-C, 1 PROM programming port
Console: CRT

Texas Instruments Model TSP50C10EVM
Operating System: MSDOS
I/O: 1 RS-232-C, Dual 40 pin with 4 I/O ports, address and status
Console: PC-AT

Realistic Model 31-1988 10 channel equalizer
Realistic Model 273-1454 5 channel mixer
Shure Model SM62 low impedance cardioid microphone with desk stand

AUDIO AND MUSIC GENERATION/PRODUCTION

Roland Model 890 24 channel digital hard-disk recorder, 2 effects processors, PC control software
Realistic Model 33-992B high impedance cardioid microphone with boom stand
(2) Stageworks Cardiod dynamic microphone
BSR Model EQ 14/14XR computerized 14 band equalizer/ spectrum analyzer
Roland Model BX16 16 channel stereo mixer
Tascam Model PORTA1 8 track cassette recorder
Realistic Model SCT-24 stereo cassette tape deck
Realistic Model STA-430 AM/FM stereo receiver
(2) Realistic Model Minimus 7 monitor speakers
Ensoniq Model SD-1 music production synthesizer
Roland Model RA-50 Real Time Arranger
Casio Model CT-640 keyboard synthesizer
Casio Model MT-210 keyboard synthesizer
(3) Peavy Model KB100 3 channel keyboard amplifier
DigiTech Model RP-1 stereo digital effects processor
Roland Model SE-50 stereo digital effects processor
Boss Model HM2 distortion unit
Boss Model OD-2 overdrive unit
Boss Model DSD2 digital sampler/delay
Boss Model CS2 Compressor
Boss Model GE7 Equalizer
Boss PSM-5 Power supply
Ibanez Model DAT6 digital audio tuner
Harmon Kardon Model 530 30 watt per channel monitor receiver
(2) Criterion Model 100A 8 inch monitor speaker
Roland Model JC50 50 Watt guitar amplifier
Fender Stratocaster Plus guitar
Morley Model SLVO volume pedal
Univox Model U130L 100 Watt dual channel amplifier
KORG Model PSS50 “Super Section” rhythm machine

Music Quest Model MXQ-32M 32 channel intelligent MIDI interface
Realistic Model 32-1105 4 channel stereo mixer
DBX Model db-SW15 Plus 15 inch subwoofer
(2) Realistic MACH-II 15 inch, 3 way speaker system
Digitech Model GNX2 digital stereo effects processor
Lexicon Model MPX200 dual channel 24-bit digital effects processor
Behringer Model; GEQ3102 Dual 31 channel equalizer
Alesis Model 3630 dual channel compressor-limiter
Samson Model SERVO260 power amplifer, 130 Watts X 2

Products

ATL Products

ALFIE - A Portable "Mini Expert"

ALFIE is a portable device that can be used as a decision aid, small expert, or an intelligent instrument. Its inference engine uses a three state logic system to provide branching in decision tree applications. Essentially, branching is controlled through a three window comparator. This enables decisions to be made on equal to, greater than, and less than relationships with the specific differences predefined. Backward chaining is provided through "hooks" placed in critical conclusion positions, and allows recovery from apparently impossible conditions. The knowledge base is maintained separately from the inference engine and is contained in Plug-in Modules. Applications can therefore be easily changed without the need of additional training on the part of the user.

ALFIE uses a two line, 40 character display and a synthesized voice to communicate with the user. A session is interactive, user controlled and requires keyboard inputs in response to either voice or visual information. The device is battery powered and can be easily carried.

As an intelligent instrument, ALFIE provides the user with a decision tree fault isolation program and a functional instrument frontend. For instance, one implementation has a digital voltmeter as an input device. Additional functions can be added as required. This reduces the need for additional instruments during a trouble shooting session.

In operation, the device provides the user with verbal commands with respect to specific troubleshooting tasks. For instance, it will tell the user where to place the probes (test point numbers, etc.), and what controls on the system under test to activate. It will also annunciate the resultant reading and display it on the screen. The internal software contains the required circuit and signal information, so that decisions based on a nodal analysis of the system under test may be made until a conclusion of the problem is reached. The operator can also be required to enter inputs on the unit's keyboard if acquisition of certain parameters would complicate the data acquisition function. For instance, system display information could be entered directly without the need to provide additional interfaces and programming.

ALFIE provides a company with the capability of on-site maintenance without the need of in-depth training of maintenance personnel. Additional merits include greater conformance with established test routines and a more rapid change in test procedures to accommodate a new system or information.

ATL's Family of Hand Held Training Aids (HHTA)

ATL has developed a series of microprocessor based Training Aids ranging from Vocabulary Tutoring and Basic Mathematics instruction to Operational Procedures and Maintenance functional training and maintenance trouble shooting systems.

