

TRAINING FACILITIES

TRAINING AT AMERICAN AIRLINES: A TOTAL COMMITMENT

American Airlines Flight Academy, located just minutes from the Dallas/Fort Worth Airport, in a \$40 million complex, provides a learning environment that compares with the finest U.S. educational institutions. This is where 4,000 flight crewmen are put through any of 75 different flight and ground-school courses, all approved by the Federal Aviation Administration. At a cost of \$15-20 million annually, approximately 10,000 training cycles are completed each year . . . with about 30 per cent of this training being done on contract basis with other airlines.

Last August, members of the ASTD Board of Directors had a chance to visit the Flight Academy, during their meeting at the Dallas/Fort Worth Airport. Dr. R.C. Houston, director, Technical Training Support for American

Airlines, hosted an evening for the Board and David Killian, manager, Audio-Visual Center for the airline, outlined American's pioneering work in improving flight-crew training.

Safe operation is the number one priority . . . and a total commitment. No other human endeavor carries the responsibilities and complexities comparable to those of the professional flight crewman. The basic skills brought to the job of flying a modern, high-performance airliner must be tuned to the finest degree. With safety being a total commitment, effective training is a total commitment, also.

American Airlines is dedicated to satisfying three main objectives:

1. To maintain a training facility staffed by a permanent cadre of professional instructors, under innovative leadership, capable of im-

plementing programs that will stay ahead of the requirements of a dynamic, complex field.

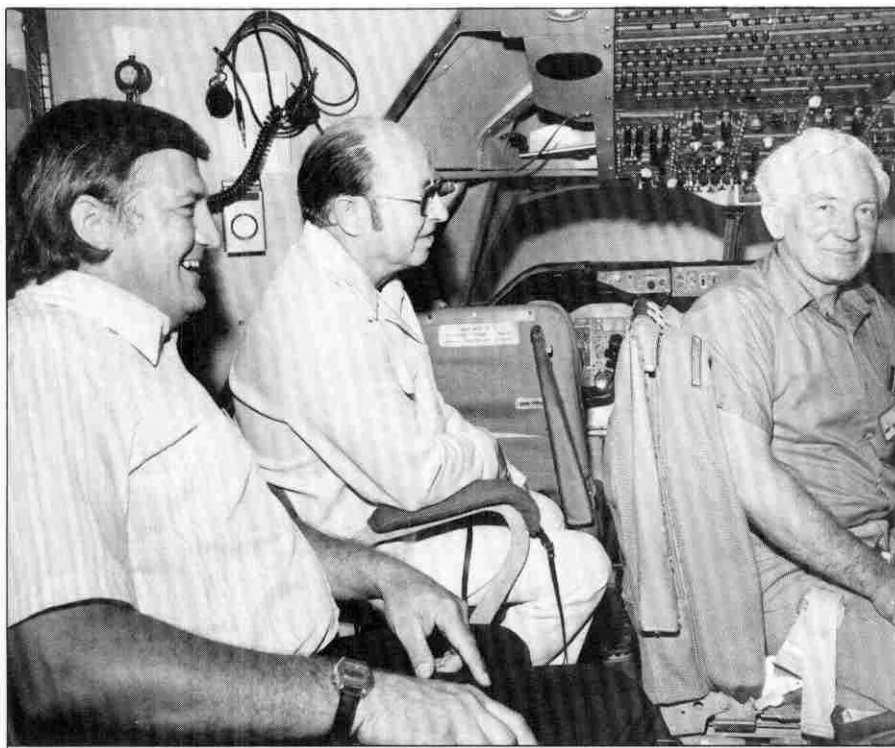
2. To make full use of the very latest training techniques and technology.

3. To produce the most proficient and highly motivated flight crew in the industry.

The Flight Academy instructor staff is made up of nearly 300 hand-picked, dedicated professionals whose knowledge and experience have aided in the development and implementation of highly polished classroom programs, comprehensive simulator exercises and concise training plans. Both flight and simulator instruction is under the direction of line-qualified captains and flight engineers who average more than 20 years with American Airlines and have 15,000 to 20,000 hours of flying experience.



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ASTD President R.H. Marcotte (center) observes flight-simulator training in action with Flight Academy staff members.

Ground schools are conducted by personnel with extensive backgrounds in classroom teaching in addition to considerable flight experience. Maintenance training programs are conducted by personnel with broad experience in line maintenance and instructional techniques.

This staff has, under contract, conducted training of flight crew members and maintenance personnel from more than three dozen major air carriers, the U.S. government, close to 200 corporations and over 50 foreign countries.

Learning Facilities & Methods

Classroom facilities at the Flight Academy have been designed to make maximum use of the audio-visual media. Motion pictures and slide-projection equipment, housed in soundproof booths and focused on rear-projection screens, is remotely operated from specially equipped instructor's podiums. Dual-screen capabilities can be used to enhance visual impact. Great emphasis is placed on the concept of individualized training.