The basic research and development of the HHTA hardware has been completed. Implementation of your specific training, maintenance or procedural requirements - i.e. the information you wish to be transmitted to the individual - is a matter of inserting the information database and the sequence of presentation (courseware) into a "Plug-in Module." ATL has developed and maintains authoring systems to aid in the efficient organization of module materials for any application.

The concept is to deliver educational, procedural and/or training material to individuals in a clear, concise and understandable manner. The design of the HHTA was implemented keeping individual requirements and human factors in the forefront. The result is an easily used device that is cost-effective and well received by the user.

Utilizing the results of many years of basic research in Behavioral Science and educational delivery techniques, a top down system specification was developed. The HHTA design addresses many individual factors such as intellect, education, prior skills, motivation, interest, multiple sensor stimulation, possible physical or mental deficiencies, environmental effects of the classroom or work spaces, and other factors that enhance or inhibit the effectiveness of the delivery process.

The hardware design was driven by cost, size, weight, power, available technology and the capabilities of microprocessors, displays, keyboards, voice synthesizers, memory devices and other system components. Simplicity, ease of operation and other man-machine factors are incorporated.

The firmware that controls the keyboards, displays, voice synthesis and various input/output devices is contained in the basic HHTA hardware. The physical configuration of the hardware is not fixed and can be tailored to specific customer requirements or specifications. Commercial, Rugged or MILSPEC requirements can be met with obvious differences in cost and delivery.

The information to be delivered - i.e. the courseware or database - is embedded in a Plug-in Module that is inserted into the main case. The courseware includes questions, answers, instructions, procedures, specific words to be spoken and other information. This data is pre-programmed by ATL using a proprietary authoring system, or can be programmed from a host computer database via an RS-232 interface utilizing a suitable authoring program.

The most common design to date consists of the basic HHTA contained in a fairly rugged 12 x 12 x 2.5 inch plastic main case weighing under three (3) pounds, including the battery pack. The plastic plug-in module measures 3 x 4 x 1 inches and weighs under four (4) ounces.

Portable Organizational Level Maintenance Aid (POLMA)

POLMA is a demonstrable concept designed to provide the maintenance technician with an aid to better job performance. BITE - Built In Test Equipment - is another useful aid but competes within the system for resources such as memory, input/output ports, real estate, power, etc. and often produces ambigious results in systems that are made up of multiple WRA's (Weapon Replaceable Assemblies).

POLMA incorporates a variety of techniques to guide the technician through a maintenance procedure. Both visual and/or oral information, procedures, commands, etc. are presented to the technician in a self-paced manner to accommodate individual knowledge levels, skills, dexterity, motivation, enviromental conditions or other factors that inhance or inhibit performance.

POLMA hardware consists of two elements: 1) the main case, which contains a rechargeable battery, an LCD alphanumeric display, a keyboard, the synthetic speech system and jacks for headsets, probes and battery charger, and 2) the Plug-in Module, which contains the information to be delivered along with the vocabulary incident to the item being maintained. The hardware design can be tailored for the specific application with both human factors and environmental conditions being considered.

Each Plug-in Module is pre-programmed with the specific functions to be performed by the technician. Results of each operation in the program branch the user to the next logical step. Any measurements made are automatically recorded for further analysis. If the test requires human observation of the results, those observations can be manually entered and recorded in the proper sequence. Other information can be entered into the module memory - i.e. operator identification, start/stop times, type and quantity of expendables consumed, removed/ replaced/repaired, and post adjustment test results.

ATL has developed an RS-232-C serial interface that provides a hardware/software interface to a variety of host computers and other devices. For instance, access to an interactive video disk database has been demonstrated and could provide shop maintenance technicians with instant on-line information. Circuit diagrams, layouts of mechanical, electrical or hydraulic systems, physical locations of equipment in the weapon system, lists of tools, consumables or other items required to perform the maintenance actions can be displayed. Additional applications can be accommodated on an as-needed basis.

SECOM-I HIGH RISE BUILDING SECURITY SYSTEM

SECOM-I is a computer-based high-rise apartment security system developed to fill the void between the more rigid hard-wired logic systems and the large-scale, general-purpose computer systems often used in building management. It offers the advantage of low cost while retaining the flexibility found in most computer-oriented systems. SECOM-I is completely compatible equipment. It can therefore be expanded to fill virtually any requirement, whether immediately or in the future. For instance, heating, air-conditioning, fire and general maintenance monitoring can be combined with building security to provide an integrated control center for all building operations.

The operator's attractive mini-console is small enough to reside on a receptionist's desk, yet contains all the control and display functions required for full system performance. The entire system can be housed in decorator styled cabinetry to provide an inconspicuous installation even where space is tight.

The custom programming provided with each installation allows specific, plain English, messages to be displayed on the operator's console in accordance with information received at the system's inputs. No tables or codes are required for interpretation of system status or alarm condition. This means less training for the operator and lower costs for the owner.

The optional Automatic Dialing Subsystem allows continuous monitoring of the computer's operation and the high-priority segments of the system. This offers the opportunity of unattended monitoring along with the peace of mind that comes from knowing the proper personnel will be notified if a malfunction or breach of security occurs. The system also provides the peace of mind that results from its reasonable cost. When clients compare ATL's capabilities with those of other manufacturers, they find that SECOM-I is the most cost-effective system on the market today.

SECOM-I OPERATIONAL SPECIFICATIONS

- 400 monitoring points per system, standard.

- 529 monitoring points per system, maximum.

- Operator's console with simple controls and display.

- Plain English printing of room numbers, commands and alarms, as well as automatic recording of date and time.

- Independent computer alarm for complete security.

- Optional computer alarm and trouble automatic dialing for emergency service and continuous supervision.

- Real time clock with large visual display for time reference.

- Stand-by power system to maintain complete operation in the event of power failure or cut lines.

- Redundant computer scan monitoring system with alarm.

- Isolation of all incoming lines by opto-isolators for 2500 volts, common mode.

- Unique fault-finding routine for automatic testing of opto-isolator operation.

- Key switch for computer security system control.

- Key switch for tamper-proof setting of time and date.

- Operator's console may be remotely located from the computer and is small enough to reside on a receptionist's desk.

- Both audible and visual alarm indicators provided. An alarm is annunciated simultaneously at the computer site and the operator's console.

- Plain English error messages printed on the console display whenever the operator makes an invalid move – no improper operation can be performed without the operator becoming aware of it.

- Display format and messages custom programmed for each installation.

- System adaptable to detect fire, maintenance requirements and energy management directives.

- No special operator training required. All communication is in conversational English. No codes to look up or remember.

- Entire system under computer control and supervision.

- EIA standard RS-232-C and TTY interfaces supplied for direct interfacing with all serial computer peripherals.

- Self-clearing display for added security.

MONCOM BUILDING MONITORING SYSTEM

MONCOM is a computer-based monitoring system developed to fill the void between the more rigid hard-wired logic systems and the large scale general purpose computer systems often used in building management. It offers the advantage of low cost while retaining the flexibility found in most computer oriented systems. MONCOM is completely compatible with most currently available computer peripherals and can be expanded to fill virtually any requirement, either immediately or in the future. Heating, air conditioning, fire and general maintenance monitoring, for example, may be combined with plant process control monitors and easily interfaced with MONCOM to provide an integrated control center for all building operations. In fact, any system, piece of equipment or monitor with either normally open or closed contacts or a voltage output can be interfaced with MONCOM.

The custom programming provided with each installation allows the display of information received from the system's specific, plain English messages to be displayed on the operator's console. No tables or codes are needed interpret system status or alarm condition. This means less training for the operator and lower costs for the owner.

The optional Automatic Dialing Subsystem allows continuous monitoring of the computer's operation and the security segments of the system. This offers the opportunity of unattended operation, along with the peace of mind that comes from knowing the proper personnel will be notified if malfunction or a breach of security occurs. The system also provides the peace of mind that results from its reasonable cost. When clients compare ATL's capabilities with those of other manufacturers, they find that MONCOM is the most cost-effective system on the market today.

Software

ATL Software

ESAVER7 - Audits energy utilization for residential and commercial applications. Calculates heat loss/gain based on an audit of the physical plant. Includes energy input from solar sources.

SOLAR1 - Computes the solar potential realizable from fixed or tracking collectors for any lattitude and collector orientation.

UTILITY - Analyzes residential or commercial energy costs. Provides summary statistics on a month to month or year to year basis. Output is in a monthly tabular form.

ASHRAE - Provides design specifications for residential and commercial heating and airconditioning systems.

HEATL - Calculates annual heat loss using structural parameters and materials as inputs.

AIRCOMP - Sizes air conditioning systems for residential structures. Incorporates such variables as conducted and radiated heat, appliance energy and human radiation. Based on a standard developed by the Association of Home Appliance Manufacturers.

COCOM - Analyzes residential heating and air conditioning systems. Provides payback calculations for structural modifications altering heat loss equations.

LOGIC - Performs state and timing analyses of digital logic systems. Allows setting of initial conditions, perturbations and the total number of iterations prior to run. Indicates the state of each node in the circuit for each iteration. Allows the use of AND, NAND, OR, NOR, XOR, XNOR and NOT gates of up to 8 inputs each.

PROGRAM - Provides PERT/CPM analysis for multiple task project performance. Generates a path-length relative frequency histogram and a CP Activity Analysis table.

MIDAS – Pen tablet PC based software for the collection and analysis of vibration data for rotating machinery. MIDAS allows the setting of collection parameters such as system gain, sensitivity filter constants, integrator function and channel selection. The system provides automatic calibration from sensor to digital data and can store any number of test runs. Current data can be compared with historical data for the measurement point. An integral database allows the perusal of all collected data and the measurement point characteristics.