"Study Units" are prepared to satisfy carefully derived training objectives and are presented in study carrels, designed and constructed to specifications. Each

study unit is designed to teach and test, with testing being accomplished through display of multiple-choice questions.

Individualized training permits each student to proceed at his/her own best learning rate and after completing the necessary study units in various aircraft systems, the student goes immediately to a working mock-up of that system for a "hands-on" practical application of the newly acquired skill.

Experience shows that this training concept permits a closer, more effective instructor-student relationship with a high level of retention. This individualized training permits more frequent "start training" dates and eliminates the need to pull large numbers of operation-crew people out of line service to meet specific "class starting" dates.

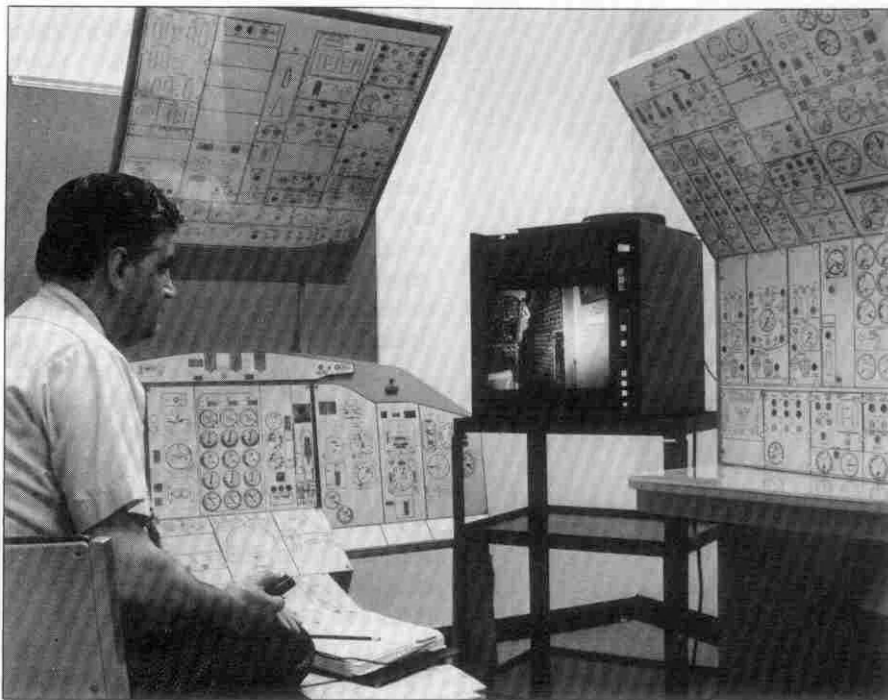
Learning to fly today's complex, highly sophisticated aircraft requires total concentration on relevant, "need to know" subject matter. Instructional materials are carefully constructed to meet this requirement. With the knowledge of each specific action, a crew member or mechanic must know how to perform the job with complete proficiency. Program development specialists make these actions the focal points of the training program.

The instructional staff has available videotape, motion picture, 35mm slide, black and white photo, and audio-tape capabilities to facilitate rapid, low-cost, in-house production of program material tailored to meet any type of routine or specialized need.

A vast library of existing program material is kept completely up to date as changing requirements occur. New programs are produced as dictated by new developments. Informational programs or single-subject programs



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The visual impact of a closed-circuit TV setup helps put emphasis on the concept of individualized training.

designed to bring audio-visual messages on specific operation peculiarities can be produced and made available for viewing on short notice.

Training curricula at the Flight Academy are designed to emphasize "hands-on" experience. While the ultimate "hands-on" device would be the airplane itself, the cost of having one available on a full-time basis is prohibitive. Consequently, a succession of equipment is used that will enable a student to progress from the classroom to the cockpit through cost-effective stages.

First in the order is the systems trainer . . . a device which duplicates the controls of an aircraft system and displays the system's operation by using logic circuits to activate color-coded schematic diagrams, mechanical movements, indicator lights, etc., in response to the operation of the controls. It demonstrates cause and effect and permits problem-solving exercises. As each system is mastered, the student advances to the Cockpit Procedures Trainer (CPT) to put together his/her newly acquired skills.

The CPT is a reproduction of the total cockpit. It provides a cost-effective means of easing the transition from the classroom and

systems trainer to the simulator. The student is provided with the first real-world contact with actual aircraft hardware in the cockpit environment and becomes better acquainted with component, switch and control locations. Students also become involved with checklist activities, normal and abnormal procedures and the development of crew-coordination skills. Time spent in the CPT is an invaluable preliminary to flying the flight simulator.

Flight Simulation

The Academy's fleet of flight simulators is a source of extreme pride to American Airlines. Once students have mastered system operation in the classroom and at the systems trainer and become proficient on procedures in the CPT, they are ready for the machine that will give them their initial flying experience in the "new" aircraft. All of the digital-computerized flight simulators are equipped with the most effective motion and rigid-model TV visual systems currently available. Each flight simulator is capable of precisely reproducing all required performance and handling characteristics. Their unparalleled realism and fidelity provide maximum transfer of training to the actual aircraft.

A student undergoing flight-simulator training is taken through the entire spectrum of flight maneuvers, perfecting the techniques related to routine performance, and learning to recognize and appropriately respond to those situations involving emergencies. Landings are practiced under varying gross weight and wind conditions and during daylight, dusk or darkness. The visual system introduces a complete range of visibility conditions to provide an aspect of training usually possible only with a session in an actual aircraft.

Crews can practice hazardous flight maneuvers in a safe, controlled environment without the risk of exposing personnel and multimillion-dollar aircraft to accident. The absence of conflicting air traffic and radio chatter that exists in real-flight situations enables total concentration on the business of learning. The ability to freeze a situation for an instant review of performance, or the added ability to quickly recycle to repeat key exercises greatly enhances the learning impact.

Almost all flight training is accomplished in the flight simulator. As the new crewman gains seniority he moves to larger, newer types of aircraft, first as a flight engineer, eventually as second in command and finally as captain. These steps require that he move to several different types of aircraft during his career. All of the training done is accomplished primarily in flight simulators. One major training requirement is *recurrent* training. The crewman receives recurrent training or a proficiency check at least once each year and captains every six months. Flight simulators were originally used and recognized so the crewman could demonstrate flight proficiency in a long list of flight maneuvers required for certification and rating.¹

Saving \$\$s and Fuel

The cost of flying a flight simulator is only a fraction of the cost of flying aircraft. Maintenance costs are also significantly lower. Since the flight simulator eliminates the requirement for full-time "pilot trainer" aircraft, those that would

otherwise be assigned to such an activity are freed to operate for profit. In 1966, pilot transition for the Boeing 727 required about 21 hours with no simulator time. American now achieves the same proficiency with about one hour of flying time and 18 hours of simulator time. Simulator time costs about 10 per cent of actual airplane time.

A 1976 American Airlines' survey indicated that use of the simulator saved more than 6,830 flight hours. This resulted in the saving of more than 11.5 million gallons of jet fuel. The saving of fuel is a factor that takes on ever-increasing importance. In terms of community relations, the flight simulator permits significant reductions in noise and air pollution and provides important reductions in airspace congestion.

Although reduction in airplane hours (flight training cost) is very important, the most important objective is safety, and American Airlines has made record progress. During the period 1966 through 1975, the company set an industry record for flying hours without a fatal accident. This speaks well for the quality of training through simulation.

It's very possible that most

flight - crew personnel can go through their entire career without experiencing an emergency experience. But if they ever do, there can be no substitute for the confidence gained from "having gone through it before." At the Flight Academy, an entire building is equipped with the facilities necessary to provide this kind of live experience.

Full-scale cabin mock-ups are used as emergency - evacuation trainers. One of these mock-ups is capable of tilting to angles that simulate the attitudes created by various landing-gear failures. It realistically reproduces the stress situations under which emergency evacuations might need to be made, even to the creation of smoke in the cabin. Other cabin mock-ups positioned adjacent to pit areas permit students to experience the operation and use of inflatable emergency - evacuation slides. Live training is available at the fire pit where students are instructed on the proper way to use the CO₂ and water-type fire extinguishers.

Adjacent to the Flight Academy is American Airlines' Flight Service College. It was established to handle training of flight-attendant personnel and houses the same cal-

iber of classroom facilities as those at the Flight Academy. The College also has facilities for conducting specialized meetings and seminars for management development programs, whether the need is for traditional classroom training, small group conferences or large amphitheater set-ups for lecture activities. There are audio-visual support capabilities that range from simple chalkboards to closed-circuit TV. American offers these facilities for lease to airlines and corporations who might need them.

Total Training Through Simulation

Over the years, the airlines have made continuous progress in proving the training capabilities of the flight simulators. Each rule change that gives greater recognition for training conducted in flight simulators has been preceded by extensive studies and documentation, always with the stated commitment of *total training through simulation* in mind. With the use of training programs designed specifically to make maximum use of all training opportunities, many airlines are confident that with the flight simulators and the available visual and motions systems now in use, it is possible to conduct total training in the simulator. This is likely to be true with additional careful study, documentation, and the continuing improvement in equipment and training techniques.

The accomplishments of the staff and direction of the Flight Academy management in developing and implementing more efficient, effective and innovative methods of training has earned American Airlines a recognized position of educational leadership throughout the United States in industrial, military and academic circles.

Editor's Note: Our thanks to R.L. (Ron) Joubert, manager of the Flying Training Grounds School and the staff of the American Airlines Flight Academy for their assistance in preparing this report.

REFERENCES

1. D.C. Killian, "The Impact of Flight Simulators on U.S. Airlines," American Airlines.



Cabin mock-ups give students an opportunity to experience the operation and use of emergency equipment firsthand.